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# JOURNAL

OF THE

## ASIATIC SOCIETY OF BENGAL,

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THE SECRETARIES.

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VOL. XXV.

Nos. I. to VII.—1856.

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“It will flourish, if naturalists, chemists, antiquaries, philologists, and men of science, in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish if such communications shall be long intermitted; and it will die away, if they shall entirely cease.”—SIR WM. JONES.



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1857.





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*Errata in the Paper called Routes from Kathmandu to Peking.*

P. 6, line 10, *for* Cinchi *read* Chinchí.

P. 6, line 3 from bottom, *for*  $52\frac{1}{2}$  *read*  $55\frac{1}{2}$ .

P. 8, lines 10—12 *read* latitude *for* longitude and vice versâ, and p. 13, latitudinal *for* longitudinal.

P. 10. After reason 2nd, *for* regarding Tibet as a plateau, *insert* as reason 3rd as follows—

“3rd. The numerous places in the Map of Tibet, the names of which are compounded with the above words, as Chanthang in Nari, Nithang in U, and Lhasa lung and Phemba lung both in U'. Such words demonstrate the existence of numerous plains and valleys, and we know, otherwise, that many of these plains and valleys are of great extent.” Dele the note.

Alter the subsequent numbers 3rd, 4th, 5th to 4th, 5th, 6th.

P. 10, line 3 from bottom, *for* Thassa *read* Thápa.

P. 12, line 2, after Sanscrit Geography *insert* the words “and which region is named Tso-tso in Tibetan.” For Erú *passim* *read* Eru.

P. 14, line 9, *for* Galdeso *read* Galdso.

---



SECTION  
Across the  
**BRAHMAPUTRA RIVER**

Near the  
Lighthouse on the Rocks of Orboosa, Gowhatty  
for determining the form of the bed of the river & the quantity of water

*Hermann Schlagintweit Esq*  
Direction of the Section from  $N 20^{\circ} 55' W$  to  $S 29^{\circ} 55' E$ .

NOVEMBER 1855.

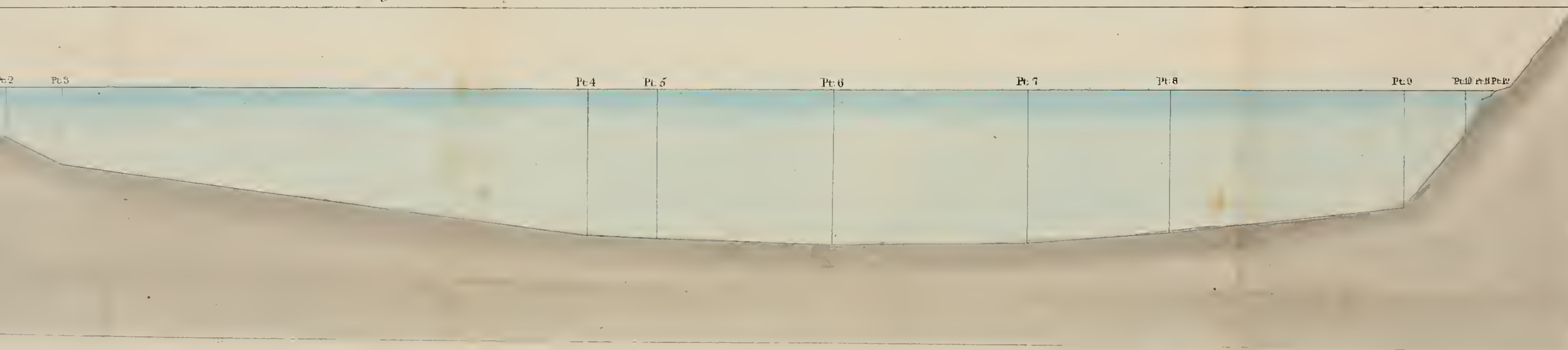
SECTION  
of the  
SMALL NULLAH NEAR THE SUSPENSION BRIDGE  
at the  
West end of the Station of Gowhatty

0 100  
Metres 10 20 30 40 50 60 70 80 90 40 20 30 40 50 60 Metres



Proportion of the Horizontal & Vertical dimensions as 1:400

600 700 800 900 1000 1100 1200 1300 1400 1500  
80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 Metres  
*High Water Mark*



600 700 800 900 1000 1100 1200 1300 1400 1500  
20 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 Metres  
*High Water Mark*



*N<sup>o</sup> 1 Proportion of the Horizontal dimensions as 1: 2000.*

*" " Vertical " 1: 100*

0 100 200 300 400 500 600  
 Metres 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90



*N<sup>o</sup> 2 Proportion of the Horizontal and Vertical dimensions as 1: 2000*

0 100 200 300 400 500 600  
 Metres 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90 10 20 30 40 50 60 70 80 90





# JOURNAL

OF THE

# ASIATIC SOCIETY.

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No. I.—1856.

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*Report on the progress of the Magnetic Survey and the researches connected with it in Sikkim, the Khosia Hills and Assam, April to December, 1855.—By HERMANN SCHLAGINTWEIT, Esq.*

*From H. SCHLAGINTWEIT in charge of the Magnetic Survey of India.*

*To Sir JAMES MELVILL, K. C. B. Secretary to the Court of Directors of the Honorable East India Company, India House, London.*

*Gowhatty, December 19th, 1855.*

SIR,

I have the honour to present you a report of my proceedings, in that part of the Magnetic Survey of India which has been entrusted to me, during the period from March to December.

The report contains, besides an abstract of the chief results, the routes we have followed up to the present date.

We are spending the present winter months in Central Assam and along the Bhootan frontier, from hence I intend to proceed to Calcutta, in order to despatch the books of observations, plans, and drawings, as well as the collections of geology and natural history, to the India House.

From Calcutta I intend, after my plans have been presented as before in full detail to the Government of India, to proceed through Bengal to the western parts of the Himalayas.

No. LXXIX.—NEW SERIES. VOL. XXV.

B



I am particularly happy to mention the valuable assistance which I have received in every way from the Government of India.

I have the honour to be,

Sir,

Your most obedient servant,

HERMANN SCHLAGINTWEIT.

### 1.—*Routes and Geographical Remarks.*

I left Calcutta, April 5th, proceeding viâ Kishnagur, Dinagepore and Tytaliah, to British Sikkim. My draftsman, Abdool Cawder, went the same way, keeping one day's hawk distance in order to make corresponding barometric and other observations.

The assistant, Mr. Adams, went by the steamer to Caragola Ghat and viâ Purneah to Darjiling.

After a short stay in Darjiling and its environs, we proceeded up to the ridge, which branches off from the central mass of Kunchinjunga, and extends in a southerly direction, near the southern borders of the Sikkim Himalaya. Previous official propositions to the Sikkim Rájáh for permission to travel in his dominions were perfectly unsuccessful, though Dr. Campbell, Superintendent of Darjiling, most obligingly and with true scientific interest tried every way to forward my plans.\*

The range extending from Tonglo over Chundunangee, Phulloot, Gosah, Singalelah to the mass of Kunchinjunga, allowed me not only to make a very complete set of comparative magnetic and physical observations at different heights, but these peaks commanded at the same time one of the most splendid views of the snowy peaks of the Eastern Himalaya, extending 20° East from Chumalari and 30° West from Kunchinjunga.

From the different points of the Singalelah range the height and position of the snowy peaks were most carefully measured with an

\* During all the time of my operations in Sikkim, I enjoyed Dr. Campbell's as well as Mr. Hodgson's precious and unremitting assistance; I take advantage, with particular pleasure, of this occasion, to return my best thanks to both these gentlemen.

It is scarcely necessary to add how much I was assisted by Dr. Hooker's previous researches in this part of the Himalayas.

Ertel's universal instrument and a theodolite by Troughton and Simms.

The detail of these measurements has been combined with drawings, in which a given angular value was made equal to a unit of linear measure; in the coloured drawings of Tonglo and Phulloot one millimeter is equal to five minutes, and though by this scale the full panorama of  $360^{\circ}$  extended to a length of 4.2 meters, it allowed me, at the same time, to enter with full detail into the topographical structure of the district.\*

I intended to proceed from Phulloot along the ridge, forming from that place the boundary between Nepal and the Rájáh of Sikkim's territories, over the summits as far as possible to the central groups, but we had been observed by the Nepalese (our fires during the night being seen) and there came up first a few Nepalese sepoys, and then a native officer with twenty sepoys, sent by Karak Bahadoor, whose corps was stationed near the Wallanchoon Pass, on the frontier of Thibet and Nepal. They at first seemed not disinclined to allow at least a limited progress, but soon after leaving Phulloot we were surprised by a man, who had evidently waited some days for our passing, who brought fresh orders for the sepoys, who had come up and were now accompanying us, absolutely forbidding them to allow us to go on.

After repeated negotiations, we succeeded in getting a few miles further, to the Chungtaboo mountain, where we were obliged to return, all supplies being denied us, and some of our coolies, who were Nepalese, being threatened that they would be made prisoners.

I returned to Darjiling after an absence of seven weeks and continued my stay in British Sikkim till the 15th August, occupied with another series of magnetic observations and in completing the materials for a map of equi-distant horizontal contour lines for British Sikkim.

\* The drawings of the same range of mountains having been made from different points of known position, they form pictures complimentary to each other, like stereoscopic pictures, allowing me to lay down roughly in a map many more points, if required, than could be fixed by triangulation.

The number of drawings in Sikkim now deposited in the Surveyor General's Office is 100 to 120.

This map, in the scale of three inches to two miles, proportion 1 : 42240, was sent to Capt. Thuillier, Surveyor General's Office, Calcutta, where, through the kind assistance of Capt. Thuillier, copies are now being made which will be added to the next report.

We chiefly used a portable levelling instrument, consisting of a divided wheel and a diopter for tracing the level lines from 500 ft. to 500 ft. vertical distance; with these measurments were combined the determination of the inclinations of slopes by a very sensible Clinometer.

As the latter process gives very material assistance in cases where every point is not accessible (from want of roads as well as particularly from the luxuriant vegetation), I may mention in a few words how we proceeded to deduce from the inclinations the form of the lines required. The horizontal projection (P) of a unit of vertical height [500 ft. in the present case] varies with the inclination (I) of the surface, being the cotangent of the angle of inclination multiplied by the height taken as the standard ( $P = \cot. I. \times 500.$ )

Beginning therefore at a point whose height was measured and coincided with the full multiple of 500 ft., the projection in the map of the next point 500 ft. higher can be deduced from the formula above mentioned.

We calculated a table containing, in inches and its decimal fractions from degree to degree, the values of P reduced to the proportion of 1 : 42240 of which I give a few numbers as an example.

| Angle of declivity.<br>degrees. | Log cot. | Horizontal distance of two<br>contour lines in the plan,<br>inches. |
|---------------------------------|----------|---------------------------------------------------------------------|
| 0                               | ∞        | ∞                                                                   |
| 10                              | 0.7537   | 0.806                                                               |
| 20                              | 0.4389   | 0.390                                                               |
| 30                              | 0.2386   | 0.203                                                               |
| 40                              | 0.0762   | 0.169                                                               |
| 50                              | 9.9238   | 0.119                                                               |

The points with which the steps from 500 ft. to 500 ft. coincided being thus found on the different slopes, their combination gives the equi-distant contour lines as an immediate result.

We left Darjiling August 19th to go by boat to the foot of the

Khosia hills. I followed the course of the Mahanuddy, Ganges, Megna, and Soormah rivers, whilst my draftsman went by the Teesta in order to make a plan of the river.\*

We arrived at Sylhet September 23rd, and at Cherrapunji Sept. 29th.

After visiting the different places of particular geological interest near the Southern slope of the Khosia hills, and taking a series of angles to determine the positions of spurs descending from the plateau of Jynteah,\* we passed through the interior of the Khosia hills and descended into the valley of the Brahmaputra at Gowhaty. As the conditions were here particularly favourable for calculating the discharge of water in the Brahmaputra, the river passing through a channel very well defined and pretty regular, we tried to determine its amount.

I found, per second,

318,200 cubic feet during the time of low water.

894,700 cubic feet during the time of high water.

A detailed account of the operations connected with this determination is given in the latter part of my report.†

We are now visiting the Northern part of central Assam near the Bhootan frontier, the Assistant, Mr. Adams and the draftsman, Abdool, are on their way to Jypore to see the coal and lime formation, at Namding. Their directions are to go from thence by the Boree Dihing and Noh Dihing to Sudeiya, and thence to Gowhaty.

## II.—*Magnetic Observations.*

At Darjiling a complete set of magnetic observations was made immediately after our arrival in Sikkim from the 15th to 17th of April, and a second series after our return from the Nepalese frontier at the end of July; on the latter occasion three little houses of bamboo were built in order to protect the instruments for comparative observations on the daily variations.

2. At Tonglo complete observations from the 12th to 15th of May.

\* This plan will also be added to the next report, it is now in the hands of Capt Thuillier, with the plan before mentioned.

† A section of the river 1 : 1000 and a plan 1 : 5000 added to the report.



3. At Phulloom [11,900 ft.] besides the determination of the declination, absolute intensity (by vibration and deflection), and dip, the daily variations of these elements were observed during a succession of five days.

4. For estimating the influence of height on the intensity of magnetism more directly, the passage of the little Rungeet, which lies between Phulloom and Darjiling, and which we reached a few days after leaving Phulloom, was particularly favourable, and careful observations of the deflection were made.

6. In order to compare the Himalayan station with the plains, a set of observations was made at Beriadangee, near Kissengunj on the shore of the Mahanuddy, and only sixty-six miles distant from the foot of the mountains in a direct line.

7. Rampore Bauleah—dip and vibration; the cloudy state of the weather by day and night prevented the determination of the declination.\*

8. Cherrapunji complete observations.

9. Gowhatty \* \*

In the following, I give an abridged account of some results of these observations:

The calculations of the absolute value of these elements depend as well upon the change in the magnetism of the magnets employed, as upon the regular changes of terrestrial magnetism, corresponding to the time of observation.

The latter element must be deduced hereafter from the observatories of Madras and Bombay; in reference to the magnets, all care has been taken to prevent irregular changes of magnetism, by a most careful transport, and by keeping a pair in one box (in opposite corners) the poles being in opposite directions.

The declination in Sikkim varied between  $3^{\circ} 9'$  and  $3^{\circ} 15'$  for the different places of observation.

At Cherrapunji the declination was West,  $2^{\circ} 10'$ , a very unexpected result, probably connected with the amount of magnetic iron in the central parts of the Khosia hills, the sandstones of the plateau

\* I was assisted here by Mr. Herschel, Mr. Adams being laid up with remitting fever.

Nº 3

PLAN OF THE SECTION

ACROSS

THE RIVER BRAHMAPUTRA

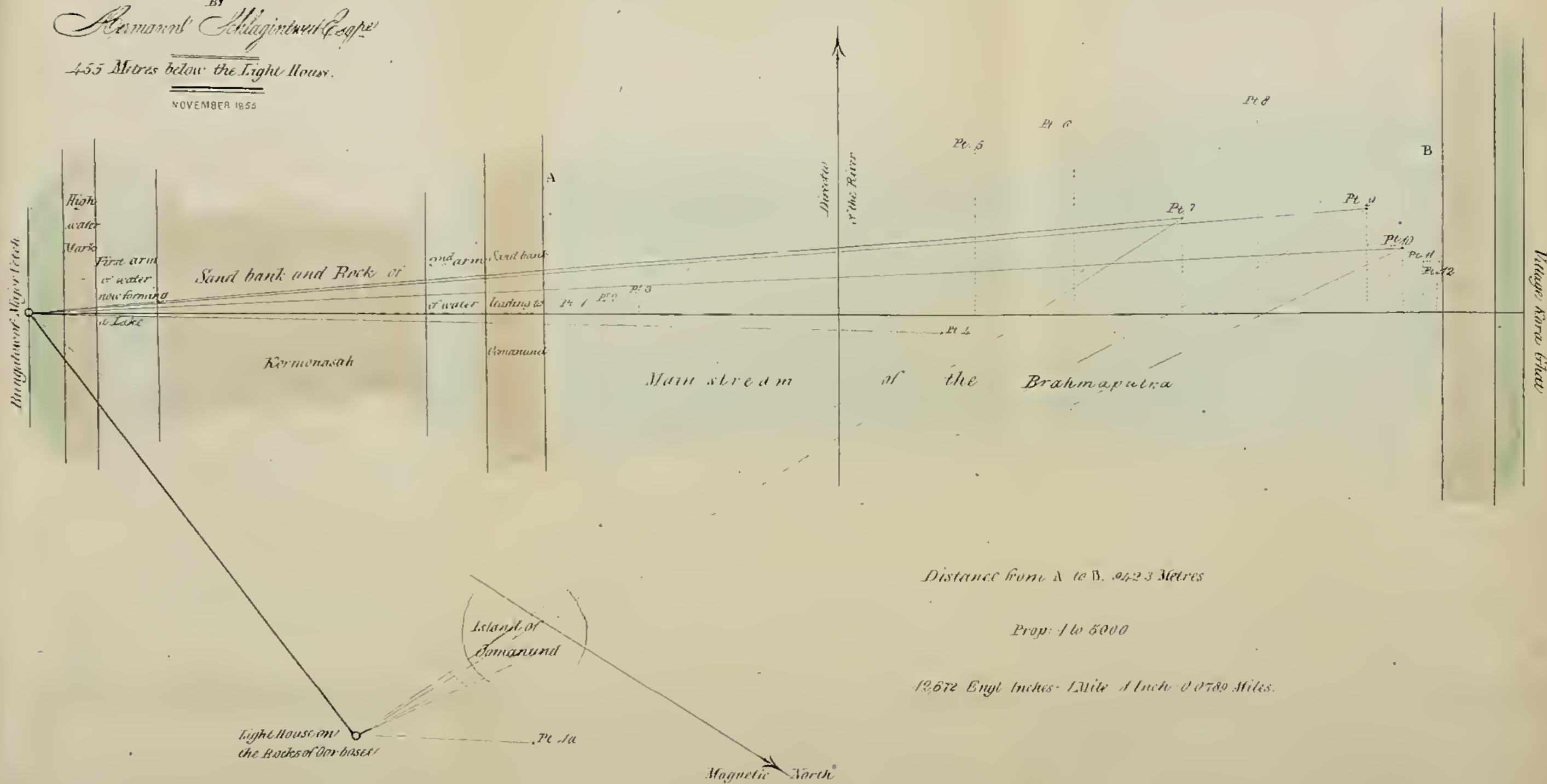
near Gowhatty

BY

*Admiral Schlegel*

*455 Metres below the Light House.*

NOVEMBER 1855







of Cherra, as well as the slates of Myrung, showing no trace of magnetism, even when pieces were brought nearly in contact with the dip needle, as well as with the horizontal magnet in the deflection apparatus.

At Gowhatty the declination was found to be  $1^{\circ} 41'$  E.

The horizontal intensity of magnetism was found decidedly to decrease with the height, as resulting particularly from the observations on the little Rungeet, and at the summit of Phulloot, with a difference of level exceeding 10,000 feet. Before giving the amount of decrease in numbers, I wish to compare with my own the corresponding observations made by my brothers in the Western Himalayas.

The results of the determination of the dip also tend to show a decrease of the vertical force of magnetism.

I had at

Darjiling, April 19th, .....  $36^{\circ} 28.985$ .

July 30th, .....  $36^{\circ} 31.160$ .

Tonglo 10,000 ft. May 12th, .....  $36^{\circ} 22.04$ .

Phulloot, [the difference in latitude making the dip greater.]

June 9th, .....  $36^{\circ} 46.875$ .

At the other stations the dip was the following:—

Beriadangee, Aug. 17th, .....  $35^{\circ} 11.595$ .

Rampore Bauleah, August 28th, ....  $30^{\circ} 57.75$ .

Cherra, October 23rd, .....  $33^{\circ} 34.26$ .

Gowhatty, December 10th, .....  $35^{\circ} 18.73$ .

Together with the magnetic observations, the meteorological elements, pressure, temperature, and moisture of the atmosphere, and the direction of the wind, were minutely observed and determinations of latitude and longitude combined.

### III.—*Meteorology.*

A set of meteorological observations embracing the temperature of the air, the moisture, the pressure of the atmosphere, direction of the wind, and the temperature of the ground at different depths, had been made with great regularity in every place we passed through or where we made a stay.

I add to this report the hourly means of a set of observations

made in localities of particular interest on account of their height, Tonglo exceeding 10,000 ft., Phulloom nearly reaching 12,000 ft.

The thermometer readings in the following tables are corrected for the errors of the instruments, which had been most carefully ascertained before our departure from Europe at the Kew Observatory and examined during our stay in India every three or four months.

The readings of the barometer are reduced to the freezing point.

The instruments for determining the temperature of the ground were corrected of their index errors and also reduced to the true temperature of the stratum in which the bulb of the instrument stood, a correction instrument, containing only a capillary column of mercury without a bulb, being immersed in the same stratum.

In the following tables the variation is given for every full hour. The direct observations included the time from 5 A. M. to 10 P. M. Minima and maxima were also registered.\*

These observations were projected on a paper covered with square millimeters, and the hourly changes for the hours without observations were read off from the curves traced out for every day.

At Tonglo I left an observer after our departure, and the observations have thus been continued there from May to August without interruption.

\* Sometimes observations were made, but not so regularly, at different hours of the night.

I.  
*Temperature of the Air, Tonglo, from May 10th to May 16th inclusive.*

| Means<br>from<br>May 10 to 16. | M. N. | Hours. |      |        |      |      | A. M. |      | 8    | 9     | 10            | 11    |
|--------------------------------|-------|--------|------|--------|------|------|-------|------|------|-------|---------------|-------|
|                                |       | 1      | 2    | 3      | 4    | 5    | 6     | 7    |      |       |               |       |
|                                | 6.75  | 6.87   | 6.85 | 6.78   | 6.75 | 6.92 | 7.91  | 9.03 | 9.83 | 10.61 | 10.81         | 11.83 |
| N.                             | 12.17 | 1      | 2    | Hours. |      | 6    | P. M. |      | 10   | 11    | General mean. |       |
|                                |       |        |      | 4      | 5    |      | 8     | 9    |      |       |               |       |
|                                |       |        |      | 10.52  | 9.42 | 8.42 | 7.83  | 7.87 | 7.45 | 7.28  | 8.89          |       |

*Phulloo, from May 20th to June 12th inclusive.*

| Means<br>from<br>May 20th to May 26th.<br>May 27th to June 1st.<br>June 4th to June 12th, | M. N. | 1     | 2     | Hours. |      |      | 5     | A. M. |      | 8     | 9     | 10    | 11            |
|-------------------------------------------------------------------------------------------|-------|-------|-------|--------|------|------|-------|-------|------|-------|-------|-------|---------------|
|                                                                                           |       |       |       | 3      | 4    | 5    |       | 6     | 7    |       |       |       |               |
|                                                                                           | 6.33  | 6.10  | 5.85  | 5.67   | 5.58 | 5.34 | 5.34  | 6.00  | 6.88 | 8.18  | 9.54  | 10.54 | 11.25         |
|                                                                                           | 6.05  | 5.93  | 5.82  | 5.89   | 5.80 | 5.93 | 5.93  | 6.63  | 7.48 | 8.42  | 9.18  | 10.00 | 10.88         |
|                                                                                           | 6.95  | 6.72  | 6.64  | 6.57   | 6.49 | 7.07 | 7.07  | 8.58  | 8.54 | 10.65 | 10.74 | 10.31 | 10.91         |
| N.                                                                                        | 11.28 | 1     | 2     | Hours. |      | 5    | P. M. |       | 8    | 9     | 10    | 11    | General mean. |
|                                                                                           |       |       |       | 3      | 4    |      | 6     | 7     |      |       |       |       |               |
|                                                                                           |       |       |       | 9.60   | 9.03 | 8.60 | 8.17  | 7.83  | 7.48 | 7.14  | 6.74  | 6.59  | 7.93          |
|                                                                                           | 11.62 | 11.60 | 10.31 | 9.64   | 9.06 | 8.50 | 7.84  | 7.28  | 6.92 | 6.70  | 6.36  | 6.18  | 7.91          |
|                                                                                           | 10.41 | 10.31 | 10.51 | 10.11  | 9.71 | 9.45 | 8.62  | 8.12  | 7.82 | 7.54  | 7.30  | 7.08  | 8.63          |

NOTE. At the summit of Tonglo the observations on the temperature of the air, and on the moisture, on the temperature of surface of the ground, etc. had been continued by an observer left there till to our departure from Sikkim in August.

## II.

*Temperature of the ground, Tonglo, from May 10th to May 16th, inclusive, 1855.*

## SURFACE.

| Means<br>from<br>May 10 to 16. .... | M. N. | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10            | 11    |
|-------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|-------|
|                                     | 8.32  | 8.02  | 7.78  | 7.65  | 7.58  | 7.88  | 11.28 | 11.63 | 13.05 | 14.17 | 14.80         | 15.32 |
|                                     | N.    | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10            | 11    |
|                                     | 15.73 | 16.03 | 16.05 | 15.08 | 14.25 | 13.00 | 11.10 | 10.28 | 9.73  | 9.28  | 8.93          | 8.60  |
|                                     |       |       |       |       |       |       |       |       |       |       | General mean. |       |
|                                     |       |       |       |       |       |       |       |       |       |       | 11.06         |       |

## 0.3 Meters below the Surface.

| Means<br>from<br>May 10 to 16. .... | M. N. | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10            | 11    |
|-------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|-------|
|                                     | 10.82 | 10.82 | 10.72 | 10.78 | 10.78 | 10.75 | 10.73 | 10.73 | 10.77 | 10.90 | 10.90         | 10.98 |
|                                     | N.    | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10            | 11    |
|                                     | 10.88 | 10.84 | 10.82 | 10.84 | 10.84 | 10.90 | 10.87 | 10.85 | 10.85 | 10.83 | 10.83         | 10.82 |
|                                     |       |       |       |       |       |       |       |       |       |       | General mean. |       |
|                                     |       |       |       |       |       |       |       |       |       |       | 10.82         |       |

### 1.0 Meter below the Surface.

|                                  | M.N. | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9                         | 10   | 11   |
|----------------------------------|------|------|------|------|------|------|------|------|------|---------------------------|------|------|
| Means from<br>May 11 to 16. .... | 8.80 | 8.78 | 8.78 | 8.78 | 8.78 | 8.78 | 8.76 | 8.76 | 8.77 | 8.77                      | 8.73 | 8.77 |
|                                  | N.   | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9                         | 10   | 11   |
|                                  | 8.77 | 8.76 | 8.76 | 8.76 | 8.78 | 8.74 | 8.78 | 8.78 | 8.78 | General mean.<br><br>8.78 | 8.78 | 8.78 |

*Temperature of the ground, Phulloot, from May 20th to June 12th, inclusive.*

## SURFACE.

| Means               | M. N. | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11            |
|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|
| May 20 to 26. ....  | 7.77  | 7.10  | 6.35  | 5.63  | 5.03  | 4.97  | 5.54  | 7.59  | 9.71  | 12.80 | 14.91 | 15.76         |
| May 27 to 31. ....  | 8.68  | 8.36  | 8.06  | 7.84  | 7.80  | 7.98  | 8.72  | 9.62  | 11.26 | 12.86 | 14.16 | 14.94         |
| June 3 to 9. ....   | 8.18  | 8.02  | 7.87  | 7.82  | 7.80  | 8.08  | 7.32  | 15.60 | 12.70 | 13.58 | 13.63 | 14.38         |
| June 10 to 12. .... | 8.67  | 8.40  | 8.10  | 7.90  | 7.87  | 8.07  | 8.60  | 10.50 | 12.30 | 14.75 | 14.50 | 15.55         |
|                     | No.   | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | General mean. |
|                     | 16.21 | 16.30 | 15.43 | 14.63 | 13.77 | 12.76 | 11.83 | 11.07 | 9.96  | 9.00  | 8.41  | 10.54         |
|                     | 15.80 | 16.00 | 15.34 | 14.58 | 13.74 | 12.00 | 11.18 | 10.68 | 9.75  | 9.40  | 9.12  | 11.17         |
|                     | 13.60 | 14.55 | 15.72 | 15.37 | 14.19 | 13.30 | 11.34 | 11.61 | 6.23  | 8.46  | 8.33  | 10.71         |
|                     | 16.00 | 15.15 | 15.50 | 14.95 | 12.75 | 12.25 | 11.85 | 11.40 | 10.35 | 9.95  | 9.60  | 11.49         |



## 0.3 Meters below the Surface.

| Means               | M. N. | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11            |
|---------------------|-------|------|------|------|------|------|------|------|------|------|------|---------------|
| May 20 to 26. ....  | 7.05  | 7.05 | 7.01 | 6.98 | 6.93 | 6.88 | 6.93 | 6.60 | 6.59 | 6.63 | 6.70 | 6.73          |
| May 27 to June 1. . | 8.65  | 8.65 | 8.65 | 8.63 | 8.62 | 8.60 | 8.60 | 8.60 | 8.60 | 8.54 | 8.54 | 8.56          |
| June 3 to 11. ....  | 9.40  | 9.37 | 9.37 | 9.36 | 9.35 | 9.34 | 9.34 | 9.3  | 9.36 | 9.38 | 9.38 | 9.41          |
| N.                  | 1     | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | General mean. |
| 6.77                | 6.79  | 6.81 | 6.86 | 6.96 | 7.08 | 7.14 | 7.16 | 7.16 | 7.14 | 7.16 | 7.16 | 6.93          |
| 8.65                | 8.68  | 8.74 | 8.76 | 8.78 | 8.84 | 8.84 | 8.86 | 8.84 | 8.82 | 8.84 | 8.84 | 8.70          |
| 9.42                | 9.44  | 9.47 | 9.50 | 9.54 | 9.51 | 9.45 | 9.45 | 9.42 | 9.41 | 9.41 | 9.41 | 9.41          |

## 1 Meter below the Surface.

| Means<br>from       | M. N. | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11            |
|---------------------|-------|------|------|------|------|------|------|------|------|------|------|---------------|
| May 20 to 26. ....  | 4.60  | 4.60 | 4.61 | 4.61 | 4.61 | 4.62 | 4.62 | 4.62 | 4.62 | 4.62 | 4.62 | 4.64          |
| May 27 to June 1. . | 5.70  | 5.72 | 5.72 | 5.72 | 5.72 | 5.72 | 5.72 | 5.72 | 5.72 | 5.62 | 5.66 | 5.66          |
| June 3 to 11. ....  | 6.91  | 6.92 | 6.92 | 6.94 | 6.95 | 6.95 | 6.95 | 6.95 | 6.95 | 6.94 | 6.94 | 6.94          |
| N.                  | 1     | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | General mean. |
| 4.64                | 4.64  | 4.64 | 4.64 | 4.64 | 4.67 | 4.70 | 4.71 | 4.71 | 4.72 | 4.72 | 4.72 | 4.65          |
| 5.66                | 5.66  | 5.66 | 5.66 | 5.68 | 5.72 | 5.72 | 5.74 | 5.74 | 5.76 | 5.76 | 5.76 | 5.70          |
| 6.88                | 6.89  | 6.89 | 6.90 | 6.92 | 6.93 | 6.94 | 6.94 | 6.97 | 6.97 | 6.97 | 6.97 | 6.93          |

## III.

Daily variation of the Barometer—Millimeters reduced to  $0^{\circ} C = 32^{\circ} F.$ , Tonglo, from May 10th to May 16th, inclusive.

| Means<br>from<br>May 10 to 16. .... | M. N.  | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | 11               |
|-------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------------|
|                                     | 528.35 | 528.39 | 528.41 | 528.41 | 528.42 | 528.45 | 528.49 | 528.55 | 528.83 | 529.21 | 529.07 | 528.61           |
| N.                                  | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | 11     | General<br>mean. |
| 528.71                              | 528.80 | 527.67 | 527.24 | 526.74 | 527.05 | 527.71 | 527.67 | 527.87 | 528.10 | 528.22 | 528.29 | 528.21           |

Phuloot, from May 19th to June 12th inclusive.

| Means<br>from<br>May 19 to 25, ....<br>May 25 to June 1.<br>June 3 to 12. .... | M. N.  | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | 11               |
|--------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------------|
|                                                                                | 496.04 | 496.08 | 496.12 | 496.08 | 496.23 | 496.18 | 496.30 | 496.46 | 496.59 | 496.67 | 496.68 | 496.59           |
|                                                                                | 495.94 | 495.95 | 495.97 | 495.99 | 496.03 | 496.13 | 496.67 | 496.17 | 496.32 | 496.69 | 496.81 | 496.81           |
|                                                                                | 494.59 | 494.58 | 495.56 | 494.55 | 494.54 | 496.53 | 494.83 | 494.99 | 495.25 | 495.35 | 494.92 | 494.82           |
| N.                                                                             | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | 11     | General<br>mean. |
| 496.62                                                                         | 496.54 | 495.84 | 495.60 | 495.50 | 495.43 | 494.88 | 495.27 | 495.57 | 495.72 | 495.83 | 495.91 | 496.08           |
| 496.57                                                                         | 496.31 | 496.20 | 495.96 | 495.88 | 495.85 | 495.78 | 495.78 | 495.83 | 495.91 | 495.95 | 495.97 | 496.12           |
| 494.96                                                                         | 494.64 | 494.33 | 494.13 | 494.05 | 494.00 | 494.08 | 494.07 | 494.47 | 494.54 | 494.79 | 494.81 | 494.67           |



In the following resume I will try to collect, in the form of an extract from our journals, some meteorological phenomena which seemed to me particularly interesting, either in their more general character or from peculiarities characteristic of the regions explored.

*Decrease and variation of the temperature of the air.*

Comparing the Sikkim Himalaya in general with the plains, it is very manifest that the law of decrease of temperature for the annual and monthly means, as particularly for the extremes of single days, is a very different one from the plains to the range of mountains not exceeding 6000 or 7000 feet, and not very distant from the plains—and from these mountains to the higher parts of the central Himalayas. In the first case the decrease is much more rapid than in the second.

The temperature also of the lower part of the hills in the neighbourhood of the plains is frequently affected by the fog, which rapidly ascends along the slopes, and does not change the temperature of the air confined between the vesicles of vapour at a rate corresponding to the variation of their height.

A similar difference in the laws of decrease of temperature is also clearly observable in the *Khosia hills*, though on a smaller scale; their steep flanks facing the south, and the gentle elevations of the ridges based on the plateaux succeeding in the interior, present a configuration particularly adapted to show such modifications. In *Assam*, we got a very valuable set of meteorological observations communicated to us through the kindness of Col. Jenkins, which, combined and reduced by our own observations, will allow us to trace the thermic lines with great detail.

*The temperature of the ground, of rivers, and of springs*, has been always carefully observed.

I add, as an interesting object for comparison with the preceding tables, some numbers obtained in Gowhatty, Central Assam, the instrument being employed on ground covered with short grass.

| Gowhatty, Dec. 1855.                            | Absolute Extremes. |      |
|-------------------------------------------------|--------------------|------|
|                                                 | max.               | min. |
| <i>Surface of the ground, .....</i>             | 6 A. M. 20.4       | 16.2 |
|                                                 | 10 A. M. 22.0      | 18.3 |
|                                                 | 2 P. M. 26.4       | 23.4 |
|                                                 | 6 P. M. 22.4       | 18.5 |
| At 0.3 meters, (11.9 inches) below the surface, | 6 A. M. 23.5       | 19.2 |
|                                                 | 10 A. M. 23.4      | 19.3 |
|                                                 | 2 P. M. 24.8       | 20.1 |
|                                                 | 6 P. M. 24.5       | 20.4 |
| At 1 meter, (3 ft. 3 in.) below the surface.    | 6 A. M. 25.9       | 23.0 |
|                                                 | 10 A. M. 25.9      | 23.0 |
|                                                 | 2 P. M. 26.5       | 23.0 |
|                                                 | 6 P. M. 26.0       | 23.0 |

The temperature of the Brahmaputra near Gowhatty had a daily variation of  $1^{\circ} 6$  between 18.0 and 16.4.

The height corresponding to a decrease in the temperature of springs of  $1^{\circ}$  C. is larger, the decrease is less rapid, in comparing Assam with the Khosia hills, than in comparing Sikkim with the plains of Bengal, in the latter case the corresponding height varied between 700 and 760 feet English.

*The snow line* could be very well measured and its variation ascertained during our stay on the Singalelah ridge, though we were prevented from proceeding ourselves to the foot of the snow.

We found a decided difference between its annual variation on the isolated peaks in the spurs of southern direction and on the flanks of the central parts. In the first case, the snow line goes steadily up till the beginning of the rains, and shows the great periodical oscillations, its maximum being attained near the middle of July. In the inner parts, much less accessible to the tropical rains, the maximum of snow line coincides with the end of August. In a lateral valley of Phulloot, a snow-bed was found in the beginning of June, but not lasting.\*

\* *Moisture of the atmosphere—rain, &c.* This snow, first seen by one of my shooters, was reported to me as an immense hailstone, the solid nature of the ice nearly concealing its origin; many reports of enormous hailstones, so often mentioned in the lower parts of the Himalayas, might probably be traceable to a similar origin.

*Rain.*—Many instances have been observed showing the quantity of rain to be sometimes of very local occurrence,\* and its distribution as much modified by the configuration and topographical position of the surface receiving the rains, as by the more general laws of the movements of the atmosphere.

Places on a steep declivity facing large plains are particularly exposed to large quantities of rain, which exceeds, for instance, in Cherra, the annual mean of 600 inches.

It is very remarkable that at Cherra the proportion between the rain during the day and the night is on an average like 2 to 3, very often exceeding that proportion, but in the months after and before the rainy season, the daily variation of the heights of the clouds is quite different, the night being generally very clear and cloudless.

The great quantity of dew in the tropics seemed an object worthy of particular attention.

We tried in the Khosia hills, and afterwards in central Assam, to determine the quantity of dew; the details of one series of experiments are given in the following pages. I add that the absolute quantity is much inferior to what the first appearance of the substances exposed and the size of the drops made us expect, but a closer inspection explains it very well, by the distances of the drops from each other; a second experiment at Cherra gave for black wool 0.4 to 0.5 millimeters, one at Gowhatty 0.6, the quantity of water in the atmosphere decreasing with the mean daily temperature more rapidly than the radiating power increases with the elevation above the plains.

*Experiments for the determination of the quantity of dew and the relative radiating power of different substances.*

Night at Cherrapunji from 28th to 29th of October, perfectly clear, very small low cumuli, height not exceeding 3°, disappeared after 10 P. M.

Substances exposed at 7h. 30' P. M. Oct. 28th. Taken to the balance at 10h. 10' A. M. Oct. 29th.

The following substances were exposed.

No. 1.—Empty paper box.

No. 2.—Black wool (very fine black colour).

\* At Darjiling we had on the 12th of August, 1855, 1.15 inches in two hours, and no rain fell at the military sanatorium not two miles distant.

No. 3.—White wool (very fine white colour).

No. 4.—Black vegetable earth (as formed naturally in little concavities of the rocks, not quite black, a little reddish).

No. 5.—Quartz sand from a river, formed of decomposed sandstone rocks.

No. 6.—Short grass, imitating the natural surface in the flat of Cherra by being cut off and arranged in the box points upwards.

No. 7.—Dark grey slate from Myrung with a very uniform smooth surface.

These substances were exposed in the following way. A double stratum of light bamboo mats was spread over short grass; length of the mats 25 meters, breadth 1.4 meters. The paper boxes were disposed so as to have the greatest possible distance from each other and from the borders of the mats.

The empty paper-box, weighed at the very beginning and at the very end, was during the night protected from radiation and dew by being placed on the grass, supported by a large cake of wax, and covered by a bamboo umbrella with a stick of 0.4 meter height.

In this way we obtained the changes of weight of the paper cases, produced by absorption during the night and evaporation during the stay in the room.

### *Weights.*

Increase  
of  
Weights  
in  
Grammes.

|                                                                                                               |       |
|---------------------------------------------------------------------------------------------------------------|-------|
| 1.—Empty box weighed first and last for giving a correction for the absorption of moisture by the paper, .... | 0.174 |
| 2.—Black wool, . . . . .                                                                                      | 4.019 |
| 3.—White wool, . . . . .                                                                                      | 3.791 |
| 4.—Black vegetable earth, . . . . .                                                                           | 2.211 |
| 5.—Quartz Sand, . . . . .                                                                                     | 1.965 |
| 6.—Grass, . . . . .                                                                                           | 2.631 |
| 7.—Dark grey Slate, . . . . .                                                                                 | 0.904 |

The change of weight in the test paper box having been 0.174 grammes, this amount is to be deducted from all the substances from No. 2 to No. 6 inclusive. Besides this, the weights of the two kinds of wool and the grass must be corrected for a small, but appreciable, quantity of moisture lost during the stay in the room before



their turn came to be weighed ; this quantity was ascertained by weighing them a second time, and putting the loss thus ascertained, during a given difference of time, proportional to the time which elapsed between the moment when they were brought into the room and the moment when their turn for being weighed came.

The corrections thus obtained are :—

|                                            | grammes. |
|--------------------------------------------|----------|
| For No. 2.—Black wool weighed first, ..... | 0.000    |
| 3.—White wool,.....                        | 0.079    |
| 4.—Black earth,.....                       | 0.012    |
| 5.—Quartz sand, .....                      | 0.020    |
| 6.—Grass, .....                            | 0.310    |

Dark grey slate could not be managed in the same way, the water being taken off by blotting. The loss may be considered as inappreciable, the water forming well defined drops not extended by capillarity over so large a surface as in the other substances.

The corrected increase of weight is therefore ;—

|                           | Difference between 1st & 2nd Weighing, grammes. | Correction for absorption grammes. | Correction for evaporation grammes. | Real increase grammes. |
|---------------------------|-------------------------------------------------|------------------------------------|-------------------------------------|------------------------|
| For No. 2.—Black wool,... | 4.019                                           | — 0.174                            | 0.000                               | 3.845                  |
| 3.—White wool, ..         | 3.791                                           | — 0.174                            | + 0.079                             | 3.696                  |
| 4.—Black earth, ..        | 2.211                                           | — 0.174                            | + 0.012                             | 2.049                  |
| 5.—Quartz sand, ..        | 1.965                                           | — 0.174                            | + 0.020                             | 1.711                  |
| 6.—Grass, ..... ..        | 2.631                                           | — 0.174                            | + 0.310                             | 2.767                  |
| 7.—Dark grey slate,       | 0.904                                           | ....                               | ....                                | 0.904                  |

To facilitate the conversion of the weights in vertical heights of the stratum of water deposited in the form of dew, the boxes containing the different substances, as well as the stones, were made as nearly equal to a square decimeter as we could, but the moisture allowed the boxes to extend their edges, and it was not possible to mark the stones with sufficient accuracy without a useless waste of time, the real surfaces had therefore to be ascertained after the experiments. This was done by putting them on a paper covered with square centimeters and square millimeters, tracing the upper contour line, and counting the number of little squares thus enclosed.

The surface of the slate was found 100.54 square centimeters, the boxes on an average 101.75 square centimeters, varying only between 101.70 and 101.80 square centimeters.

The temperature of the air was

|                                      | Dry bulb. | Wet bulb. |
|--------------------------------------|-----------|-----------|
| October 28th 6 P. M. ....            | 15.6      | 13.6      |
| October 28th 10 P. M. ....           | 13.6      | 11.8      |
| October 28th to 29th, minimum, ..... | 12.9      |           |
| October 29th, 6 A. M. ....           | 14.4      | 14.2      |

Therefore the gramme of dew (distilled) water may be considered equal to one cubic centimeter without any correction for the change in the volume of water by temperature. The weight of the dew deposited is, after the reduction to 100 square centimeters;—

|                                 | grammes. |
|---------------------------------|----------|
| For No. 2.—Black wool, .....    | 3.78     |
| 3.—White wool, .....            | 3.63     |
| 4.—Black vegetable earth, ..... | 2.01     |
| 5.—Quartz sand, .....           | 1.68     |
| 6.—Grass, .....                 | 2.72     |
| 7.—Dark grey slate, .....       | 0.90     |

Which gives the following thickness of the deposited stratum of water in millimeters and decimals of millimeters and in decimals of the English line (.1 inch);—

|                                 | M. M. | Lines. |
|---------------------------------|-------|--------|
| For No. 2.—Black wool, .....    | 0.38  | 0.150  |
| 3.—White wool, .....            | 0.36  | 0.142  |
| 4.—Black vegetable earth, ..... | 0.20  | 0.079  |
| 5.—Quartz sand, .....           | 0.17  | 0.067  |
| 6.—Grass, .....                 | 0.27  | 0.107  |
| 7.—Dark grey slate, .....       | 0.09  | 0.035  |

The radiating power may be considered as proportional to the quantity of water deposited. Making the quantity deposited on the black wool 1000, we get the following numbers corresponding to the different radiating powers.

|                   |      |
|-------------------|------|
| Black wool, ..... | 1000 |
| White wool, ..... | 980  |

|                              |     |
|------------------------------|-----|
| Black vegetable earth, ..... | 527 |
| Quartz sand, .....           | 447 |
| Grass, .....                 | 713 |
| Dark grey slate, .....       | 233 |

### *Winds.*

As an observation of a more general nature, I may mention that in Sikkim North winds are scarcely ever observed at heights below 10,000 feet, the large central masses protecting at a remarkable distance the lower ranges to the South of them.

In the valley of the Brahmaputra a regular daily variation takes place, particularly in the cold season.

During the day East and North-East winds follow the main direction of the valley, in the night South winds descend (which are the prevailing winds in the Naga, Khosia, and Garrow mountain ranges) into the valley of the Brahmaputra, after the ascending current has ceased. The Southerly wind does not follow immediately after sunset, but much later, from 9 to 10 P. M. This discordance in time seems to show that this phenomenon is caused to a great extent by the cessation of the ascending current in the lower part of the course of the Brahmaputra, where, during the day, an ascendant current is originated over a much larger surface. The daily variation of the barometer is decidedly affected by these changes in the currents of the air.

### *Composition of the atmosphere.*

1.—Experiments have been made about the quantity of carbonic acid contained in the atmosphere, which increases decidedly at great heights and shows remarkably great variations in regions accessible to clouds rapidly ascending from the plains.

2.—Iodized papers (got directly from Prof. Schonbein) were regularly used for getting the measurement of ozon. At Darjiling, Calcutta, and Gowhatty continuous observations were made. In the plains, particularly in jheels, we found the colouration of the paper (the number increasing with the increase of ozon) to be 1 to 1.5;

at Darjiling . June, day 4.5    night 7.1.

July    „    3.3        „    4.8.



At heights of from 10,000 to 12,000 feet, we got nearly always 10 (the last number of the scale) if the papers were exposed twelve hours; this allowed us to take a shorter time of exposition and to shew the variation at intervals of 3 hours during the day.

### *Electricity.*

The most violent electric discharges take place immediately before the rains or at their first beginning.

In May I found the electricity on isolated peaks of 10,000 to 12,000 feet, in clear days, five times greater than in the plains.

### *Optical phenomena of the atmosphere.*

The plains, as well as the mountains of Sikkim offered a great variety of interesting optical phenomena, of which the following may be mentioned in a few words.

The blue colour of the sky is in the plains of India much darker than in higher (Northern or Southern) latitudes, but the darkness of the sky does not increase with the height in the same ratio as in Europe. At heights of 10,000 to 12,000 feet, the absolute brightness of the sky is even greater than at the same height in Europe between  $45^{\circ}$  and  $47^{\circ}$  of North latitude.

The highest temperature we observed on a black bulb thermometer lying on black wool was  $74^{\circ}$  C. =  $165^{\circ}$  Fht, July, Darjiling, 7,200 ft. English.

During our stay at a greater height, we had never an entirely clear insolation after  $11\frac{1}{2}$  A. M.

The second colouration of the snow after sunset had not been hitherto observed in tropical climates (see Humboldt's Cosmos, vol. IV).

We had some difficulty in observing this phenomenon, since at sunset it is generally very foggy in Sikkim; but on two occasions, particularly June 2nd from Phulloot, it was as plainly visible and as well defined as I ever saw it in the Alps. Besides this, I was told by Dr. Campbell, that after the rainy season it is very often to be seen extending over all the snowy peaks, and visible a considerable time after sunset.

The chemical action of light, determined as formerly described in our "new researches in Alps," was found in maximo to be number

58 of a coloured scale in the plains, and number 30 on Phulloot, decreasing consequently with elevation.

From Phulloot, a particular modification in the transparency of the air was observed June 4th. A few minutes after sunrise the shadow of the mountain was seen as plainly as possible, and nevertheless all the objects in the same direction were visible, only a little less distinct, through it, the fine haze being just thick enough to show the limits between its illuminated and shaded part, and allowing objects at the same time to be seen through it, as through a very thin curtain.

#### IV.—*Geological Observations.*

In Sikkim the rocks are all crystalline and metamorphic without limits so well defined as to enable me to distinguish them in a geological map; but in these districts, the direction of joints and cleavage showed many interesting relations with the form and direction of the valleys and with the inclination of the surface.

The cleavage has a predominant dip to N. 45° E. and is generally very steep, which causes not unfrequently the slopes of the mountains to be steeper, where they coincide with the direction of the surface of the stratification, than on the opposite flanks.

In the valley of the Mahanuddy, two miles below its junction with the Ratiang, a system of sandstone containing tertiary coal was examined.

The coal at this place is of very good quality, but does not reach the surface in very large masses; more of the same coal is to be seen on the left shore of the Mahanuddy.

The sandstones dipped to N. 6° E. inclination 30°; they are followed by marls, probably corresponding in age to the limestone overlying the coal in the Khosia hills.

In the Khosia hills, the valuable geological map of Mr. Oldham allowed of but few additions, and these particularly in reference to cleavages. I found one direction of the cleavage in the sandstones on the surface of the plateau of Cherra, coinciding with one system of cleavage in the gneiss at the foot of the hills; several other systems of cleavage are decidedly different in the different succession of rocks.\*

\* The collection of stones now sent to Calcutta contains 500 to 600 specimens.

The geological map of the Khosia hills was continued from Nuncklow to the valley of the Brahmaputra.

V.—*Remarks on some hydrographic observations.*

The velocity of the current in different streams has been frequently measured and compared with the accumulation of deposits and size of boulders, with the depth of erosion, etc.

The quantity of the discharge has been determined in the Mahanuddy, the Ganges\* near Rampore Bauleah, and the Brahmaputra near Gowhatty.

The Mahanuddy immediately below its junction with the Ratiang had a discharge of 240 cubic metres per second, and near the village of Sirsee below Malda 4,500 cubic metres per second, breadth 1,073 metres. For the Brahmaputra, the detail of the observations and the results obtained are given in the following pages.

*Observations on the river Brahmaputra at Gowhatty.*

The form of the valley of the Brahmaputra near Gowhatty is particularly well adapted for measuring the quantity of its discharge, the bed of the river being well defined, and the mass of water occupying only one channel. Besides, the station of Gowhatty being close to the (left) shore of the river, I had the advantage of getting much valuable information about the changes of the river in different seasons from the inhabitants. I mention particularly Major Vetch and Lieut. Craster, repeating my best thanks to them.

The observations were made from November 21st to December 13th the soundings November 28th and 30th, the determination of the velocity November 29th to December 3rd.

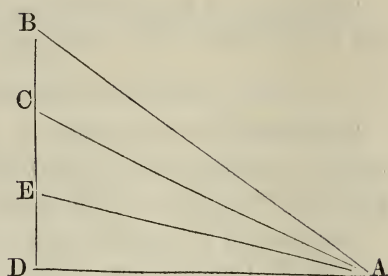
No. 1.—Breadth of the river.

The breadth of the river was ascertained by measuring a base line BE on the right shore and making a triangulation with a theodolite reading 10'' by the vernier.

\* The observations on the Ganges have been sent to Calcutta, without the result being copied out for the report.

## Angles

$$\begin{aligned}
 ABC &= 76^{\circ} 12' 4'' \\
 BEA &= 95^{\circ} 35' 11'' \\
 BAE &= 8^{\circ} 12' 45'' \\
 &= BAC + CAE \\
 BAC &= 4^{\circ} 9' 50'' \\
 CAE &= 4^{\circ} 2' 55''
 \end{aligned}$$



$$\text{Length of } BC = 113 \text{ meters.}$$

$$,, \quad CE = 113 \quad ,,$$

$$,, \quad BE = 226 \quad ,,$$

Bearing of the line AD  $150^{\circ} 5'$

i. e. S.  $29^{\circ} 55'$  E. to N.  $29^{\circ} 55'$  W.

These triangles give the following values for the real breadth, represented by the line AD.

|                         | Meters. |
|-------------------------|---------|
| $\Delta$ BAE gives AD = | 1531.5  |
| $\Delta$ BAC „ „ =      | 1531.7  |
| $\Delta$ CAE „ „ =      | 1526.5  |

---


$$\text{Mean } 1529.9$$

This line is to be reduced by 42.9 meters, the theodolite not standing close to the high water mark on the left shore, and to be augmented by 22.3 meters on account of the instrument's position on the right shore, therefore we get as the resulting breadth from one high water mark to another, 1509 meters, 4951 feet.

*Levellings in the bed of the Brahmaputra river at Gowhatty.*

| Distance—in metres. |        | Reading of leveling rod, left bank, metres. | Difference of level. |                  |                                                    |
|---------------------|--------|---------------------------------------------|----------------------|------------------|----------------------------------------------------|
|                     |        |                                             | Positive metres.     | Negative metres. |                                                    |
| 0                   | 4.9    | 0.14                                        | 1.402                | ..               | Total height of the left bank from the water mark. |
| 4.9                 | 9.7    | 0.182                                       | 1.368                | ..               |                                                    |
| 9.7                 | 16.5   | 1.080                                       | 0.470                | ..               |                                                    |
| 16.5                | 22.22  | 0.747                                       | 0.803                | ..               |                                                    |
| 22.22               | 29.44  | 0.074                                       | 1.456                | ..               |                                                    |
| 29.44               | 34.16  | 0.214                                       | 1.336                | ..               |                                                    |
| 34.16               | 41.63  | 0.230                                       | 1.320                | ..               |                                                    |
|                     |        | First arm of water.                         |                      |                  | 8m. 155                                            |
| 41.63               | 106.63 |                                             |                      |                  |                                                    |

*Levellings over the Karmanásáh rock.*

|        |        |       |       |       |                             |
|--------|--------|-------|-------|-------|-----------------------------|
| 106.63 | 108.06 | 2.107 | ..    | 0.557 | Ascending parts.<br>6m. 376 |
| 108.06 | 110.08 | 2.121 | ..    | 0.571 |                             |
| 110.08 | 118.23 | 2.113 | ..    | 0.563 |                             |
| 112.23 | 114.16 | 2.155 | ..    | 0.605 |                             |
| 114.16 | 117.88 | 2.137 | ..    | 0.587 |                             |
| 117.88 | 122.60 | 2.156 | ..    | 0.606 |                             |
| 122.60 | 140.97 | 2.126 | ..    | 0.576 |                             |
| 140.97 | 149.89 | 2.076 | ..    | 0.526 |                             |
| 149.89 | 152.11 | 2.160 | ..    | 0.610 |                             |
| 152.11 | 157.14 | 2.115 | ..    | 0.565 |                             |
| 157.14 | 170.22 | 2.160 | ..    | 0.610 |                             |
| 170.22 | 195.12 | 0.860 | 0.790 | ..    |                             |
| 195.12 | 221.82 | 0.331 | 1.219 | ..    |                             |



| Distance—in metres. |                                                       | Reading of leveling rod metres. | Difference of level.                                                             |                  |                    |
|---------------------|-------------------------------------------------------|---------------------------------|----------------------------------------------------------------------------------|------------------|--------------------|
|                     |                                                       |                                 | Positive metres.                                                                 | Negative metres. |                    |
| 221.82              | 241.25                                                | 0.346                           | 2 009                                                                            | ..               | Descending parts   |
| 241.25              | 274.96                                                | 0.869                           | 1.204                                                                            | ..               | 7.761              |
| 274.96              | 309.73                                                | 0.812                           | 0.681                                                                            | ..               | The water a-       |
| 309.73              | 332.47                                                | 0.255                           | 0.738                                                                            | ..               | bove forms dur-    |
| 332.47              | 361.17                                                | 0.450                           | 1.295                                                                            | ..               | ing this season    |
| 361.17              | 380.99                                                | 0.816                           | 1.100                                                                            | ..               | a lake, the depth  |
|                     | Second arm of water.                                  |                                 | 0.734                                                                            | ..               | of which does      |
| 380.99              | 453.27                                                | Sand bank.                      |                                                                                  | ..               | not alter so ra-   |
| 453.27              | 484.57                                                | 1.929                           | ..                                                                               | 0.379            | pidly as the ri-   |
|                     |                                                       |                                 |                                                                                  |                  | ver. Ascending     |
| 484.57              | 505.62                                                | 1.645                           | ..                                                                               | 0.095            | parts 0.474        |
|                     |                                                       |                                 |                                                                                  |                  | Descendg. parts    |
| 505.62              | 522.07                                                | 1.051                           | 0.499                                                                            | ..               | 0.499.             |
|                     |                                                       |                                 |                                                                                  |                  | ..                 |
|                     | Large mass of water. See compass bearings.            |                                 |                                                                                  |                  |                    |
|                     | Right shore from the water up to the high water mark. |                                 |                                                                                  |                  | Total of the       |
| 0.                  | 8.4                                                   | 1.985                           | Here ends the steep bank, the slope of the following parts is 15° in an average. | 0.435            | ascending parts    |
| 8.4                 | 11.3                                                  | 2.025                           |                                                                                  | 0.475            | right shore 9.540. |
| 11.3                | 14.22                                                 | 2.011                           |                                                                                  | 0.461            | The basis of       |
| 14.22               | 16.82                                                 | 2.152                           |                                                                                  | 0.602            | the masonry on     |
| 16.82               | 19.22                                                 | 2.148                           |                                                                                  | 0.598            | which the light    |
| 19.22               | 21.52                                                 | 2.130                           |                                                                                  | 0.580            | house stands is    |
| 21.52               | 22.62                                                 | 2.149                           |                                                                                  | 0.599            | just passed by the |
| 22.62               | 44.99                                                 | ..                              |                                                                                  | 5.79             | highest water ;    |
|                     |                                                       |                                 |                                                                                  |                  | ht. found above    |
|                     |                                                       |                                 |                                                                                  |                  | water 9m. 41.      |

## No. 3.—Soundings.

First some soundings were made from a small boat ; the boat not being provided with an anchor the angular distance between two objects on shore for ascertaining the exact place could not be taken with sufficient accuracy.

These points correct for depth are marked with dotted lines in the *plans*.

Then another set of soundings was taken, using a larger boat with an anchor, the position of the places was ascertained by bearings to the light house and the chimney of Major Vetch's house.

Light house from Major Vetch :—

Angular height of the white column, . . . . . 31' 30"  
metres.

Lineal height, . . . . . 5 16

Bearing magnetic, . . . . . N. 22° 5 E.

Resulting distance, . . . . . 563.2 metres.

The places of the soundings and the depth found are contained in the following table and laid down in the *plan* of the Section :

| No. of the place. | Distance from the shores of the main branch of the Brahmaputra. |                             | Distance from the line of the section in metres. |       | Depth in metres. |
|-------------------|-----------------------------------------------------------------|-----------------------------|--------------------------------------------------|-------|------------------|
|                   | From left shore in metres.                                      | From right shore in metres. |                                                  |       |                  |
| 1                 | 42.5 { measured                                                 | ..                          | Below                                            | 15    | 4.5              |
| 2                 | 65.0 { by a rope                                                | ..                          | „                                                | 17.5  | 5.8              |
|                   | { directly.                                                     |                             |                                                  |       |                  |
| 3                 | 90 to 110                                                       | ..                          | „                                                | 28.   | 9.3              |
| 4                 | 420 5                                                           | ..                          | Above                                            | 20.1  | 17.1             |
| 5                 | 450 to 470                                                      | ..                          | Below                                            | 180.  | 17.3             |
| 6                 | ..                                                              | 370 to 390                  | „                                                | 230.  | 18.0             |
| 7                 | ..                                                              | 265 0                       | „                                                | 102.5 | 17.8             |
| 8                 | ..                                                              | 170 to 195                  | „                                                | 225.0 | 16.5             |
| 9                 | ..                                                              | 52.5                        | „                                                | 111.5 | 14.0             |
| 10                | ..                                                              | 15.0                        | „                                                | 70.   | 5.0              |
| 11                | ..                                                              | 8.0                         | „                                                | 52.5  | 1.0              |
| 12                | ..                                                              | 2.5                         | „                                                | 40.0  | 0.5              |

NOTE.—No. A in the plan was above the island of Oommanand and a little to the right of it. Depth 12.5 metres.

#### No. 4.—*Velocity of the water.*

The following table contains the numbers found for the velocity of the water at different points. The velocity was ascertained, No. A for the surface by an empty pot (ghurrah), No. B for depths of 7.5 and 10.0 meters by bamboos loaded below with sacks containing sand and protected against their sinking deeper than their full length by a pot tied to the upper end, a thin and very soft rope, 100

meters long, was attached to the floaters so as to give as little resistance as possible to their progress.

*Velocity of the Brahmaputra.*

| Points and total depth.<br>(See plan and section.) | Velocity,<br>meters in 1 second.                                                                             |                                      |                                      |                                                                                                                                   |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------|--------------------------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
|                                                    | Sur-<br>face.                                                                                                | Depth of<br>7.5 m.                   | Depth of<br>10 m.                    |                                                                                                                                   |
| Pt. 1a,<br>depth 12.5 m.                           | 1.28                                                                                                         | ....                                 | ....                                 | This water was stopped by the island Oommand behind which the velocity was 0.                                                     |
| Pts. 1, 2, 3,...                                   | Velocity 0, a little motion at about 30 m. from the shore, at 43 m. the vel. and depth the same as at pt. 4. |                                      |                                      |                                                                                                                                   |
| Pt. 4<br>depth 17.1 m.                             | 1.30                                                                                                         | 1.20 } Mean<br>1.22 }<br>1.24 }      | 1.10 } Mean<br>1.08 }<br>1.09 }      | A very good point, fullstream.                                                                                                    |
| Pt. 7<br>depth 17.8 m.                             | 1.42                                                                                                         | 1.30 } Mean<br>1.30 } 1.30<br>1.28 } | 1.20 } Mean<br>1.23 } 1.21<br>1.21 } | Also quite regular full stream.                                                                                                   |
| Pt. 9<br>depth 14.0 m.                             | 1.15                                                                                                         | 1.20 } Mean<br>1.22 }<br>1.25 }      | 1.30 } Mean<br>1.32 } 1.31           | The lower currents here are more rapid owing to a tendency of the water to flow in the deep channel indicated by sounding, No. 8. |
| Pts. 10, 11, 12,...                                | Very slow motion, protected by a spur of the Ceela hill.                                                     |                                      |                                      |                                                                                                                                   |

NOTE.—The motion becomes 0 at about 50 meters distance from the right shore.

No. 5.—*Quantity of water.*

In the present state of the river, approaching pretty nearly its minimum of water, only the surface of the section of the main

stream can be taken into consideration in estimating the discharge of water, the Eastern part being formed by sand banks or still water.

The area of the section between the distance of 665 meters and 1420 meters from the left shore contains, as found by projecting it on paper where 5 square millimeters are equal to 1 meter square of the natural size,

8044 square meters.

This must be multiplied by the mean velocity.

*The mean velocity* lies, as an inspection of the table of velocities shows, between

1.0 and 1.2 meters per second

it can be determined more accurately by the formula

$$m = s - \sqrt{s} + 0.5,*$$

where  $m$  is the mean velocity,  $s$  the surface velocity in English inches per second, from which the meters are got by multiplying the result by .0254.

The surface velocity being 1.30, 1.42, 1.15 meters or 1.29 meters on an average, the resulting mean velocity is 1.12 meters a second.

This multiplied by 8044 the number of square meters as mentioned above gives as the *discharge of water* in 1 second of time.

9010 cubic meters = 318200 cubic English ft.

To get an approximate idea of the discharge during the greatest height of the water the following considerations may guide us.

The velocity in the main stream of the Brahmaputra during the height of the water after the rains, approximately ascertained from the rate of boats at the time of low and of high water is at least  $\frac{3}{2}$  of what it is at present, a velocity, sometimes even exceeded in times of rapid rises of the river.

The increase of the section of the main stream between 665 and 1420 meters from the left shore is, as shown by the section 6750, square meters.

These multiplied by 1.68 gives an increase of water

= 11340 cubic meters.

\* The bottom velocity " $b$ ," expressed by the formula  $b = 2m - s$  becomes 0.95 meters per second.

From 1420 m. to the right shore the increase of the section is 248 square meters.

The depth being less, the velocity seems not much to exceed the present velocity of the main stream, which gives an increase of  $248 \times 1.12$ .

= 277 cubic meters.

The rest of the river to the left shore increases the section by 3270 square meters leaving out some shallow places close to the Kormonasah rock.

The velocity of this part being, particularly in the arm No. 1 of the section, very rapid is at least 1.5 meters, corresponding to a discharge per second of

4705 cubic meters.

Total increase

16320 cubic feet,

Approximate total quantity during high water,

25330 cubic meters.

or 894700 cubic ft.





*Aborigines of the Nilgiris.*—By B. H. HODGSON, *Esquire.*

| <i>English.</i> | <i>Toda.</i>                | <i>Kota.</i> | <i>Badaga.</i>            | <i>Kurumba.</i> | <i>Iruia.</i> |
|-----------------|-----------------------------|--------------|---------------------------|-----------------|---------------|
| Air             | Kátu (á=ou in bought)       | Gálé         | Glai (l particular sound) | Gáli            | Kátu          |
| Ant             | Erb                         | Irbé         | Irúpu                     | Irupu           | Iurmbu        |
| Arrow           | Abu                         | Ambe         | Ambu                      | Ambu            | Ambu          |
| Bird            | Bilti                       | Péké         | Hakibu                    | Hakibu          | Páki          |
| Blood           | Bách                        | Netra        | Netru                     | Netaru          | Iátta         |
| Boar            | Caret                       | Gandu pandij | Gand handij               | Gand handy      | Gándu pani    |
| Bone            | Elf                         | Yelave       | Yellu, Illu               | Yellu           | Yellambu      |
| Boy             | Moch (lit. son)             | Magé         | Máti                      | Mati            | Kúge          |
| Brother         | Ennon vót ó=german          | Anna, Tamma  | Kúda huiidava             | ..              | Annan, Tambri |
| Elder brother   | Ennon etud                  | Appan        | Anna                      | Anna            | Anna          |
| Younger brother | Ennon kinud                 | Királ        | Tamma                     | Tamma           | També         |
| Cat             | Koti                        | Pisé         | Koti                      | Koti            | Puné          |
| Child           | Pópen, Enne                 | Magé         | Kúju                      | Kusu            | Púllé         |
| Male child      | Moch                        | Gandu mage   | Gandu kuju                | Gandu kusu      | Ampúlle       |
| Female ditto    | Kuch                        | Peñne mage   | Henpu kuju                | Henpu kusu      | Pompullé      |
| Cow             | Dánám                       | Ave          | Dana, Hasu                | Dana            | Mádu          |
| Cock            | Caret                       | Púse kóli    | Háva, Húrja               | Hunja koli      | Javalu        |
| Crow            | Kák                         | Káké         | Káké                      | Kaké            | Kaké          |
| Day             | Nál                         | Nalé         | Dina, Jina                | Dina            | Nalu          |
| Dog             | Noi                         | Nai          | Nai                       | Nai             | Nai           |
| Ear             | Kevvi                       | Kivé         | Kivé                      | Kivé            | Kádu          |
| Earth           | Búmi                        | Búmi         | Búmi                      | Mannu, Búmi     | Bumi          |
| Egg             | Motte                       | Motte        | Motte                     | Motte           | Mottu         |
| Elephant        | An                          | ..           | Ane                       | Ane             | Ane           |
| Eye             | Kann                        | Kannu        | Kannu                     | Kannu           | Kannu         |
| Father          | Eyan                        | Eyan         | Appa, Tande               | Tande           | A'mme         |
| Fire            | Nebb, Dilt (th=Eng-lish th) | Dijé         | Kichéhu                   | Kichu           | Tü, Tee       |

| <i>English.</i> | <i>Toda.</i>                 | <i>Kota.</i>          | <i>Badaga.</i> | <i>Kurumba.</i> | <i>Iruḷa.</i> |
|-----------------|------------------------------|-----------------------|----------------|-----------------|---------------|
| Fish            | Mín                          | Míné                  | Mínu           | Minu            | Mínu          |
| Flower          | Púf                          | Púve                  | Hóvu           | Huv             | Pu            |
| Fowl            | Kúdi                         | Kóli                  | Króvi (Badaga) | Kóli            | Kóli          |
| Foot            | Kál                          | Kálú                  | Kálu           | Kálu            | Kálu          |
| Goat            | Adu                          | Adu                   | Adu            | Adu             | Adu           |
| He goat         | Caret                        | Gandadu               | Hótu           | Gandádu         | Katai         |
| She ditto       | Caret                        | Peñadu                | Henadu         | Henádu          | Henádu        |
| Hair            | Mír                          | Míre                  | Mandé, Kúdalú  | Kudalu          | Meiru         |
| Hand            | Koi                          | Kei                   | Kei            | Kei             | Kei           |
| Head            | Mad                          | Mandé                 | Mandé, Tálé    | Mandé           | Télé          |
| Hen             | Caret                        | Pennekóli             | Hette kroví    | Kóli            | Heñukoli      |
| Hog             | Pandij                       | Panje                 | Handij         | Handij          | Panni         |
| Horn            | Kuar                         | Kóbe                  | Kodu, Kombu    | Kombu           | Kombu         |
| Horse           | Kadarae                      | Kudare                | Kudure         | Kudure          | Kudure        |
| House           | Todo house-Arsh              | Pei                   | Mane           | Mane            | Kúre          |
| House of        | Badaga house and Daé-rypálti | ..                    | ..             | ..              | ..            |
| Husband         | Europeans, or Bungalows-Kúat | Alé                   | Ganda          | Maneava         | Ganda         |
| Iron            | Al                           | Ibbe                  | Kabbuna        | Kabbuna         | Irumbu        |
| Leaf            | Kabbun                       | Yéllé                 | Yéllé          | Yéllé           | Yéllé         |
| Light           | Ersh                         | Belaku                | Divige         | Dípa            | Valaku        |
| Man             | Velaku                       | Ale, Manijon          | Manija         | Manisha         | Manisha       |
| Female          | Al                           | Pemmage               | Henpu          | Henpu           | Ponnu         |
| Monkey          | Kuch                         | Turuni, Kódan, Pershk | Korangu        | Korangu         | Korangu       |
| Moon            | Teggall                      | Korté                 | Tiggalu        | Chandra, Tingla | Nálavu        |
| Mother          | Avv                          | Tiggulé               | Avve, Tai      | Avve            | Avve          |
| Mountain        | Bana, Dalta, Márs            | Vettume               | Betta          | Bettu           | Mélé          |
| Mouth           | Boi                          | Vai                   | Bai            | Bai             | Vai           |
| Musquito        | Chikattu                     | Chukattu              | Chukattu       | Sógane          | Jolle         |

| Name         | Pér                  | Hesaru       | Hessaru, Peru | Hessuru       |
|--------------|----------------------|--------------|---------------|---------------|
| Night        | Kaggár               | Iru, Kattale | Iru           | Rittu         |
| Oil          | Ennei                | Yenne        | Yenne         | E'enne        |
| Plantain     | Pávón                | Blaéhannu    | Palehannu     | Pálepámbu     |
| Rice         | Arshk                | Nellakki     | Nellakki      | Arsi          |
| Boiled rice  | Tuáru                | Kru, Anna    | Kúlu          | Jóru          |
| River        | Pá                   | Halla, Holla | Nirú          | Pálla         |
| Road         | Aldár                | Dári         | Dári          | Beete, Dadáda |
| Salt         | Uppu                 | Uppu         | Uppu          | Uppu          |
| Skin         | Tuvarsh              | Tólu         | Tólu          | Tólu          |
| Sky          | Bán                  | Banu         | Bana          | Vánu          |
| Sister       | Enor vót kuch        | Akka tange   | Akka, Amme    | Akken, Tänge  |
| Snake        | Páb                  | Hávu, Pámbu  | Hávu          | Pámbu         |
| Sow          | Pandi                | Hennuhandij  | Henhandy      | Panni         |
| Star         | Mín                  | Mínu         | Mínu          | Vánu minu     |
| Stone        | Kall                 | Kallu        | Kallu         | Kállu         |
| Sun          | Bírsh                | Potte        | Hottu         | Pódu          |
| Tiger        | Búrsh (ü = german ü) | Puije        | Huli          | Pulli         |
| Tooth        | Parsh                | Palle        | Hallu         | Pallu         |
| Tree         | Maen (ae = german ä) | Marama       | Mara          | Mara          |
| Village      | Hañi, úr             | Hañi         | Úru           | Úru           |
| Toda village | Mort                 | Mandu        | Mand          | ..            |
| Water        | Nír                  | Niru         | Niru          | Dani          |
| Wheat        | Gádubi               | Godumbi      | Godumbi       | Godumbi       |
| Wife         | Kuigyó               | Hendaru      | Hendaru       | Pondu         |
| Yam          | ..                   | Mungé        | ..            | ..            |
| I            | Anu                  | Ná           | Ná            | Nanu          |
| Thou         | Ni                   | Ní           | Ni            | Ni            |
| He           | Adum, Avan           | Ava          | Avanu         | Ava           |
| She          | Adum, Adu            | Avla         | Avlu          | Avla          |
| It           | Adum, Adu            | Adu          | Adu           | Adu           |
| We           | Am, Em               | Yengla       | Yenga         | Návu          |

| <i>English.</i> | <i>Toda.</i>     | <i>Kota.</i>  | <i>Badaga.</i>     | <i>Kurumba.</i> | <i>Iruḷa.</i> |
|-----------------|------------------|---------------|--------------------|-----------------|---------------|
| You             | Niv              | Ninge         | Ningla             | Ninga           | Niv           |
| They            | Avar adum        | Avarē         | Avaka              | Avaru           | Aduru         |
| Mine            | Yennadú          | Yennade       | Yennadu            | Yennadu         | Nannadu       |
| Thine           | Ninnadu          | Ninnade       | Ninnadu            | Ninnadu         | Ninadu        |
| His             | Avandu           | Avanade       | Avanadu            | Avanadu         | Avanudu       |
| Our's           | Yemmadu or<br>du | Namma-Nangude | Yengadu, Nammadu   | Yengadu         | Nammudu       |
| Your's          | Nimmadu or       | Ningadu       | Ningadu            | Ningadu         | Nimmudu       |
| Their's         | Avaradu          | Avarade       | Avaradu, Avakaradu | Avaradu         | Avarudu       |
| One             | Vadd             | Vodde         | Vondu              |                 | Vondu         |
| Two             | Ed               | Yede          | Yeraḍu             |                 | Irudu         |
| Three           | Múdu             | Munde         | Múru               |                 | Muru          |
| Four            | Nānk             | Nake          | Nalku              |                 | Náku          |
| Five            | útsu             | Anje          | Eidu               |                 | Eindu         |
| Six             | Ar               | Are           | Aru                |                 | Aru           |
| Seven           | El               | Yéye          | Yéllu              |                 | Elu           |
| Eight           | Ett              | Yette         | Yettu              |                 | Yettu         |
| Nine            | Anpath           | Vorupáde      | Vombattu           |                 | Vombadu       |
| Ten             | Path             | Patte         | Hattu              |                 | Pattu         |
| Twenty          | Evoth            | Irváde        | Ibbatta            | Ibbatu          | Irvadu        |
| Thirty,         | Múbath           | Múvatte       | Muvattu            | Muvattu         | Mubbadu       |
| Forty           | Narshbath        | Nalvatte      | Nalvattu           | Nalvatu         | Nábadu        |
| Fifty           | E'both           | Eivatte       | Eivattu            | Eivattu         | Ambadu        |
| Hundred         | Vadnúr           | Nur           | Nuru               | Nuru            | Núru          |
| Of              | N. M.            | N. M.         | Ya, Na             | Ya, Na          | No            |
| To              | Ge, G            | Ge            | Ga                 | Ge, Ke          | Ke            |
| By or from      | Ind, Ar          | Inde          | Inda               | Inda            | Irinda, Inda  |
| With, cum       | ..               | Sengada       | Kóda               | Sangada         | Káda          |
| Without, sine   | Allade           | Allade        | Allade             | Allade          | Adalla        |
| In              | Ult              | Vollage       | Vollage            | Vollage         | Ulle          |

(N. B.—Genitive case scarcely used, the nominative case is used instead of it).

|                  |              |             |             |             |             |
|------------------|--------------|-------------|-------------|-------------|-------------|
| On               | Mél, Mok     | Méle        | Méle        | Méle        | Méle        |
| Now              | Eni          | I'ga        | I'ga        | I'ga        | I'ga        |
| Then             | Ani          | Agale       | Agale       | Agale       | Agale       |
| When             | E'tvan       | Yé'ga       | Yé'ga       | Yé'ga       | Yé'ga       |
| To-day           | E'du         | Indu        | Indu        | Indu        | Indu        |
| To-morrow        | Belkash      | Nále        | Nále        | Nále        | Nále        |
| Yesterday        | Enné         | Ninne       | Ninne       | Ninne       | Ninne       |
| Here             | It, Ing      | Illi        | Illi        | Illi        | Illi        |
| There            | At, Ang      | Alli        | Alli        | Alli        | Alli        |
| Where            | Et           | Yéle        | Yéle        | Yéle        | Yéle        |
| Above            | Mél          | Méle        | Méle        | Méle        | Méle        |
| Below            | Erg, Neshg   | Kriyaga     | Kriyaga     | Kriyaga     | Kriyaga     |
| Between          | Ná'rh, Káshi | Ná'le       | Ná'le       | Ná'le       | Ná'le       |
| Without, outside | Pornud       | Porenje     | Porenje     | Porenje     | Porenje     |
| Within           | U'f          | U'f         | U'f         | U'f         | U'f         |
| Far              | Podthdshi    | Dúrame      | Dúrame      | Dúrame      | Dúrame      |
| Near             | Keehuri      | Vottle      | Vottle      | Vottle      | Vottle      |
| Little           | Yeddi, Kinud | Kuna, Konji | Kuna, Konji | Kuna, Konji | Kuna, Konji |
| Much             | Upam         | Yeddame     | Yeddame     | Yeddame     | Yeddame     |
| How much         | Yet          | Yéje        | Yéje        | Yéje        | Yéje        |
| As               | Yingei       | Yete        | Yete        | Yete        | Yete        |
| So               | Ingei        | Ate         | Ate         | Ate         | Ate         |
| Thus             | Ingei, Angei | Ate, Angei  | Ate, Angei  | Ate, Angei  | Ate, Angei  |
| How              | Hyage        | Yéje        | Yéje        | Yéje        | Yéje        |
| Why?             | Aed          | Yendea      | Yendea      | Yendea      | Yendea      |
| Yes              | Ha           | Ha          | Ha          | Ha          | Ha          |
| No               | A'           | Illa        | Illa        | Illa        | Illa        |
| Do not           | Achadi       | Béda        | Béda        | Béda        | Béda        |
| Or               | Illade       | Illave      | Illave      | Illave      | Illave      |
| This             | Avan         | Avana       | Avana       | Avana       | Avana       |
| That             | Adu          | Adu         | Adu         | Adu         | Adu         |
| Which?           | Yádu         | Yédu        | Yédu        | Yédu        | Yédu        |



| <i>English.</i> | <i>Toda.</i>                     | <i>Kota.</i>   | <i>Badaga.</i>           | <i>Kurumba.</i>        | <i>Iruka.</i>    |
|-----------------|----------------------------------|----------------|--------------------------|------------------------|------------------|
| What?           | E'n                              | Yéna           | Yéna                     | Yénu                   | Yenna            |
| Who?            | A'r                              | Áre            | Yáru                     | Yáru                   | Áru              |
| Eat             | Thedth biné                      | Tiggene        | Tinane                   |                        | Tinke            |
| Drink           | Udth bini                        | Uniklene       | Kudidane                 |                        | KúdiKe           |
| Sleep           | Vorchth bin or<br>gíné           | Vor- Pat kene  | Voragine                 |                        | Rombuve          |
| Wake            | Eðaderth bini                    | Mekikene       | Ylledane                 |                        | Yélke            |
| Laugh           | Karth bini                       | Karsibe        | Naggadane                |                        | Jirike           |
| Weep            | Ath bini                         | Attube         | Altané                   | peculiar               | E'ke             |
| Be silent       | Bokkiru                          | Bhévé          | Sámagiru,<br>niru        | Sappe                  | Summa iru        |
| Speak           | Eshth bini or Arversh<br>bini    | Mansbe         | Nudi dane, Mátá-<br>dine | like the Badaga verbs. | Peshike          |
| Come            | It va                            | It va          | Ite ba                   |                        | Iti ba           |
| Go              | At fo                            | At hógú        | Ate hógú                 |                        | Bho              |
| Stand up        | Mklo                             | Nitullé        | Niddiru                  |                        | Nike             |
| Sit down        | Neshkir                          | Kásure         | Kuli, Kútiru             |                        | Kukuve           |
| I walk          | Nadersh bini                     | Nadegabe       | Nadedane                 | Nadedane               | Nadake           |
| Run             | Vádu                             | Vóse           | Vádu                     |                        | Vódipoke         |
| I give          | Tashken                          | Kadube         | Tanane                   |                        | Tarke            |
| Take away       | Ett fo                           | Ett hógú       | Yettiund hógú            |                        | Ededu kondu poke |
| I strike        | Puis bini                        | Puigabe        | Huidane                  |                        | Ádike            |
| I kill          | Bésht vers bini [biné            | Taverigabe     | Koddane                  |                        | Kolluke          |
| I raise         | Túchs bine, Mokvers              | Yetti gabe     | Yettinetáline            |                        | Yékkuke          |
| I put down      | Háks biné, Potvers<br>biné [biné | Kriaga veigabe | Hakine                   | like the Badaga verbs. | Irke             |
| I hear          | Kelth biné, Vonath               | Vorutabe       | Kretine, Voradiné        |                        | Kélke            |
| I understand    | Arth biné                        | Arsibe         | Aridane                  |                        | Arike            |
| Tell            | Binduqverth biné                 | Peidibe        | Hlegine                  | like the Badaga verbs. | Sollre           |
| Good            | Vuli                             | Volle          | Volle                    | Volle                  | Nalla            |

|           |                   |                 |               |            |              |
|-----------|-------------------|-----------------|---------------|------------|--------------|
| Bad       | Vollade           | Aga             | Holla         | Ketta      | Polla        |
| Cold      | Perthti, Kuarthti | Jalli           | Jalli, Kóravu | Jei        | Jalli        |
| Hot       | Kásti, Kásviji    | Uri             | Uri, Bissé    | Bissé      | Kája         |
| Raw       | Paji              | Paje            | Háse          | Hasu       | Paje         |
| Sweet     | Djati             | Sé              | Si            | Si         | Rúse         |
| Sour      | Púlthati          | Pulsa           | Hulli         | Hulli      | Pulli        |
| Bitter    | Káthti            | Kaju            | Káhi          | Káhi       | Késape       |
| Handsome  | Nárthti           | Pasane, Singara | Singara       | Singara    | Alagu        |
| Ugly      | Adádi             | Máse            | Holla         | Hola       | Polla        |
| Straight  | Caret             | Hasia, Nettu    | Nettage       | Nettage    | Nette        |
| Crooked   | Balug             | Kénke           | Gokke         | Gokke      | Kokki        |
| Black     | Kárthti           | Kari            | Kari, Kappu   | Koppu      | Kari         |
| White     | Belpu             | Velape          | Belapu        | Bóle       | Véle         |
| Red       | Kebbu             | Kembu           | Kebbu         | Kempu      | Jevve        |
| Green     | Paje              | Paje            | Hase          | Hase       | Páje         |
| Long      | Nirigiti          | Uddame          | Udda          | Udda       | Uddya        |
| Short     | Kurigiti          | Mone            | Mone          | Mone, Kúle | Kúle         |
| Tall man  | Nirigi ál         | Uddaman         | Uddava        | Uddalu     | Udda manisha |
| Short man | Kuruḍa moch       | Mod ále         | Moneava       | Kúle alu   | Kúle manisha |
| Great     | Etud              | Dadḍa           | Dadda         | Dodda      | Dodda        |
| Round     | Caret             | Mudde           | Urutu         | Urute      | Rutte        |
| Square    | Caret             | Satte           | Jauka         | Jauka      | Javuka       |
| Fat       | Bechiti           | Porale          | Kobbu         | Gobbu      | Kolupu       |
| Thin      | Kinud             | Vottale         | Kuna          | Melle      | Vadage       |
| Thirst    | Nirchásti         | Arthóje         | Arupu         | Arupu      | Véke         |
| Hunger    | Bír erthti        | Peti hoje       | Hasu          | Hasu       | Passi        |
| Weariness | Caret             | Salupu.         | Salupu        | Salupu     | Salupu       |

The difference of the several dialects of the hill tribes consists not exactly in the idiom of the languages but chiefly in their pronunciation. Therefore, the same or nearly the same word in the mouth of a Toda with his pectoral pronunciation can scarcely be recognized as the same in the mouth of the Kotas with their dental pronunciation. The Badaga and Kurumba dialects are midway between the former two, with regard to pronunciation; only the Badaga is a little more guttural than the Kurumba. There is a little difference in the dialects of the several Badaga tribes, those who came at a later period to the hills, for instance the Kangaru "(Lingaites)," who emigrated from Targuru, speaking a purer Canarese than the common Badagas.

The Todas also have some slight difference in their pronunciation according to the different districts they inhabit, for instance some pronounce the *s* quite pure, others like the English *th* and others like *z*.\* The names of the Toda tribes are not quite correct in the letter of Mr. Hodgson. They are the following five: Peikee, Kenna, Pekkan, Kutṭan, Tódi. The chief tribe is the Peikee, which pronounces the *s* like *th*.

\* The *th* English is more especially Burmese; the rest is generally true of the northern tongues, which, even when they possess an ordinary sibilant series, prefer the use of the equivalent *z* series, or *z*, *zy* (Ellis' *zh*) and *dz*, whereof the first is a simple sound; the second a sliding sound as in *azure*, *pleasure*, English, and = the French *j* in *jeu*; the third is the harsh modification of the sound. Several consonants besides *z* take the sliding sound represented by the blended *y*. This modification of the primitive sound of the precedent consonant may be seen in respect to the consonant *p* in the English *pure*, and *puling*, which I write *pyur* and *pyuling*; and so of all consonants followed by *y*. Another almost universal trait of Tartaric phonology is the exceeding commonness of the French *eu*, as heard in *jeu* aforesaid. In the above paper, I have not thought it prudent to meddle with Mr. Metz's orthography.

*Aborigines of the Eastern Ghâts.*

To the Secretary of the Bengal Asiatic Society.

SIR,—Pursuant to my purpose of submitting to the Society, upon an uniform plan and in successive series, samples of all the languages of the non-Arian races of India and of the adjacent countries, I have now the honour to transmit six more vocabularies, for which I am indebted to Mr. H. Newill of the Madras Civil Service, at present employed in Vizagapatam. These six comprise the Kondh, Sávara, Gadaba, Yerukala and Chentsu tongues. In forwarding them to me, Mr. Newill, a very good Telugu scholar, has noted by an annexed asterical mark such words of these tongues, and particularly of Yerukala, as coincide with Telugu. He has also remarked that many of the Chentsu vocables resemble the Urdu.

Having, as you are aware, a purpose of submitting to the Society an analytical dissection of the whole of the vocabularies collected by me, I shall be sparing of remarks on the present occasion. But, I may add to Mr. Newill's brief notes, a few words, as follows':

The Chentsu tribe, whose language, as here exhibited, is almost entirely corrupt Hindi and Urdu, with a few additions from Bengali, affords one more example to the many forthcoming of an uncultivated aboriginal race having abandoned their own tongue. Such relinquishment of the mother-tongue has been so general that throughout Hindustan Proper and the Western Himalaya, as well as throughout the whole of the vast Sub-Himalayan tract denominated the Tarai, not excluding the contiguous valley of Assam, there are but a few exceptions to this the general state of the case, whilst in the Central Himalaya the aboriginal tongues are daily giving way before the Khas language, which, though originally and still traceably Tartaric, has been yet more altered by Arian influences than even the cultivated Dravirian tongues. The very significant cause of this phenomenon it will be our business to explain by and bye. In the meanwhile the fact is well deserving of this passing notice, with reference to the erroneous impression abroad as to the relative amounts of Arian and non-Arian elements in the population of India,—an impression deepened and propagated by the



further fact, still demonstrable among many of these altered aborigines, of the abandonment of their creed and customs, as well as tongue, for those of the Arians. We thence learn the value in all ethnological researches, of physiological evidence, which in regard to all these altered tribes, is sufficient to decide their non-Arian lineage and to link them, past doubt, with the Himalayan and Indo-Chinese conterminous tribes on the east and north. It should be added, however, that, in a sheerly philological point of view, it becomes much more difficult to determine who are the borrowers and who the borrowed from, when both are non-Arians, than when one is Arian and the other non-Arian; and that, for instance, and in reference to the present vocabularies, we can decide at once that the Kondh numerals (save the two first), are borrowed from the Arian vernaculars, whereas it is by no means so certain that the Gadada and Yerukala numerals are borrowed from the Telegu and Karnatic respectively, merely because they coincide; and so also of the pronouns where the same coincidence recurs. All such questions however, are subordinate and secondary; and if we succeed in determining with precision, by physiological, lingual, and other helps, the entire Turanian element of our population, we shall then be able to advance another step and show the respective special affinities of the several cultivated and uncultivated Turanian tribes of India to each other and to certain of the tribes lying beyond India towards Burmah and Tibet, with at least an approximation to the relative antiquity of the successive immigrations into India.

A word in defence of these vocabularies of which the utility has been impugned, and impugned by special comparison with brief grammatical outlines.

When I commenced this series of vocabularies I expressed as strongly as any one could do the opinion that their utility must be circumscribed; and that the ethnology of India would only then be done complete justice to, when every branch of the subject should be carefully and simultaneously studied, upon the plan exemplified in my work on the Kooch, Bodo and Dimal. Much and toilsome labour has, however, since then, convinced me that enquiries confined wholly to India and its immediate vicinity would yield results far less satisfactory than such as should be greatly more extended even



if they were less complete; whilst these continued labours have more and more satisfied me that limited grammatical comparisons are much more apt to give rise to error, than limited glossarial ones. Perhaps the fascination of such extended enquiry may have somewhat biassed my judgment; but I am still decidedly of the opinion that the true relations of the most shifting and erratic, the most ancient and widely dispersed branch of the human family cannot be reasonably investigated upon a contracted scale, while the subject is so vast, that one must needs seek for some feasible means of grasping it, in sufficient amplitude to comprehend its normal character (a thing rather of surface than of depth), at the same time that one neglects not more complete and searching investigation of certain actual or supposed characteristic samples. Such is the course I have been pursuing for some time past. I have examined and am still examining the complete grammatical structure of several of the Himalayan tongues; and I have at the same time submitted the whole of my vocabularies to the alembic of comparative analysis. I hope soon to be able to present the results to the Society. Those of the analysis have been fruitful beyond my hopes, owing to the extraordinary analogy pervading the Tartaric tongues in regard to the laws which govern the construction of all their vocables save the monosyllabic ones, which are very rare. Even a superficial examination of the vocabularies suffices to indicate this prevalence of common constructive principles, and to such persons as have neither time nor skill to trace and demonstrate those principles, the mere collocation of the terms as they stand, if done on a sufficiently ample scale, will afford such evidence of general relationship and family union between the whole of the Indian aborigines and the populations of Indo-China, Sifan, Tibet, and Himalaya, aye and of China also, as philological superciliousness will seek in vain to ignore; and still more so, will the results of the analysis, empirical though that analysis must to some extent be admitted to be. It may be conceded at once, that these vocabularies must necessarily contain a good deal of error which could only be completely avoided by a perfect knowledge of each recorded tongue on the part of its recorder. But, as the languages are counted by hundreds, and as very few of them ever were or ever will be cultivated either by those

who speak them or by others, it is obvious that such precision can never be reached. On the other hand, it is certain that practical results of great value have been reached by a much less superfine process than that insisted on, and that, if we suppose some thousands of facts, so simple in their nature as the mere vocables of a language are, collected with ordinary care, their failing to subserve effectually some of the highest ends of ethnological science, more particularly if taken in connexion with other available evidence, must result rather from the incompetency of him to whom they are submitted, than from their own intrinsic deficiency. Vocabularies illustrate one another and furnish to the skilful no small means of correction of palpable errors, if sufficiently numerous. They also furnish means of sound induction from analogy, as I hope to prove by and bye beyond the possibility of cavil.

In a word, vocabularies seem to me very much like the little instrument which Hamlet puts into the hands of Polonius; a mere bit of perforated wood, which yet in competent hands can be made to discourse sweet music. Nor can I avoid some emotions of surprise and pain (for to disparage vocabularies is to discourage their collection) when I see learned men citing with applause the inferences built upon a few doubtful words picked out of a classic writer, or perchance out of some old map, and which yet are supposed to furnish sufficient evidence of the affinity of a lost tribe, renowned in the history of past times, whilst these same learned and eminent men allow themselves to speak of vocabularies containing some hundred of words, carefully selected and deliberately set down from the mouths of those to whom they are mother-tongues, as if these vocabularies could not furnish any legitimate basis for inference respecting ethnological affinities. But the objection adverted to is sufficiently answered by the valuable purposes which my series of vocabularies, long before completion, and with little or no resort to analysis, has been made actually to subserve; and therefore, I trust, it is no presumption in me to expect to be able to educe yet more ample and important results from their careful analysis\* after com-

\* I subjoin a sample or two of my method of dealing with the vocables, to demonstrate, 1st, identity of roots, 2nd, identity of adjuncts, 3rd, identity of constructive principles.

pletion. Fresh ones continue to flow in upon me still, and I have obtained not less than thirty, almost all new, since my analysis was nearly completed. This is the reason why it has been withheld—

Sá, Burmese, a son.

A-sá, } Limbu { a child.  
Ku-sa } { a son.

Ku-sú, Karnatak, a child.

Ku-sé, Mikir, ditto.

Ku-ko-s', Oraon, ditto.

Ta-ng-ko-s', ditto, ditto.

Pá, passim, father.

Ta-pé, Gyarung, ditto.

Ka-pá, Kassia, ditto.

Ta-ga-pá-n, Tamil, ditto.

Wa-pé, Gyarung, ditto.

U-pá, Hayu, ditto.

W-ab, Circassian, ditto.

U-pá, Chintang, ditto.

O-pá, Rangchhen, ditto.

U-pá-p, Thulung, ditto.

U-ka-pá, Kassia, ditto.

Ap-ó, Chowrasi, ditto.

A-pa, Waling, my father.

Yí-n } Chinese { Mankind, the spe-  
Yú-n } { cies.

E-yá-n, Toder, father.

You-k, Burmese, man, the male.

Yó, Savara, woman, mother.

Yú-m, Tibetan, ditto.

A-yú } Lepcha and { a wife.

Ta-yu } Tamil { a woman.

Ta-yí, Karnatak and Yerukala, a mother.

Ta-ng-yó, Oraon, a mother.

Ta-í } Khyi or Kassia { a mother: í =  
Tha-í } Malabar { yi.

Er = Ré, Onigur, man.

Ar = Rá, Mikir, ditto.

Ir = Rí, Bhaskir and Nogay, ditto.

A-ir = a-ríj, Armenian, ditto.

E-ri-l, Ho, ditto.

E-ré-l, Sontal, ditto.

E-ro-s, Hungarian, virilis.

Wi-ró, Scythic, man.

U-rí, Kasikumak, man.

G-rí, Kocch and Dimai, Pater familias.

G-rá, Bodo, head of pagus.

E-ri-n, Kasikumak, man.

T-ri-n, Shan, ditto.

Ta-n-d-rí, Telugu, father.

Ta-g-rí, Lepcha, man, father.

*Sa* (vel *chá*) is the root. It means a non-adult. *Ka* vel *ga* is the indefinite article; and *a*, the definite, or its equivalent = my, so that *ku-sa* is any child, and *a-sa* my child. *Ta* is = *ka* and both take the nasal appendage, *n*, *ng*, or *m*. Oraon iterates the prefix and elides the vowel of its root: *ta-ka-sa* = *ta-ga-pa* below.

The root speaks for itself, Gyarung has the *ta* and Kassia the *ka* prefix. They are commutable *ta* vel *da* and *ka* vel *ga*, and the use of both is normal. Tamil exhibits both and also the nasal suffix. The *ta* vel *ka*, used as an indefinite article is a contraction of the 3rd pronoun, another form of which is *ú* vel *ó* vel *w*. Hence *u-pa*, *o-pa*, *wa-b* vel *wa-p*, *ta-pa* and *ka-pa* = pater illius vel istius, pater cujusvis, a father whilst *á-pá* = my father as above. Thulung iterates the root, and Kassia the articular prefix, like Tamil *u-ka-pa* = *ta-ga-pa*.

*Ya*, *yu*, *yi* the root = man the species, or the male or female, or the emphatic female, viz. mother. Chinese, Burmese and Tibetan have the suffixal definitive; *m* = *n*, as in Chinese and Tamil supra: *k* suffix, the same as *k* vel *g* prefix supra, such transposition being normal and exemplified in *ap-o* = *u-pa* = *wa-b*, supra. Observe that the use of the prefixal *a* and *ta*, as respectively definite and indefinite articles, is common to Tamil, Lepcha and Limbu. I might add Burmese, &c. &c. Malabar has *ta* prefix aspirated.

The *rá*, *ré*, *ri* root for mankind is palpable throughout and the prefixes and suffixes, as well as the cumulation of the former, are normal and therefore harmonize with the preceding samples; thus *t-rí*, *g-rí*, *ta-g-rí* respond precisely to *tá-pa*, *ka-pa*, *tá-gá-pá* aforegone, while the *n* suffix of Shan *trí-n* = the Tamil *n* in *tagapa-n* not less than the Telugu *n* in *ta-n-dri*. *A* vel *e* and *u* vel *w* prefixes recur just as in *a-sa*, *a-pa*, *a-yu*, *e-ya-n*, *u-pa* and *o-pa*. So also the nasal infix, whilst the suffixed labial and sibilant are as normal as the other adjuncts.

this, and the daily increasing skill in the use of that most potent of instruments, extended comparative analysis. But I cannot now

The above samples are selected out of thousands whereby collectively perfect proof is afforded that Tartaric vocables are every where subject to identical laws of construction and built out of identical materials. In the absence of books of authority to cite, the demonstration must of necessity be *par la voie du fait*, and depend on the fitness and number of instances. I am prepared with thousands of instances whose applicability or fitness will, I think, be allowed to be irresistibly convincing. Though we have good grammars, dictionaries and books on some few of the many tongues I cite, I am not aware that the composition of vocables has at all engaged the attention of their authors. It is the rock I build on.

Addenda—Under the head *Sá*, Burmese, a son, add

*Sá-u*, Thai, a son.  
*O-su*, U-sa, Lazic, a child.  
*D-si*, vel *D-zi*. Kuanchua, a son.  
*T-sé*, *T-sé-i*, Kong, a child.  
*D-chú-i*, Mantchu, ditto.  
*Chó-a*, Kocch, ditto.  
*Kó-a*,\* *Hó*, a child.

\* *Sá* = *chá* on one hand and *ká* on the other. The soft *sa* passes into *za* or *zya* (French *j*); and the hard *cha* into *ka*, as in church = kirk. Thus *Ho Kó* = *Kocch Chó*, as surely as the suffix *á* = the prefix *a*, whether used as a definitely or indefinitely definitive article: *á-yú* Lepcha, a wife, shows it as quasi definite whilst *á-kap*, a child, gives the *a* an indefinite sense rather; and *a-nak* in Lepcha and Burmese = the black, or a black one, is used either way.

The prefix *da* vel *ta*, by elision *d'*, *t'*, is as common a definitive, as *ka* vel *ga* with which it is constantly interchangeable, or both are given, as in *ta-pa*, *ka-pa*, *ta-ga-pa*; and *á* vel *é* prefix has often the indefinite article sense, and thus also is used indifferently with *ta* and *ka*, thus Burmese *a-yen* vel *ka-yen*, an aborigine; and thus *ta-vó* vel *ka-vó*, a bird in Bugis. The most common of definitives which are tantamount to articles usually indefinite, are, *t* vel *d*; *k* vel *g*; *n*, *ng*, vel *m*; *p*, *b*. *v.* vel *w*; *r*, vel *l*; and the vowels *i*, *e*, *a*, *u*, *o* which are all nearly commutable as being in origin = ille, iste. And all are liable to transposition and thus to become suffixes, as well as to be repeated both prefixally and suffixally as in Chinese *t-se-i* and Mantchu *d-chu-i* where *sa* vel *cha* = little, is the crude, and *t-se-i*, vel *d-chu-i*, precisely our English "a little one." That this is so, compare Chinese *tá* = great and *sé* = small with Newari *tá* and *chí* having the same sense. Newari takes the *ka*, *ga* suffix, like Mantchu, thus *chi-ki* small, and *d-cha-ka* a thing, in those tongues respectively.

Under the head *Yu-n*, mankind, after the word *You-k*, Burmese, add the word—

*K-yó-ga*, Tibetan, a man, the male.

Tibetan *k-yó-ga* from the *yá*, *yú*, *yó* crude, shows the *ka* vel *ga* definitive in both forms (soft and hard) and in both positions (prefix and suffix). The correspondent word for the female is *ki-mi* = *ka-mi* in Kassia and not less = *ka-mi* and *ku-mi* in the tongues so named after the name for our species in them. The sexual distributive use of *ka* and *u* prefixes in Kassia is only of secondary



expect and hardly desire any more new materials, and I hope therefore, soon to be able to submit my examination of the whole.

{ value, like the prefixual or postfixual position of the definitives, thus *ap-o* in Chourasi and *o-pa* in Rungchhen, = pater istius or ejus pater, viz. a father, any one's father, are from mere dialects of the same tongue or Kirunti. Thus also *Sa-u*, *Thai*, filius ejus = *U-sa*, *O-su*, Lazic. Compare *Yo* and *K-yo* with *Mari* and *K-mari*, *Lu-n* and *K-lu-n*, &c. apud Mongol Affin. of Caucasians, [Journal for January, 1853.



| <i>Vocabulary of some of the Dialects of the Hill and wandering tribes in the Northern Sircars.</i> |               |                 |                |
|-----------------------------------------------------------------------------------------------------|---------------|-----------------|----------------|
| <i>English.</i>                                                                                     | <i>Kondh.</i> | <i>S'avara.</i> | <i>Gadaba.</i> |
| Air                                                                                                 | Billu         | Ringe           | Ganváyí        |
| Ant                                                                                                 | ..            | Bobo            | Gusála         |
| Arrow                                                                                               | Pinju         | Am              | Sonai          |
| Bird                                                                                                | Propamannéru  | Onti            | Piti           |
| Boat                                                                                                | Rakko         | Miyamo          | Yignam         |
| Boat                                                                                                | Tekkinga      | Vodá*           | Dóna           |
| Bone                                                                                                | Pásu          | Ajáña           | Vondrángóyí    |
| Buffaloe                                                                                            | Kóru          | Bognátel        | Vontsani       |
| Cat                                                                                                 | Miyó          | Rámegná         | Girem          |
| Cow                                                                                                 | Kháyi         | Tangli          | Bandi          |
| Crow                                                                                                | Káka          | Káká            | Guggá          |
| Day                                                                                                 | Vujjágú       | Tambá           | Simnyá         |
| Dog                                                                                                 | Nahudi        | Kencho          | Guso           |
| Ear                                                                                                 | Kirru         | Luv             | Nintiri        |
| Earth                                                                                               | Taná          | Labo            | ..             |
| Egg                                                                                                 | Vatánga       | Are             | Mittá          |
| Elephant                                                                                            | Hattanga      | Ra              | Kom            |
| Eye                                                                                                 | Kannuka       | Amu             | Olló           |
| Father                                                                                              | Abbá          | Uwá             | Abbá           |
| Fire                                                                                                | Nádi          | Togo            | Sungol         |
| Fish                                                                                                | Mininga       | Ayo             | Addam          |
| Flower                                                                                              | Sáru          | Taraba          | Sari           |
| Foot                                                                                                | Vestámu       | Aji             | Adugésenánu    |
| Goat                                                                                                | Vodanga       | Kime            | Yimme          |
| Hair                                                                                                | Tlámbérakha   | Avu             | Jarli          |
| Hand                                                                                                | Káju          | Asi             | Titti          |
| Head                                                                                                | Tlávu         | Abúmuv, Abumv   | Bo             |
| Hog                                                                                                 | Pajji         | Kimbo           | Gibbi          |
| Horn                                                                                                | Kosko         | Ajigna          | Nirri          |

† In Telugu káki.

‡ Telugu pagalu.

| <i>Yerukala.</i>     | <i>Chentsu.</i> |
|----------------------|-----------------|
| Gáli*                | Batás           |
| Chima*               | Peppide         |
| Yikke                | Kondu, Kánd     |
| Kokku, Sogide, Kunju | Chodai          |
| Regam, Vudaram       | Lahu            |
| Padava*              | Lá              |
| Yamaka*              | Had             |
| Barre*               | Mohis           |
| Púna                 | Billeyi         |
| Alamádu, Pútamádu    | Gáyi            |
| Selan Káká†          | Ková            |
| Pammárú, ‡ Pangámáru | Din             |
| Náyi                 | Kukkúr          |
| Sóyi                 | Kán             |
| Tarra                | Bhúyi           |
| Mutta                | Dimma           |
| Ana                  | Hate            |
| Supán                | Ayenkhi         |
| Avá                  | Ba              |
| Nerupu               | Agin            |
| Mínu                 | Matstó          |
| Puvvu*               | Phul            |
| Medapán, Kéru        | Khoju           |
| Ajá                  | Chheli          |
| Vondu, Mogurú        | Kéms            |
| Káyi, ki             | Hát             |
| Vondu, Talayi        | Múnd            |
| Pandri               | Suvvar, Ghusiri |
| Kómmu*               | Sing            |

|          |           |              |           |                  |                  |
|----------|-----------|--------------|-----------|------------------|------------------|
| Horse    | Godá      | Kudata       | Kirtyám   | Kudara           | Ghódó            |
| House    | Yiddu     | Súgna        | Deyyón    | Vúdu             | Ghór             |
| Iron     | Luharigá  | Lóná         | Vonehani  | Yerunbu          | Loho             |
| Leaf     | Aka       | Olá          | Vollá     | Yale, Yalaku     | Pát              |
| Light    | Vujwálá   | Tambá        | Tarádutu  | Valuku           | Díp, Vujait      |
| Man      | Lokká     | Mandra       | Lokko     | Munasam          | Mánús            |
| Monkey   | Kóju      | Karóyi       | Gusá      | Kóte*            | Mákađ            |
| Moon     | Layidi    | Vonga        | Arke      | Tarra            | Másu             |
| Mother   | Ayyá      | Yo           | Peñamma   | Táyi             | Má               |
| Mountain | Soru      | Baru         | Kondá     | Geřtu            | Parvat           |
| Mouth    | Súđda     | Amuká        | Tummo     | Váyi             | Mú               |
| Moschita | Vihángá   | Abubbo       | Kirigi    | Yeyyi            | Mussó            |
| Name     | Paddá     | Vonneman     | Nenimmede | Andu             | Ná               |
| Night    | ..        | Tógolo       | Tungol    | Ravu, Náváru     | Ráyt             |
| Oil      | Níju      | Miyvalo      | Sól       | Rganna, Vanna    | Tél              |
| Plantain | Tádi      | Kinte        | Vusubullu | Nivále           | Kodel, Sodail    |
| River    | Jóđi      | Náyi         | Roggilu   | Aru              | Loddi, Ladi      |
| Road     | Pálóri    | Tangóra      | Kungóru   | Yegi             | Bát              |
| Salt     | Vuppanga  | Basi         | Bitti     | Sonara           | Nún              |
| Skin     | Pándá     | Wusal        | Artá      | Tálu             | Chamađá          |
| Sky      | Mudengi   | Agasá        | Kondá     | Ménu             | Sarg             |
| Snake    | Soráso    | Ja           | Budubu    | Túna             | Sáp              |
| Star     | Sukalá    | Tute         | Tsukka    | Tsukka*          | Bhudaká          |
| Stone    | Vidi      | Arregna      | Birel     | Kellu            | Paththar         |
| Sun      | Belá      | Vuyu         | Singi     | Proddu, Beruli*  | Belá             |
| Tiger    | Króđi     | Kina         | Yekili    | Nálugádee        | Bág              |
| Tooth    | Ahámu     | Ajána        | Gimá      | Pallam, Pelivelu | Dat              |
| Tree     | Mránu     | Anébagna     | Sunabbo   | Cheđe, Marom     | Gáts             |
| Village  | Náju      | Gorajáng, Da | Yugoma    | Náđu             | Gá               |
| Water    | Sríđrú    | Dá           | Deyyá     | Tanni            | Páni             |
| Yam      | Gandikúna | Gane         | Dampu     | Aluvele          | Sarú, Sakarkanda |
| I        | Anu       | Gua          | Naisá     | Nánu             | Hame, Hami       |

| <i>English.</i> | <i>Kondh.</i> | <i>S'avara.</i> | <i>Gadaba.</i> | <i>Yerukala.</i>     | <i>Chentsu.</i>   |
|-----------------|---------------|-----------------|----------------|----------------------|-------------------|
| Thou            | Yínu          | Aman            | Nó             | Nínu                 | Tumyi, Tú, Yike   |
| He              | Yánu          | Ani             | Tulokku        | Avanu                | Vú, Vamhi         |
| She             | Toliyadu      | Ani             | Tulo           | Avalu, Paiði         | Mayyáta, Vú       |
| It              | Mónju         | Ani             | Neyam          | Adu                  | Vahe, Vú          |
| We              | ..            | Móni            | Pen            | Námu. Namburu        | Hame              |
| Ye              | ..            | Aman            | Mai            | Níngalu, Avaru       | Te, Tumyi         |
| They            | ..            | Ani             | Noinyo         | Tilá, Avállu         | Vamhi             |
| Mine            | Nánde         | Granate         | Nenne          | Nunguðedi, Namburu-  | Hamár             |
| Thine           | Minde         | Amannate        | Mayinó         | Níngadeo, Ningaði    | Thór              |
| His             | Yevánetará    | Ani-nate        | Niyinó         | Avanudu, Attamudidi  | Valar             |
| Ours            | ..            | Móni-nate       | ..             | Namburudu            | [du Hamár         |
| Yours           | ..            | Aman-nate       | Mayyinó        | Níngalide, Ninebuðu- | Thór              |
| Theirs          | ..            | Ani-nate        | Vokati*        | Avanudu              | Valar             |
| One             | Róndi         | Aboy            | Rendu*         | Vondu                | Yék               |
| Two             | Jódeká        | Bágu            | Mudu*          | Rendu                | Duyi              |
| Three           | Tinigoṭá      | Yagi            | Nálugu*        | Múme                 | Tin               |
| Four            | Sári          | Vonji           | Ayidu*         | Nálu                 | Chár              |
| Five            | Páncu         | Mollayi         | Aru*           | Anju                 | Páncu             |
| Six             | Só            | Kudru           | Yédu*          | Aru*                 | Chhé              |
| Seven           | Sáta          | Gulji           | Yenimide*      | Yégu, Vógu           | Sát               |
| Eight           | Aṭa           | Tamuji          | Tommidi*       | Yeṭu, Vaṭu           | Aṭh               |
| Nine            | Nogaṭṭá       | Tinji           | Padl*          | Ombadu               | Ló, Tóṭá          |
| Ten             | Dosó          | Gahji           | Yiruvai*       | Pattu, Pottu         | Das               |
| Twenty          | Kóde          | Bokodi          | Muppai*        | Yiravadu, Yirapottu  | Bis, Panchgandá   |
| Thirty          | Tirisigoṭiá   | Bokoḍigaliṭi    | ..             | Muppadu              | Satgandá doyiṭha  |
| Forty           | Chalisiḡoṭiá  | Bágukodi        | Nalabhai       | Nalubadu, Náarakaka- | Pandrágandá       |
| Fifty           | Panchásó      | Bágukodiḡaliṭi  | Yábhai*        | Anjarakapottu        | Poun, Dasgandá    |
| A hundred       | Sohó          | Molloyikoḍi     | Núru*          | Pattu padulu, Potta- | Báraganda doyiṭha |
| Of              | ..            | Ti              | Móyi           | rakapottu            | Panch Voḍi        |
|                 |               |                 |                | Vakka                | Vór               |

|                  |          |               |          |                    |                   |
|------------------|----------|---------------|----------|--------------------|-------------------|
| To               | ..       | Ti            | Nó       | Ku*                | Ku                |
| From             | ..       | Sitholo       | Róm      | Nunche*            | Singa             |
| By               | ..       | Sitholo       | Róm      | Valla*             | Soyi              |
| With             | ..       | Ruhá          | Bonóm    | Tóte*              | Sang              |
| Without          | ..       | Yeijja        | Vuregusu | Yilladóte          | Návanánai         |
| In               | ..       | Lógna         | R        | Kóre, Kóku         | T, Gánt           |
| On               | Séndó    | Lanka         | Te       | Paini*             | Vuparóru, Vuparót |
| Now              | Iddáli   | Nami          | A'       | Yeppuđu*           | Yekhá, Yechini    |
| Then             | ..       | Namóde        | Appuđu   | Appuđu*            | Tekhá, Areghodi   |
| When             | Yeseká   | Yenga         | Yindoyi  | Yeppuđu*           | Kekhá, Kekkoneki  |
| To-day           | Nenju    | Nangadini     | Yincha   | Iman               | Ayije, Ajko       |
| To-morrow        | Rasi     | Biyo          | Beyyar   | Nesú               | Káyil             |
| Yesterday        | ..       | Amauni        | Minde    | Nesu Yennáyi       | Káyil, Porusú     |
| Here             | ..       | Tenne         | Tennó    | Yatukire, Yinge    | I'hana, Yechhini  |
| There            | ..       | Vodite        | Tonnó    | Atukire, Ange      | Unhaná, Vuha      |
| Where            | ..       | Téngá         | Ammanó   | Yite, Yenge        | Kuhaná, Kahá      |
| Above            | ..       | Lanka         | Tomma    | Méne               | Vupar, Vuparót    |
| Below            | Nede     | Jáyitá        | Alóm     | Tallen             | Tolót, Tól        |
| Between          | Madde    | Lanka         | Vomidi   | Neduve             | Mayidhit, Móyid   |
| Without, Outside | ..       | Vodite        | Valumúsá | Bele               | Bahar             |
| Within           | ..       | Alógna        | Vomidi   | Vulle              | Bhitar            |
| Far              | Atumané  | Sangayi       | Sulóm    | Túra, Kitte        | Dúr               |
| Near             | ..       | Tuya          | Tantel   | Kitta, Kititayi    | Lag               |
| Little           | Yike     | Téte          | Khandiki | Rútana             | Ráj, Chone        |
| Much             | Purá áte | Bari          | Burre    | Mettá              | Bhóri             |
| How much         | Mesoní   | Dite          | Adisugó  | Yittana            | Ketta, Kettagula  |
| As               | ..       | ..            | ..       | ..                 | Lakha             |
| So               | ..       | Kanínasan     | Voftu    | Ate                | Vú, Vumané        |
| Thus             | Yisingi  | Yetténa       | Vokke    | Yite               | Yi, Yemune        |
| How              | ..       | Yéngá         | Yerandi  | Yate               | Kemune            |
| Why              | Annadeki | Jitasangná    | ..       | Yemmatuku, Phaláyá | Kissale           |
| Yes              | Vujje    | Jadite, O' O' | Vom      | Ambó               | Schchhá, Hoyyá    |

| English.   | Kondh.         | Savara.            | Gadaba.       | Yerukala.                          | Chentsu.                               |
|------------|----------------|--------------------|---------------|------------------------------------|----------------------------------------|
| No         | ..             | Yajja              | Vüre          | Yillá                              | Nahí                                   |
| (Do) not   | Kunamá         | Tiggo              | Ayide         | Mánu, Yikara                       | Kánnai, Kánnahi                        |
| And, also  | ..             | ..                 | Tonnó         | Núm                                | Ke, Ye, Ye                             |
| Or         | ..             | ..                 | Vüre          | Taradote                           | Nahi                                   |
| This       | ..             | Ani                | ..            | Avanu                              | Vahare, Vu                             |
| That       | Yerivi         | Ani                | Tónó          | Adu                                | Vahe, Ke                               |
| Which      | Yestánju       | Vongá              | Bhulóm        | Yedu                               | Kahá                                   |
| What       | Anná           | Vongádo            | ..            | Yanna, Yemmatuku                   | Ki, Kochcher                           |
| Who        | Yestánju, Yínu | Bote               | Láyi          | Yáru                               | Ke, Vuhe                               |
| Anything   | Annátiki       | Yetagáni, Jitagáni | Máísá         | Yemmadainá                         | Kíchu, Jehaive                         |
| Anybody    | Yestánate      | Bote, Bótégáni     | Loyísá        | Yeduayiná                          | Kevu, Jehaive                          |
| Eat        | Tinumu*        | Gába, Jombá        | Sóm           | Vunu, Kulla                        | Khá, Khayye                            |
| Drink      | Punamu         | Gába               | Yidu          | Kudi                               | Pí, Piyer                              |
| Sleep      | Dohumi         | Dimebá             | Eyyá          | Tuggudayi, Varugu                  | Súl, Sutiýár                           |
| Wake       | Ningádhámu     | Dimegó             | Módukusudukká | Teligayiruktu, Dindu-<br>gunduyiru | Jágleró, Jágalerahó                    |
| Laugh      | Kakkumu        | Mágnába            | Luddó         | Sirilá, Chirike                    | Hás                                    |
| Weep       | ..             | Kam yite           | Borrió        | Agulá, Agu                         | Kánd, Kandiyár                         |
| Be silent  | Kinni jáminnú  | Kaḍangamá          | Vayisodukka   | Summa, Tsummate-<br>paro           | Tsuperahó, Tsup-                       |
| Speak      | Katágehámu     | Birdána            | Sammeva       | Vátésula, Vésatallá                | Kathhá                                 |
| Come       | Ninju          | Jáyeba             | Phinge        | Vá, Vará                           | Asibo, Asili                           |
| Go         | Nallákanju     | Maba               | Vóyináyare    | Pó*                                | [konduyiru                             |
| Stand up   | Nistámu        | Dedebá             | Tune ná       | Nikkebogu, Nindru-                 | Jáyivi, Já                             |
| Sit down   | Kukkumu*       | Góbá               | Vaisá         | Vukka, Vukkárindiri                | Thá Dóho                               |
| Move, Walk | Kujinámu       | Yírba              | Vamsu         | Nadá                               | Bos                                    |
| Run        | Gyáhamu        | Nadam              | Dugga         | Vódu                               | Tsó                                    |
| Give       | Siyáningju     | Tilisibba          | Chedive       | Tá, Vanko                          | Bég                                    |
| Take       | Kuvay          | Yama               | Demá          | Vákó, Vánkemáte                    | Ne Diyo                                |
| Strike     | Vetámu         | Teda               | Buvó          | Mottu                              | Niyyó, Niya                            |
| Kill       | Vesámahudu     | Kilisibba          | Abboye        | Kolusu, Kollu                      | Már, Maryó [leyó<br>Marephelá, Moreva- |



|                |                     |                 |                 |                     |                                  |
|----------------|---------------------|-----------------|-----------------|---------------------|----------------------------------|
| Bring          | Támu                | Pangayiba       | Yindre          | Yitikondu           | Aue, Diyá                        |
| Take away      | Ahānesamallmu       | Págná lá yírba  | Sógusiyyá       | Yitikondu<br>dupómu | Nikejá, Niyá                     |
| Lift up, raise | Densumu             | Lanka           | Lenó            | Yedudu              | Tól                              |
| Hear           | Venjamu             | Andángá         | Vóvo            | Keru, Kétu          | Sún                              |
| Understand     | Anupunnenju         | Andángalayi     | Menyá avure     | Telentsu            | Málum                            |
| Tell, relate   | Vesámu              | Appungá         | Tsúno           | Sonnu               | Ko                               |
| Good           | Nekkánju            | Amphase         | Jalem           | Nalla               | Aehláye, Bhálá                   |
| Bad            | Nekkánju Aye        | Sedéle          | Nimmakávó       | Ketia, Ketiasu      | Kharáb                           |
| Cold           | Jilliminju          | Soyi vuđede     | Tsallari        | Musunu              | Sítalá                           |
| Hot            | Rumúrúmmam          | Toggayi         | Gechem          | Vuđuku*             | Jóru, Tapta                      |
| Ripe           | Sadáde              | [ninju Amegna   | Broluká         | Pasuru              | Kanchó, Káchofá                  |
| Raw            | Mránutangi sendija- | Agurunate       | Mágegisá, Bullo | Mágisu, Pandisu     | Mugilá Pakká                     |
| Sweet          | Sendijāninju        | Mana            | Sabbulká        | Teyyanikkiri*       | Mithá                            |
| Sour           | Trahane             | Aragna          | Susoka          | Pulladikkiri        | Ammutó                           |
| Bitter         | Pittayine           | Asa             | Vusám           | Ketsu               | Titto                            |
| Handsome       | ..                  | Ambasanate      | Limmókká        | Nalla               | Bhalláti, Sundor                 |
| Ugly           | Sonjabasdhe         | Ambaste         | Nimmokávórá     | Nalladillá          | Kharáb                           |
| Straight       | Soddemaune          | Baridákó        | Lakođuttu       | Sadunu              | Sorichhaiyye, Sori-<br>karáhache |
| Crooked        | Bankadájúne         | Kokkade         | Dairoyi         | Vankara*            | Bankó                            |
| Black          | Kálájána            | Je              | Yide            | Kalede              | Kallá, Kalíta                    |
| White          | Sukkare             | Palu            | Tatár           | Valedá              | Vujula, Savarnita                |
| Red            | Gérú                | Soyipu          | Berađuttu       | Yarrađekirá         | Goriya, Gorinta                  |
| Green          | ..                  | Vólambididakuvu | Vólempatsta     | Yalátsitsággó       | Harihjal, Sabuniya               |
| Long           | Lambájámu           | Jelo            | Tiyvár          | Vasaram, Aragam     | Vunchó, Namóía                   |
| Short          | Koggári             | Doyina          | Dille           | Kuratsa             | Khata                            |
| Tall           | { ..                | Lanka           | Tiyvár          | Vasaram             | Namó                             |
| Short          | { ..                | Doyina          | Potte           | Ardullá             | [yan Khatóti                     |
| Small          | { ..                | Sonna           | Mengen          | Chinnakerum,        | Khopati                          |
| Great          | Deranju             | Gogo            | Muđó            | Berudu              | Badaka                           |
| Round          | ..                  | Gudi, Solágundu | Biregundu       | Gundu*              | Chatan, Goyati                   |

| <i>English.</i> | <i>Kondh.</i>        | <i>S'avara.</i>                | <i>Gadābā.</i> | <i>Yerukala.</i> | <i>Chentsu.</i>             |
|-----------------|----------------------|--------------------------------|----------------|------------------|-----------------------------|
| Square          | Tatū                 | Onjimūlalanka<br>nā, Sagnādaku | bag-Duttu      | Tsadaram*        | Sadunūta, Chakkata          |
| Flat            | Rósarola             | Samangādele                    | Sadunugādulta  | Sadanu*          | Chekunó, Chakka-<br>kini    |
| Fat             | Gellu ayininju       | Kovvudéle                      | Bhirúgu        | Kovvitsu, Nenamu | Telubhariya, Tella-<br>rata |
| Thin            | Banda ayininju       | Palapalasan                    | Palasanadulta  | Bakkadu          | Saruvoti, Sakunata          |
| Weariness       | Lahite               | ..                             | Burre          | Ayyósu           | Haran, Vusiki               |
| Thirst          | Yesengepekmanenju    | Araga                          | Yide           | Dagga, Dappikonu | Pyaslagi, Pyas              |
| Hunger          | Chatanganki<br>nenju | pan-Dolejan                    | Kuddu          | Soda, Peruntsu   | Bhúk, Bhoku                 |

NOTE.—The words marked thus \* are also Telugu words. Many of the vocables of the Yerukala people correspond with the Tamil words, representing the same objects; and many also of the Chentsu words resemble the Hindustani.

*Notes on ALFRED VON KREMER'S edition of Wakidy's Campaigns.—*  
*By A. SPRENGER, M. D.*

(FIRST NOTICE).

In June, 1854, when at Alexandria, I had the pleasure of making the acquaintance of the distinguished orientalist, Alfred von Kremer. He showed me a very valuable copy of the campaigns of *Wakidy*. I induced him to edit it in the *Bibliotheca Indica* and recommended it to the Asiatic Society of Bengal. On my return to India in February, 1856, I had the pleasure of seeing it printed. Being probably better acquainted with the subject than any one else, and having several books which were not at the disposal of the learned editor, I undertake to write some remarks on the work. I beg, however, in the commencement to express the high sense which I entertain of Mr. Von Kremer's erudition and industry evinced in this, as well as, in his previous labours.

The Musalmans applied in early times the principles of judicial evidence to the historical criticism of traditions and showed an aversion against admitting written testimony alone, though sometimes they were obliged to acknowledge it, as we shall see lower down. In their opinion an account found in a book has no historical value, unless you have a witness who has been assured by the author himself that every part of the book is genuine or who has received this assurance from another witness who again may have received it from another up to the author. In olden times, it was usual to write the string of witnesses up to the author into every fasciculus of the book in three places: first on the title page, then in the commencement of the text and then again at the end. The form in which it is written is different in each of these three places. In writing the Arabic title page to Von Kremer's book, I restored and completed the original form from the editor's preface. In the last *riwáyat* I used the word "wijádatan." This is a technical term which is explained by Tyby as follows: *الوجدادة من وجد يجد مولد و هو ان يقف على كتاب بخط شيخ فيه احاديث ليس له رواية ما فيها فله ان يقول وجدت او قرأت بخط فلان* Wijadáh is a newly coined word and derived

from the verb *wajad* "to find." It means that A. B. has got hold of a book containing *hadythes* in the handwriting of a *Shaykh*, but the contents of the book have not been verbally or by *ijazah* communicated to him. In this case A. B. must not say *akhbaraná* "I have been informed," but he must say "I have found," or "I have read in the hand-writing of C. D." or "in a book written in the hand writing of C. D."

In *Iráqy's* *Alfyah*, it is explained nearly in the same terms:

ثم الوجدادة وذلك مصدر \* وجدته مولدا ليظهر  
تغاير المعني وذاك ان تجد \* بخط من عاصرت او قبل  
ما لم يحدثك به ولم يحجز \* فقل بخطه وجدت او احتوز  
ان لم يثق بالخط قل وجدت \* عنه او اذكر قيل او ظننت

"The last [and least satisfactory mode of propagating *hadythes*] is the *wijadah*. This is a verbal noun from *wajad* "to find," it has been newly coined with a view of distinguishing this meaning from other meanings of this root [as *wijdán* which is used if it means "to feel" or *wojúd* "existence."] The term *wijadah* is used if you find *hadythes* in the handwriting of one of your contemporaries or a man of bye-gone days, whose lectures you have not heard and from whom you do not hold an *ijazah*. In this case you say "I have found in his hand-writing." But if you are not quite sure whether it is his hand-writing you must be on your guard, and you merely say "I found this *hadyth* from A. B." or you use the expressions "It is said" or "I believe."

Pages 1, 17, 43, 69, 95, 121, 149, 178, 206, 229, 255, 281, 306 and 357 of Kremer's text and p. 35 of Lees's *Fotúh al-Shám* contain specimens of the manner in which the string of authorities is stated in the commencement of every fasciculus. It is distinctly mentioned in the MS. of *Fotúh* that where the *isnád* stands commenced in the original, the second fasciculus.

A specimen of a *Samá* or the form in which it is written at the end of each fasciculus will be found lower down. As I have prepared for the press a work\* on "the Canons of Historical criticism

\* This work is a translation of the *Tyqryb wa Taysyr* of Nawawy illustrated with notes from Soyúty's commentary on it, from Nawawy's *Irshád*, Ibn Caláh's '*olúm alhadyth*, '*Iráqy's Afyyah* and its two commentaries, from the dictionary of the technical terms used in traditions, from the *I'lám* of Qádhíy 'Iyádh (a very



of the Musalmans" which will contain a very full account of all these matters, I deem it loss of time to dwell here any further on this subject than to the extent it was necessary to make intelligible what follows.

Mr. Von Kremer's copy is what I call an *authenticated* one. It was written by Más'úd b. 'Alyy for Abú-l-Hasan 'Alyy Ibn al-Tarráh. In order to comply with the above condition—to have a witness that every part of the work is genuine, and to correct his copy, Ibn al-Tarráh read it in A. H. 532 before his Shaykh Ibn 'Abd al-Báqiy who compared what he read with his own copy. Subsequently, in 549, Mas'úd b. 'Alyy copied from the MS. of the Shaykh the Sama' into it. It was usual, for the Shaykh, if pupils read, to say in the commencement of each lecture, Akhbaraná fulán, i. e. "What thou art going to read, has been communicated to me and my fellow-students by A. B." Or the Shaykh remained silent and the pupil read Akhbarakum, i. e. "C. D. has communicated to thee and thy school-fellows what follows." This form is used here. Ibn 'Abd al-Báqiy had been instructed in the book by Jawhary. In this instance the book was read by a fellow-student of Ibn 'Abd al-Báqiy and he as well as the Shaykh (Jawhary) were listening.

The instructor of Jawhary, and his witness for the authenticity of the book was Ibn Hayyúyah a pupil of Ibn Aby Hayyah before whom his own copy was read by a student and he (Abú Hayyah) as well as Ibn Hayyúyah listened and he (Abú Hayyah) stated that it was really what he had heard from his teacher al-Háarith Thalji (died at the age of 76 in 206?) who had attended Wákidy's own lectures. Mr. Kremer gives us learned notices of some of these persons. It so happens that some of them are links in the chain of witnesses through which the Cawnpore copy of Ibn Sa'd was propagated to the celebrated biographer of Mohammad, Háfitz Dimyáty, the teacher of Hakkáry, by whom that copy was copied from Ibn Hayyúyah's text in 718. The isnád in the com-

mon work) from the *تقييد العلم* of the Khatyb Baghdády which treats on the introduction and progress of writing among the Moslems for the sake of preserving traditions, and throws a flood of light on the literary history of the first two centuries—and from a number of other works. My labour is nearly finished, but I left it among my books at Damascus, which have not yet reached me.



mencement of Ibn Sa'd runs : اخبرنا الشيخ الامام العالم الحافظ العلامة  
 النسابة شرف الدين ابو محمد عبد المومن بن خلف بن ابي الحسن الدمياطي  
 رحمه الله قراءة عليه وانا اسمع قال انا الشيخ الامام محدث الشام ومسنده  
 شمس الدين ابو الحجاج يوسف بن خليل بن عبد الله الدمشقي يقال انا  
 ( اخبركم read ) ابو محمد عبد الله بن دهيل بن علي بن كارة انا القاضي ابو  
 بكر بن محمد بن عبد الباقي بن محمد بن عبد الله الانصاري انا ابو محمد  
 الحسن بن علي بن محمد بن الحسن بن عبد الله الجوهري عن ابي  
 عمر محمد بن العباس بن محمد بن زكريا بن يحيى بن معاذ بن حيوية الخزاز  
 عن ابي الحسن احمد بن معروف بن بشر بن موسى الخشاب عن ابي محمد  
 الحارث بن محمد بن ابي اسامة التيمي عن ابي عبد الله محمد بن سعد \*

At the end of Ibn Sa'd we find several Samás which have been copied by Hakkary from more ancient MSS. A Samá is like a college certificate: its object is to record the names of those persons who were authorized to propagate the work or part into which it is written, and the names of the witnesses upon whose testimony their authority rests. I insert here the first of these Samás because I have never yet found either a Moslim or Christian who could make head or tail of this description of documents. Yet they are not without interest, and if we understand one, we can make them out all.

شاهدت بخط شيخنا الامام الحافظ ابي محمد عبد المومن الدمياطي رحمه  
 الله تعالى يقول صورة سماع الجز الثاني من اجزا ابن حيوية الخزاز [قرأ]  
 على ابن حيوية الحسن والحسين ابنا علي بن محمد الجوهري بغير تاريخ  
 وسمعه من ابي محمد الحسن الجوهري جماعة بقراءة ابي بكر الخطيب لبعضه  
 وبعضه بقراءة عبد الله بن سبيعون القراوني ابو بكر محمد بن عبد الباقي بن  
 محمد البزاز في ربيع الاول سنة ٤٤٨ وسمعه منه بقراءة الخطيب ابوطالب  
 عبد القادر بن محمد بن عبد القادر بن يوسف و ابو محمد الحسن و ابوالحسن  
 على ابنا عبد الملك بن محمد [بن] يوسف و ابوظاهر عبد الرحمن بن احمد  
 بن عبد القادر بن محمد بن يوسف و محمد بن عبد الباقي الدوري و احمد  
 بن ثابت غلام بن الشعري في ربيع الاخر ٤٤٧ سمعه من القاضي ابي بكر محمد  
 بن عبد الغفار بسماعة من الجوهري بقراءة ابي المعالي مبارك بن هبة الله بن  
 سليمان (سلمن) بن الصباغ ابو الحسن [عبد الله بن] دهيل بن علي بن  
 كارة و ولده عبد الله و ابوياسر [بن] عبد الوهاب [بن هبة الله بن عبد  
 الوهاب] بن ابي حية و [ابو الفرج] عبد الرحمن بن علي بن محمد بن الجوزي  
 الواعظ و ابو ماهر يحيى بن مقبل بن الصدر في ثامن من جمادي الاخرة سنة  
 ٥٢٩ و [سمعه] بقراءة عبد الكريم بن محمد السمعاني مسعود بن علي بن عبد

الله بن احمد الصغار في صفر سنة ٥٣٥ وسمعه من ابي محمد عبد الله بن كارة بقرأة ابي طالب عبد المحسن بن ابي العميد بن خالد ( عبد الغفار ) الحنفي الابهرى وولده [ ابو ] عبد الله الحصى ( الحسين ) و ابو الحسن [ محمد بن علي بن الحسن ( الحسين ) ] بن يوسف الهمداني وولده ابو عبد الله ( ابو الفت ) محمد و ابو محمد يوسف بن ابي جعفر السرقى الدياس و يوسف بن خليل بن عبد الله الدمشقي في جمادى الاولى ( ربيع الاول ) سنة ٥٨٩ وسمعه [ من ] ابن كارة بقرأة محمد بن ابي بكر بن ابي السعادات بن الراس جماعة منهم ابو الحسن بن محمد بن يحيى بن حكيم البغدادي و اخرون في ربيع الاول سنة ٥٧٩ وسمعه من ابن كارة محمد بن عبد الله بن احمد بن قدامة و ابن احمد بن عبد الله و احمد بن عبد الدار بن نعمة المقدسيون و عبد الرشيد بن محمد بن علي بن احمد المستدي بقرأته في جمادى الاولى سنة ٥٩٥ فعلمته حرفا بحرف كما شاهدته كتبه احمد الهكاري \*

To understand the above, it is necessary that the reader should know that the standard copy of Ibn Sa'd—that written by Ibn Hayyúyah,\* was divided into eight parts, and that at the end of every part, the teachers and pupils who read it, wrote their samá. Hakkáry transcribed the more important Samá's into his copy and attached to every one his signature. This is the technical meaning of كتبه if it stands at the end of a document. We also find at the end of some documents العبد before the name of a witness, and this word is therefore also used for "witness" or "signature."

The samá' quoted above was written in the hand of the celebrated Háfitz Dimyáty, and it referred to the second part of the original. It appears from it that that part was read alternately by al-Hasan al-Jawhary, mentioned above, and his brother al-Hosayn (and as we learn from other samá's also all other parts of the book were read by them) before Ibn Hayyúyah. Subsequently in 447 the book was read before Hasan Jawhary by the Khatyb Abú Bakr in the presence of six pupils, none of whom is of any interest, and in 448 it was read under his (Jawhary's) superintendence partly by the same Khatyb Abú Bakr and partly by 'Abd Allah Qarawany, and it was on this occasion that Ibn 'Abd al-Báqiy Buzzáz who has been mentioned above was present. Under the superintendence of Ibn 'Abd al-Báqiy [Buzzáz] who taught the book in the version of Jawhary, it

هو بالفتح الحاء المهملة ثم مثناة تحت مضمومة مشددة و بعد الواو مثناة \*  
 Núr alnibrás, p. 1988. تحت مفتوحة ثم الها

was also twice read, once in 529 by Ibn Hibat Allah and among the auditory were Dahyal and the celebrated 'Abd al-Rahmán Ibn Jawzy and it was again read before the old man in 535 by Sam'ány. I must here observe that reading a book before a Shaykh for the sake of the isnád was a mere boast and ceremony, and therefore, students flocked to a man who had heard it a long while ago, however infirm he might be, from all parts of the Mohammadan world, in order that there might be few links between themselves and the author. This explains how it came that the old man lectured on a work which he had studied 87 years previously.

The rest of the above document offers neither any difficulty nor much interest and I therefore, confine my explanations to these few remarks.

From another Samá' we learn that Ibn Hayyúyah lectured on the book in 318 and again in 320 in his own house. It farther appears from one of the Samá's and from the isnád of Ibn Sayyid alnás that the Qádhíy Abú Bakr [Ibn 'Abd al-Báqiy] had two riwáyats of the text of Ibn Hayyúyah, that of Jawhary—and this riwáyat he transmitted to Abú 'Abd Allah b. Dahyal and others—and the riwáyat of Abú Isḥáq Ibráhyim b. 'Omar Barmaky, equally a pupil of Ibn Hayyúyah, which he had received by ijázah only. This explains why it is distinctly added above *بسماعه عن الجوهري* i. e. "Ibn 'Abd al-Báqiy taught the book as he had heard it from Jawhary." It is also stated that Ibn Hayyúyah mentioned before every ḥadyth his isnád up to the author. In referring to Kremer's text of *Wákidy*, we find that he did the same in teaching that book and that this objectionable practice was also adopted by his pupil Jawhary. Every isnád therefore, begins with "I heard from Moḥammad [Ibn Hayyúyah] who had it from 'Abd al-Wahháb, from Moḥammad [Thaljy]. This may perhaps justify the supposition that the standard copy upon which Kremer's text is founded, was that of Jawhary. Perhaps we may go farther and suppose that the omissions, and additions to be noticed lower down have been made by him. His giving the full isnád for every single ḥadyth seems to me to indicate that he did not yet consider the work as a whole but as an aggregate of documents of which he considered himself at liberty to take as many as he pleased or suited his purpose.



It is curious that Ibn Sayyid alnás, the author of the '*Oyún alathar*' has used a copy of Ibn Sa'd and quotes a riwáyat for it nearly identical with the Cawnpore codex. He says:

وما كان فيه عن محمد بن سعد فمن كتاب الطبقات الكبير له وقد قرأت معظم هذا الكتاب على الشيخ الامام بهاء الدين ابي محمد عبد الحسن ابن اصحاب محي الدين محمد بن احمد بن هبة الله بن ابي جَرَادَةَ العقيلي واجاز جميع ما يرويه وكان سمعه كاملا من الحافظ ابي الحجاج يوسف بن خليل بن عبد الله الدمشقي وذهبت يسير من اصل سماعة فلم تقيد عليه حين قراتي اياه عليه قال ابن خليل اثنا ابو محمد عبد الله بن ذهيل بن علي بن منصور بن ابراهيم بن كارة سمعا عليه ببغداد قال انا القاضي ابو بكر محمد بن عبد الباقي بن محمد بن عبد الله الانصاري عن ابي محمد الحسن بن علي الجوهري قال انا ابو عمر محمد بن العباس بن زكريا بن حيوية قال قرأ على ابو الحسن احمد بن معروف بن بشر بن موسى الخشاب و انا اسمع في شعبان سنة ثمان عشرة وثلثمائة قال انا ابو محمد الحرث بن محمد بن ابي اسامة التميمي انا ابن سعد هذا الاسناد من اول الكتاب الى اخر ما فيه من خبر النبي صلى الله عليه وسلم \*

I may here add that it appears that Ibn Sayyid alnás had no copy of *Wákidy*, he had only Ibn Sa'd.

Having done with the isnád of Mr. Kremer's copy, let us proceed to the authorities whom *Wákidy* quotes, but in order more fully to illustrate the subject, I may be allowed to say a few words on Ibn Sa'd's authorities.

It is the praiseworthy habit of Ibn Sa'd to trace the testimony for every fact he states up to an eye-witness, but he deviates from this rule in his chapter on "the campaigns." Here he quotes at the head (folio 98) the four leading works on the subject. The statements contained in these four books, he works up according to the best of his own judgment,\* without referring to them in the details. But where he supplies statements from other authorities, as he does sometimes, he gives the Isnád. These four works are 1. The campaigns of *Wáqidy* which he received immediately from the author. 2. The work of Ibn *Iskáq* which he took on the testimony of Rowaym b. Yazyd Moqriy who had it on the testimony of Hárún b. Aby 'Ysà and Ibn Aby 'Ysà was a pupil of Ibn *Iskáq* himself. 3. The work of Abú Ma'shar [*Nojayh* b. Abd al-Rahmán d. 175] which he took on the testimony of al-Hosayn b. Mohammad

\* The technical term for such a process is *دخل حديث بعضهم في حديث بعض*

a pupil of the author. 4. The work of Músà b. 'Oqbah [a client of the Zobayr family, d. 141]\* which he took on the testimony of Isma'yl b. 'Abd Allah b. Oways Madany who had it from a nephew of the author, Isma'yl b. Ibráhyim b. 'Oqbah and he had it from the author himself. I insert here Ibn S'ad's own words :

اخبّرنا محمد بن عمر بن واقد الأسلمي اخبّرنا عمر بن عثمان بن عبد الرحمن بن سعيد بن يربوع المخزومي وموسى بن محمد بن ابراهيم بن الحرث التميمي ومحمد بن عبد الله ابن مسلم ابن اخي الزهري وموسى بن يعقوب بن عبد الله بن وهب بن زمعة بن الأسود وعبد الله بن جعفر بن عبد الرحمن بن المسور بن مخزومة الزهري ويحيى بن عبد الله بن ابي قتادة الأنصاري وربيع بن عثمان بن عبد الله بن الهدير التميمي و ابراهيم بن اسمعيل بن ابي حنيفة الأشعري وعبد الحميد بن جعفر الحكمي وعبد الرحمن بن ابي الزناد و محمد بن صالح التمار قال محمد بن سعد واخبرني زهير بن يزيد المقرئ اخبّرنا هارون بن ابي عيسى عن محمد بن اسحق واخبرني حسين بن محمد عن ابي معشر واخبرنا اسمعيل بن عبد الله بن ابي اويس المدني عن اسمعيل بن ابراهيم ابن عقبة عن عمه موسى بن عقبة دخل حديث بعضهم في حديث بعض \*

In reading over this passage of Ibn Sa'd, we should hardly suspect that he refers to books, and if we did not know from other sources that these four men to whom he refers had written down their statements, we might suppose that he received from them merely oral traditions.

Wákidy like Ibn Sa'd does not give the isnád for every fact, but he mentions in the first page twenty-six Shaykhs on whose testimony he had received the statements which he worked into one continuous narrative. Among them occur Abú Ma'shar and Isma'yl b. Ibráhyim Ibn 'Oqbah, of these two we know distinctly that they taught complete, original works on the campaigns of the prophet, and it may be asserted with certainty of the remaining twenty-four Shaykhs that they were teaching books or collectanea, because the method in which in those days traditions were taught was, that one of the pupils read and the Shaykh listened to his reading and made the necessary corrections. The remaining pupils in some instances wrote down what he read, and hence the term

\* See my remarks on these two works in an article in the Journal of the Asiatic Society of Bengal, Vol. 20. "On the earliest biographies of Mohámmad."



كتبت الحديث من ولان which means generally, "I have taken traditions on his authority." Or they were also provided with copies and compared them with what he read. It is, however, impossible to say how many of these twenty-four Shaykhs lectured on systematic works on the biography of the prophet, and how many taught Masnads and Moçannafs, i. e. miscellaneous collections of traditions. I hope in a future article to be able to give a somewhat fuller account on the authorities regarding the biography of Moḥammad which were extant at the time of Wákidy and of some of the Shaykhs of this writer, than at present, and I therefore refrain from entering here on this subject.

Now I come at length to the text of Wákidy. He begins with a list of all the campaigns and assassinations in which Moḥammad was the leader, or which were undertaken by his orders. This list is followed by detailed accounts of each, but in the detailed accounts very little notice is taken of the expedition of *Hamzah*, which took place in March 623, that of 'Obaydah which took place in April of the same year, that of Sa'd b. Aby Waqqác, May, 623, that of Moḥammad to Abwá, in August, that to Bowát in September and the pursuit of Kurz. This omission is not due to Wákidy but to one of the ráwies—probably Jawhary. At the time of *Tabary*, other more complete texts were extant, but he does unfortunately not say by whom. Every *hadyth* was originally considered as a whole in itself. Consequently early ráwies (persons who transmitted a book or *hadyth*) did not think it admissible to *alter* a *hadyth* or to omit *part* of it. But from a collection of *Hadythes*, they considered it allowable to omit as many as they pleased without incurring any censure, and they might insert new ones, faithfully quoting their authorities. Again, where the author of the collection states his view on the subject, the Ráwiy might suppress it and give his own. This liberty has not only been taken with Wákidy but to a very great extent with the Muättá, and to some extent even with Bokháry, where the fullest and the most defective riwáyat (editions) vary in the number of *hadythes* by more than two hundred. Fortunately this habit came early out of fashion, but not sufficiently early to preserve for us the text of Wákidy in its integrity.

I insert here a passage from *Tabary* from which it appears that the *Ráwiy*s did make slight omissions :

قال ابو جعفر زعم الواقدي ان رسول الله عقد في هذه السنة ... لحمة  
لوا ايض ... وان رسول الله عقد ايضا في هذه السنة على راس ثمانية  
اشهر في شوال لعبيدة بن الحارث بن المطلب بن عبد مناف لوا ايض وامر  
بالسير الى بطن رابغ وان اللوا كان مع مسطح بن اثانة فبلغ ثنية المرة وهي  
بناحية الجحفة في ستين من المهاجرين ليس فيهم انصاري وانهم التقوهم  
المشركون على ماء يقال له احيا وكان بينهم الرمي دون المسابقة وقد اختلفوا  
في امير السرية وقال بعضهم كان ابوسفيان بن حرب وقال بعضهم كان مكر  
بن حفص قال ابو جعفر قال الواقدي ورايت اثبت على ابي سفيان بن حرب  
كان في مائتين من المشركين \*

"*Tabary* observes: *Wákidy* fancies that the Messenger of God appointed in this year, *Hamzah*, leader of an expedition and tied a white flag to his spear, and that the Messenger of God tied also, in *Shawwál*, in the eighth month after the flight, a white flag to a spear for 'Obaydah and sent him to *Batn Rábigh*. This standard was borne by *Mistah*. The expedition consisted of sixty refugees and no *Anṣáry*, and it proceeded as far as *al-Morraḥ* in the neighbourhood of *al-Joḥfah*. They met the enemy at *Aḥya* and there were some arrows exchanged, but it did not come to close combat with the sword. The accounts do not agree as to the leader of the caravan. Some say, it was *Abú Sofyán* and some say, *Mikraz*. *Tabary* says: the words of *Wákidy* are "I consider it as settled that *Abú Sofyán* was the leader and that the caravan was defended by two hundred men." It is true, *Tabary* gives at first merely an abstract of *Wákidy*'s statements, but Arabic authors always preserve the words of the original and at the end *Tabary* quotes *Wákidy*'s own words. In referring to *Kremer*'s text, we find that neither these words are in it, nor is the rest of the story so full. There are other quotations in *Tabary*, which are not found complete in *Kremer*'s original. In another place we find *Ibn 'Oqbah* quoted, and the manner in which it is done, leads us to suspect that this quotation is one of the many additions of a *ráwiy* to *Wákidy*'s text.

The first affair regarding which *Wákidy* enters into very valuable details is the expedition of *Ibn Jaḥsh*. This infamous exploit throws much light on the character of *Mohammad* and I therefore, give here an account of it. If the reader pays attention to the authorities

which I quote, he will observe how useful Wákidy is for tracing the history of that period.

Most of the refugees had neither friends at Madynah nor any means of subsistence. The number of men—exclusive of women and children—who were destitute is calculated at four hundred.\* However great the charity of those of their brethren might be who were in easier circumstances, it must have been altogether insufficient to relieve their sufferings. The mosque which the prophet had built was filled with men who were houseless. Here they slept at night and sought shelter during the day against the scorching rays of the sun. This mosque, it appears, consisted of a low terrace, walled in on three sides, open on the fourth towards the court-yard and provided with a roof. Such a building is called *Soffah*† and

\* “The persons alluded to are the poor people among the refugees who amounted to about four hundred men. They had neither dwellings nor friends in Madynah. They employed themselves in studying the Korân in the mosque and in picking date-stones. They were ready to proceed on any expedition the prophet might send them on. These are the men of the *Soffah*.” (Baghawy Commr. Kor. 2, 274.)

The mosque would not have afforded shelter to four hundred men and during the first and second year after the flight, the total number of refugees did not much exceed that number, and subsequently when they were successful in war the number of destitute Moslems was much diminished by death in battle and by the acquisition of booty. Ibn Sa’d folio 49 has two traditions, one of Abú Horayrah who was himself one of the men of the *Soffah* and one of Moḥammad b. Ka’b, according to both the number of men who lived in the mosque amounted only to thirty. According to a tradition of Abú Horayrah in Bokháry, they amounted to seventy. But these traditions refer to a very late period, for Abú Horayrah states what he saw and experienced himself, and he embraced the Islám very late. I therefore suppose that four hundred or less was the number of all the destitute Moslems, and that about one-fourth of them say seventy, who were more miserable than the rest lived in the mosque. The latter alone can properly be called the men of the *Soffah*, but at a later period it was apparently applied to all destitute refugees. Daily changes must have taken place, some leaving the *Soffah* and others taking their place, and therefore an attempt at too great precision would be a sure road to error.

† This is the meaning which the word has in Ibn al-Banná and which it retains up to this day in Maskat. Such a place is now called Lywán, at Damascus whilst the word *çoffah* has quite a different meaning in Syria and Egypt, on which see Kremer’s *Mittelsyrien* and Lane’s *Modern Egyptians*. Yet I have been assured at Damascus that a Lywán with a flat roof may be called a *Soffah*.

hence these men who were apparently more wretched than the rest, are known as the men of *Soffah*. They offered a miserable spectacle, many of them had no other clothing at day nor any other covering for the night, than a rag tied round the waist.\* On one occasion 'Aly got a curtain as his share of the booty and he made a present of it to these men. The prophet took it and cut out aprons for as many as it yielded. Some had rags tied round their neck which came down to their thighs and they were so transparent that they were obliged in walking to hold them together in front with their hands to cover their nakedness.† They were also very unclean: Their rags swarmed with vermin and they exhaled a most offensive smell.‡ At supper time the prophet would invite some of them to partake of his own meal and the rest he distributed over the houses of his wealthier followers, whom he exhorted in the *Korân* to be charitable towards them.§ Yet notwithstanding these efforts they suffered so much of hunger, even towards the end of the prophet's earthly career, in the days of prosperity of the Moslim community, that Abú Horayrah relates that he fainted from starvation.|| Immediately after the *Hijrah* their wretchedness must have been much greater.

The only outlet for these desperate men was bloodshed and robbery. The Messenger of God waylaid every Qorayshite caravan that went to the north. But in vain. They were in so great number and their precautions were so complete that, during the first sixteen months, all his efforts proved abortive. On the contrary, Kurz suc-

\* Ibn Sa'd, folio 49, and Bokháry.

† *Majma' albahrayn*, *sub voce* *sff*.

‡ *Ta'arruf* and the commentary thereon, a work on Sufism, p. 8, I have, however, only the Persian translation.

§ "Whatever charity you spend, give to those poor men who have been disabled for the sake of the cause of God, they cannot go about in the world, ignorant persons consider them rich on account of their modesty, but you may recognize them by their appearance. They do not beg with importunity," 2, 274. Most commentators of the *Korân* and Ibn Sa'd fol. 49 maintain that this verse refers to the men of the *Soffah*. If so, it was revealed very late, when only men who were not fit for war were poor.

|| Baghawý, *loco cit*.



ceeded in carrying away the flocks of the inhabitants of Madynah. The failure of Mohammad, and the success of his enemies must have made a very unfavorable impression on the population of Madynah, on the friends as well as the enemies of the Islám. Being driven to extremities, he planned immediately on his return from the chace of Kurz, towards the end of December, 623, a most desperate expedition.

It consisted of twelve men\* who were mounted on half that number of dromedaries, two men riding one animal in turn. He first offered the command over the party to Abú 'Obaydah,† and as he refused to accept it, he appointed his own cousin 'Abd Allah b. Jahsh to it, whom he had employed on a similar occasion the preceding year, and he conferred upon him, as long as the expedition lasted, the title of Amyr Almuminyn "Leader of the Faithful" which was subsequently assumed by the Khalifs. He did not communicate to him the plan of the expedition, but gave him sealed orders with

\* Ibn Sa'd p. 99 and Wákidy *apud* Tábari. Ibn Isḥák says that there were only eight men, and he gives their names, viz. :

1. Abú Hodzayfah [Mohashshim or Háshim or Hoshaym or Kays] b. 'Otbah b. Raby'ah b. 'Abd Shams. 2. 'Okkáshah b. Miḥsan b. Horthán, an ally of the banú Asad b. Khozaymah. 3. 'Otbah b. Ghazwán b. Jábir, an ally of the family of Nawfal b. 'Abd Manáf. 4. Sa'd b. Aby Wakkás of the Zohrah family. 5. 'Ámir b. Raby'ah of the 'Anz b. Wáyil tribe (i. e. an Anezah) and an ally of the family of 'Ady b. Ka'b. 6. Wákid b. 'Abd Allah b. 'Abd Manáf b. 'Aryn b. Tha'labah b. Yarbú' of the Tamym tribe, an ally of the 'Ady family and more especially of 'Omar. 7. Khálid b. al-Bokayr of the banú Sa'd b. Layth equally an ally of the 'Ady family. 8. Sohayl b. Baydhá or according to others his brother Safwán b. Baydhá of the banú al-Háarith b. Fihr. From Ibn Sa'd we also glean the name of al-Midád b. 'Amr, who seized al-Hakam b. Kaysán and made him a prisoner. And Sodyy *apud* Tábari p. 238 mentions also 'Ammár b. Yásir and 'Ámir b. Fohayrah. This name, however, may be a mistake for 'Ámir b. Raby'ah. In Ibn 'Okbah *apud* Ibn Sayyid alnás is 'Ámir b. Ayás.

† "The prophet dispatched a small party of men under the command of Abú 'Obaydah b. al-Jarráñ. When Abú 'Obaydah took leave, his affection to the prophet overcame him and he shed tears. Mohammad therefore, appointed another person whose name is 'Abd Allah b. Jahsh Azdy" (Mo'tamir *apud* Tábari, p. 240). Wákidy, p. 7, relates the same story, but he says that the name of the person to whom the command had been offered, was 'Obaydah b. al-Háarith b. al-Mottalib.



directions to open them, after he had proceeded two days' journey on the upper Makkah road, on which, the Moslims had several times waylaid the Korayshites. He also told him that when he had read the orders to the men under his command, he was to make them distinctly understand that every one of them was at liberty to proceed and assist him in carrying them out or to return to Madynah. On opening the letter 'Abd Allah found orders to proceed to Nakhlah, which lies on the road from Makkah to al-Tāyif and Yáman, and to watch the movements of the Korayshites in that quarter.\*

'Abd Allah declared that he would obey the orders of the prophet and ten of his men were of the same mind, but two went to Baḥrān† and after a considerable stay there they returned to Madynah, where they arrived after their victorious companions.‡

\* According to Ibn Isḥāk they were conceived in the following terms: "When you have read this my letter proceed as far as Nakhlah, between Makkah and al-Tāyif, watch the movements of the Korayshites and give me information thereof." In *Wákidy* p. 8 the letter runs: "Go to Nakhlah in the name of God and with his blessing. Do not force any one of the men to accompany you, but proceed and carry out my orders with those who choose to follow you. When arrived at Nakhlah, watch the caravans of the Korayshites." Another version is in Baghawý Comm. Kor. 2, 214. I do not consider any of these versions as genuine.

According to Sodyy he was to open the orders at Malal which is on the road from Madynah to Makkah, twenty-one or eighteen miles from the former city.

† Baḥrān or Boḥrān is in the neighbourhood of Ma'dan Bany Solaym (Ibn Sa'd). It is not far from al-For' (*Nihāyat al-Jazary*). In the territory of the Solaym tribe (*Wákidy* p. 8.)

‡ Ibn 'Oḡbah *apud* Ibn Sayyid alnās; *Wákidy* p. 8; Sodyy and Mo'tamir *apud* Tabary pp. 239 and 240. The names of these two men are Sa'd b. Aby Wakkás and 'Otbah b. Ghazwán. Ibn Isḥāk and most authors after him, including Ibn Sa'd deny that they refused to proceed. He says: "The whole party proceeded as far as a ma'dan which is above For' and has the name of Baḥrān, there the camel which Sa'd and 'Otbah b. Ghazwán were riding went astray, and whilst they went in search of it, the rest of the party proceeded." It appears from *Wákidy* p. 9, that this story has been preserved by the family of Sa'd b. Aby Wakkás and probably invented by them. The father of *Wákidy*'s teacher had received it from the son of Sa'd b. Aby Wakkás. The isnád in Kremer's edition is defective and ought to run "Wákidy from Abú Bakr b. Isma'yil b. Moḥammad from his father, from 'Aṣim b. Sa'd b. Aby Wakkás from his father."

When 'Abd Allah with his ten followers had arrived at Nakhlah\* he observed in the afternoon of the 28th of December, 623, a party of four Korayshite merchants. Their camels were laden with leather, raisins and wine, and they were on their way from al-Táyif to Makkah. They were frightened at the appearance of the stragglers, whose sinister purpose must have been pretty clear from their light mode of travelling. To remove suspicion from their minds, one of them, 'Okkashah, had his head shaved, in order to look like a pilgrim. The stratagem succeeded, the more because the new moon over the western horizon assured the merchants that the sacred month of Rajab had commenced, which was respected by the most abandoned robbers, and in which the traveller might fearlessly go on his way. They unloaded their camels and sent them over the plains to browse and sat down to cook their dinner. When they were completely off their guard, Wákid took advantage of the opportunity, shot an arrow into them which killed the leading man among them. They now made a rush upon the remaining three men and made two of them prisoners, but the third being mounted on a swift mare effected his escape, and reached Makkah the next morning.† The followers

\* "Nakhlah is identical with the Bostán Ibn 'Ámir which is near Makkah" (Ibn Sa'd p. 99). "Bostán Ibn 'Ámir is a corruption for Bostán Ma'mar (Ibn Mo'ammār ?)" (Ibn Kotaybah, *Adab al-kátib*). The full name of Mo'ammār from whom the place has its name is Mo'ammār b. 'Obayd Allah b. Mo'ammār b. 'Othmán b. 'Amr b. Ka'b b. Sa'd b. Tamym b. Morrah b. Ka'b b. Lowayy. Some however, say it has its name from *Hadhramy* Ibn 'Ámir, and some say from 'Abd Allah b. 'Ámir b. Korayz, so that etymology gives us no clue to its history. Bazalyúsy in his commentary to Ibn Kotaybah maintains that the Bostán Ibn 'Ámir and the Bostán Ibn Mo'ammār are not identical, but he allows that the latter is identical with Ba'n Nakhlah [Yáqút, *Mu'jam*, voce *Bostán*]. The same author (Yáqút) says under Nakhlah that two valleys meet at Bostán Ibn 'Ámir, one of which comes from *Karn almanázil* and is called Nakhlah Yamanyyah i. e. Southern Nakhlah). Along this valley runs the road to Yaman. The other comes from al-Komayr and is called Nakhlah Shámyyah or Northern Nakhlah. It is important to observe that these two valleys belong to the Hodzayl tribe, and are two days journey from Makkah. Bostán 'Ámir is situated in Ba'n Marr and Sabúkah.

† The name of the man who was killed is 'Amr b. al-Hadhramy ['Abd Allah] b. 'Abbád ('Imád or 'Ayyádz) of the Kindah tribe. He had three brothers, one of them al-'Alá turned a Moslim. He had also a sister, Sa'bah who embraced

of the prophet took the prisoners and goods and returned with them victoriously to Madynah.

There occur two verses in the *Korân* which, according to the testimony of most authorities, bear on this expedition. They run:

"They ask you regarding the sacred month [of Rajab], as concerns fighting in it. Answer: Fighting in it is a serious matter, but to obstruct the path (the religion) of God, to disbelieve in Him and his sacred temple (the Ka'bah) and to expel its votaries (the Moslems) from it, is a much more serious matter in the sight of God. Farther, persecution is a more serious matter than killing a man. They will never cease to make war against you, O Moslems, until they turn you from your religion, if they be able; but the works of those among you who apostatise from their religion and die as infidels, shall be vain in this world and in the next, and their reward shall be the fire, in which they remain for all eternity."

"Certainly those who believed and those who emigrated and fought in the path of God, may hope for the mercy of God, for God is forgiving and merciful."—(2, 214 and 215).

Mohammad admits without reserve that his disciples have violated the sacred month. His biographers do not exactly deny the fact, but they give explanations which afford interesting specimens of the manner in which they disguise facts discreditable to the Islâm.\*

the Islâm and is the mother of Talzah b. 'Obayd Allah. The men whom they took prisoners are: 'Othmán b. 'Abd Allah b. al-Moghyrah Mákhzúmy he was also captured at Badr and died an idolater; and al-Hakam b. Kaysán a barber by profession. The man who escaped is Nawfal b. 'Abd Allah, a brother of 'Othmán.

\* To understand what I have to say in this note, it is necessary to know that the following is the order of the Arabic months: Jumádà II. Rajab, Sha'bán. Of these three, only the Rajab is sacred. It is farther to be observed that the month begins about sunset from the moment the new moon is observed, or might be observed if it was not hidden in clouds. Ibn Ishák says, "This being the last day of Rajab, they consulted among themselves whether to attack them or not. Some of them observed, If you do not attack them to-night they will slip into the sacred territory where it is unlawful to attack them. On the other hand if you attack them you violate the sacred month. They were long doubtful what to do, but at last they took courage and attacked them." If this version were true, the question would be, did the attack take place before or after sunset. From what he says lower down, it would appear that it took place after sunset, for he states that the Moslems at

The refusal of three of his stoutest adherents—'Obaydah, Sa'd b. Aby Wakkās and 'Otbah—to take part in the sacrilege, leads us to infer that it was committed by his orders.\* This, however, he

Makkah maintained that the robbery was committed in Sha'bān.—Wákidy states that the attack took place on the last day of Júmádà, and most original authorities as Sodyy, Mo'tamir, &c. agree with him on this point though he contradicts himself in p. 2. In page 8 we read, 'The party said to the prophet, we attacked them at day time, in the evening we observed the new moon of Rajab. We therefore do not exactly know whether we attacked them in Rajab or on the last day of Jamádà.' Ibn Sa'd says simply, "They were not certain what date it was: and whether it was a day of the sacred month or not." Baghawy, in his zeal for the honor of the Islām has been betrayed into a strange mistake. He says that they made the attack on the last day of Júmádà II. because they did not like to postpone till the next day, for fear they might slip into the sacred territory.

\* In the Moçannaf Ibn Aby Shaybah, folio 346, occurs an important tradition which proves that Moḥammad did not scruple even the preceding year to violate the sacred month: "When the prophet had come to Madynah the Johaynah paid him a visit and said, You have settled in our rear, let us conclude a treaty that we may have nothing to fear from you nor you from us. He concluded the treaty with them though they did not embrace the Islām. In [the sacred month of] Rajab, January, 623, the prophet sent us (the man who speaks is Sa'd b. Aby Waqqāç) on a predatory expedition against a tribe of the Banú Kinánah [who were in league with the Qorayshites] in the neighbourhood of the Johaynah. We attacked them, but we were less than one hundred men strong, whereas they were very numerous. We therefore, retreated to the Johaynah. They said, We hope you did not fight in the sacred month. We answered We fight those in the sacred month who have expelled us from the sacred territory. Upon this [the objections of the Johaynah to protect persons who violated the sacred month] a discussion took place among us, some said, Let us go to the prophet to inform him of what has happened. Others insisted upon remaining and I [says Ibn Aby Waqqāç] and some others proposed to attack a Korayshite caravan which was expected. We told them at the same time that if we made any booty only those would have a share in it who would take part in our expedition. We went to waylay the caravan whilst the others returned to the prophet to consult him regarding the sacredness of Rajab. When they came to him he was in a great rage and said, "You left me all united, and you return to me divided into parties. Division and party-spirit has hitherto ruined the Arabs. I will now send a man who shall command you. He surpasses all others in perseverance, and in bearing hunger and thirst. Upon this he appointed 'Abd Allah b. Jaʿsh as our chief, and he was the first Amyr in the Islām." I may add that Majady the Shaykh of the Johaynah did not allow them to attack the caravan. This indignation of the Johaynah explains why Moḥammad



denied. When they came to Madynah, he said to them, I did not order you to fight in the sacred month, and he refused to accept the portion of the booty which 'Abd Allah had set aside for him, nor would he divide the booty and dispose of the prisoners. His orders were probably worded in such a manner, that complicity could not be distinctly proved against him. To share responsibility with a man in power is always dangerous. In case of failure he makes his tool the scape-goat.

Those men who professed to restore the religion of the Ka'bah to its purity, and who pretended to live for a higher object had violated one of the most sacred institutions. They had shed blood in one of the four months during which the Arabs sheathed their swords, and during which the merchant and traveller might without fear or molestation travel through the desert. Sohayly, vol. 3, f. 68, observes anent the sacred months:—

“The observance of the sacred months was a commandment of God which had been acted up to ever since the time of Abraham and Ishmael. It was one of the prohibitions which God ordained to promote the interests of the inhabitants of Makkah. He says in the Korân 5, 98. ‘God has established the Ka'bah, that it be a stand-by for mankind [where they find safety and as a centre of the observances of the true religion]. With the same view he has ordained the holy months, sacrifices and offerings.’ This is due to the prayer of Abraham who, when he caused some of his offspring to settle in an unfruitful valley, prayed to God that he might make the hearts of some men affected with kindness towards them. (Kor. 14, 40). The commandment of God, that all men should perform the pilgrimage to Makkah, greatly promotes the interests of its inhabitants and furnishes them with a livelihood. Besides establishing the Ka'bah, God ordained the four holy months. Three of them Dzú-lka'dah, Dzú-lhajj and Moħarram are continuous and one of them the Rajab is isolated. The object of the three continuous

was so cautious in planning his expedition the next year : It started before the sacred month but could not reach its destination before new moon and from the equivocations of a written order, no reference could be made to him. It farther explains why the same Ibn Aby Waqqâc who had witnessed this indignation of the Johaynah tribe remained behind, and why 'Abd Allah b. Jaʿsh was chosen as the leader.



months is to enable people to perform the annual general pilgrimage. One month precedes the month in which the pilgrimage is to be performed and one month follows it. The space of three months enables a man to come from the most distant parts of Arabia in safety and return again to his home. The object of rendering the month of Rajab sacred was to enable people to perform occasional individual visits to the Ka'bah. Half a month for going and half a month for returning was enough, for no one comes from a great distance for *this* ceremony. During the pilgrimage, Makkah was provided with supplies which were cut off during the remainder of the year by the Bedouins and robbers. In Rajab the traveller to and from Makkah was equally safe. God had ordered that it should be so in his care and foresight for the Makkians, and he caused this institution of the religion of Abraham to survive. It was not abolished until the Islám was introduced, and it was even kept up in the commencement of the Islám. But the revelation of the 'verse of the sword' made fighting lawful, yet it did not do away entirely with the sacredness of the holy months."

The popular feeling against the outrage was very strong, not only among the pagans, but also among the Moslems who were very harsh against the perpetrators,\* and as it would appear from the above Korán verses some of whom threaten to relinquish the new faith.

Mohammad had himself been present at a war in which all the Homs tribes united to punish a much slighter violation of the ancient Haramite institutions. And therefore, being as yet weak he did not dare formally to abolish the sacred months though he took this step subsequently when he was stronger.† In the above quotation from the Korán he allows that this act of aggression was sinful but holds out a hope to the perpetrators of forgiveness‡ and

\* Ibn Ishák.

† The Jews predicted that this murder would lead to a long war, in a pun which they made on the names of 'Amr b. al-Hydhramy and his murderer Wákid. It runs '*amirat alharb* "the war will last long;" *hadharat alharb* "the war has commenced" *wakadat alharb* "the war is flaming."

‡ Ibn Ishák who follows the authority of Zohry and of Ibn Rúmán from 'Orwah takes great pains to give a different bearing to the second verse. "After the first

he contents himself by showing to the world that the wrongs which the *Korayshites* committed against him were much greater than those which he committed against them, and that they had taken the initiative, for it was their display of brute force during the sacred months which prevented him from visiting the Ka'bah agreeably to the *Haramite* institutions. And in order to put them entirely in the wrong he accused them of disbelief in the primitive religion of the holy temple for which he professed the highest veneration. And he now ordered the *Moslims* who had hitherto been in the habit of turning their faces in prayers towards Jerusalem like the *Jews*, to direct their prayers towards the Ka'bah.\* In order fully to appease the popular feeling he was obliged to pay the price of the blood of *Ibn al-Hadhramy*.† As to the manner in which he disposed of the booty and prisoners, there is a great variety of

verse had been revealed which absolved 'Abd Allah b. Ja'zsh from guilt, they came to the prophet and said, that they would now expect some reward from God for their exploit, and upon this, the second verse was resolved, which, he conceived, contains a promise of farther reward."

\* According to *Ibn Ishák* the qiblah was altered in Sha'bán (February, 624) and consequently just when this affair was in agitation.

† "The prophet paid the price of the blood of *Ibn al-Hadhramy* to his *Korayshite* heirs. *Mojáhid* and others say, he paid it, because there existed a truce of two years between the prophet and the *Korayshites*." (*Baghawy Comm. on the Korân*, 2, 214).

"The prophet paid the price of blood for 'Amr b. al-Hadhramy, and he proclaimed that the sacred month is to be respected as it had been. It was subsequently that God made it lawful to fight in it." (*Wákidy* p. 10, from *Ma'mar*, from *Zohry*, from *Orwah*) but in page 11 is another tradition from *Ibn Aby Sabrah* in which *Ibn 'abbás* declares that the prophet did not pay the price of the blood, and *Wákidy* adds that he and his contemporaries considered this as the true version. I adhere to the view first expressed, because the authority of *Zohry* is stronger than that of *Ibn 'Aby Sabrah*, secondly, *Ibn 'abbás* was a liar, thirdly, as it places the prophet into an unfavorable light, if he had to pay the price of blood (by doing so, he acknowledged that his followers were murderers), it is more likely that the fact, if it happened, would be denied than that such a statement, if not true, was invented. Fifthly, *Mojáhid* who is one of those men who, during the first century of the *Hijrah* put the *Islám* into shape, admits that he paid the price of blood; but states a reason which we know to be a lie, because not a month was allowed to elapse during the two years in which the *Moslims* did not waylay the *Korayshites*.

opinions. One author, but as far as I know only one,\* states that the booty was returned to its owner, this I conceive to be true, because it is consistent with the payment of the blood-money. I also think that the prisoners received their liberty without payment.†

This daring robbery proved to the *Korayshites* that their caravans

\* "Ibn Wahb mentions that the prophet returned the booty and paid the price of the blood of the man who was killed." (*Núr alnibrás* p. 719.) The other statements contradict each other. They run:

"During the time of paganism, it was usual that the leader of a successful expedition received one-fourth of the booty. When 'Abd Allah b. Jaʿsh returned from *Nakhlah* he took only one-fifth of the booty and divided the rest among his men. This was the first case in the *Islám* that a leader took a fifth, subsequently the verse of the *Korân* 1, 42 was revealed." (*Wákidy* p. 10). "Some descendants of 'Abd Allah b. Jaʿsh say that he divided the booty when it had been declared lawful. Four-fifths he gave to his men and one-fifth to God and his Messenger. What he did coincided precisely with what God subsequently commanded to be done." (Ibn *Ishák*, he allows at least that for some time *Moḥammad* did not consider the booty as lawful). Ibn Sa'd, says 'Abd Allah, divided the booty on his arrival at *Madynah* without hesitation. And Ibn *Sayyid alnás* states that some authorities maintain that *Moḥammad* divided the booty after the battle of *Badr*.

† Though Ibn *Ishák* states that they were ransomed, he admits that the prophet did not consider their detention lawful before the *Korân* verses quoted above were revealed for, until then, he would have nothing to say to the whole matter. He says: "When the verses of the *Korân* were revealed, the prophet took the booty and prisoners under his care. The *Korayshites* sent men to *Madynah* to ransom the two prisoners. The prophet said to them, I will not give them up before my two men Sa'd and 'Otbah have made their appearance. I fear you have killed them. If so, I put your two men to death. When Sa'd and 'Otbah had come back, he accepted the ransom for them. *Al-Hakam* remained with the prophet and he was subsequently slain in the battle of *Byr al-Ma'únab*. 'Othmán returned to *Makkah* and died there in his former faith." *Wákidy* goes so far as to name even the amount at which they were ransomed, viz.: each of them for forty ounces of gold. One ounce is equal to forty dirhams. The account of Ibn *Ishák* contains a contradiction. He says that *al-Hakam* was ransomed and also that he then and there embraced the *Islám* and remained at *Madynah*. His profession of the *Islám* would have secured him his liberty without ransom. In the *Isábah* we find the solution of the contradiction. 'Omar intended to put him to death (probably under the impression that Sa'd and 'Otbah had been killed) and to avert his execution he embraced the *Islám*. The story about the ransom falls therefore to the ground.

were not safe in any place of the *Hijáz*, nor at any season of the year, and henceforth the want of safety, and the difficulties and expense of communication were so great that their commerce was ruined. If the object of *Mohammad* in planning this expedition had been to bring matters to a crisis, he obtained it, for two months after, the battle of *Badr* was fought, which decided the fate of the ancient institutions of *Makkah*. One of the greatest advantages which *Mohammad* had over his enemies, and one of the main causes of his success was, that he was perfectly free from the fetters which ancient habits imposed upon them. He could break through any law, through any custom, through any preconceived notion of honor, alleging a divine command to counterbalance public opinion. It is true in this instance he gave way ; but when he grew stronger he neither sacrificed an advantage nor a passion to public opinion. If necessary he justified his acts by a revelation.

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*Literary and Miscellaneous Intelligence.*

The January No. of the *Journ. Asiatique* for 1855 contains the conclusion of *M. Defremery's* paper on the history of the Assassins of Syria. The author is about to publish a detailed work on the Carmathians of Persia, and he will then enter into an examination of the religious dogmas of both these sects. *M. Pavie* also concludes his analysis of the *Bhoj-prabundh*.

The same periodical for February and March opens with a lexicon compiled by *M. de Saucley* in justification of his translation of the Behistan inscription published in a previous No. Then follows a notice of the principal porcelain manufactories in Japan by *M. Hoffman* with translation of an extract from a Japanese MS. in the Leyden library which describes the manufactures of *Imari*. *M. Wöphe* continues his '*Recherches*' on the history of the Mathematical Sciences among the Arabs, and *M. Victor Langlois* gives a narrative of his Journey to *Sis*, the ancient capital of Armenia.

The April No. continues *Wöphe's* Mathematical paper. An analysis with extracts is here given of a Persian MS. of *Abul Wafi* in the Imperial Library. The only other original paper is by *M.*



Gustav Dugat on Hodba, an Arab poet of the 1st century for the Hegira. Among the 'Nouvelles et Mélanges,' always so interesting in this Journal, is a letter from M. Delaporte of the French Consulate at Mosal, in which we find the promise of a detailed history of that city, the key of Kurdistan. Another letter from Constantinople gives hope of an edition of Rashidoodeen's Jamuh-ool Towarikh, being shortly published at Constantinople.

The No. for May and June continues Sanguinetti's extracts from Ibn Aby Ossaibiúh's History of Physicians. The present extract gives particulars of ten physicians, one of them a woman, who lived before and contemporary with Mohammad, or during the reign of the Ommiade and early Abbasside Caliphs. The next article is by Pavie and entitled—'Some observations on the Serpent Myth of the Hindus.' Taking for his text a bas-relief in our Society's Museum, representing the king and queen of the Nagas, and another from Egypt representing under the form of serpents, Jupiter Serapis and Iseis Myrionymus, and which is figured by Guiguiault in his Religions de l'antiquité, the author points out several striking analogies between Indian myths and Western traditions, as well biblical as Greek and Egyptian. M. Cherbonneau abstracts from a MS. of Ibn Hammud some interesting information regarding Obeid Allah the founder of the Fatimite dynasty, and M. Belin with a few remarks on the system of instruction pursued in the Ottoman Colleges, gives the text and translation of an Idjayè or Professor's diploma, such as is in use in Turkey. The No. concludes with a notice by Reinaud of the new Catalogue of the Oriental MSS. of the Imperial Library of Paris now under preparation, and of which the 1st vol. is to appear next year.

The July No. of the same Journal is entirely occupied by Mohl's Annual Report which gives a full and most interesting resumé of the labours of oriental scholars during 1854-55.

The 3rd No. of the Zeitschrift of the German Oriental Society opens with Prof. Rödiger's report for 1854. Flügel notices certain peculiar methods of attaching dates to their works in the sixteenth century by copyists of Mohammedan MSS. Von Hammer continues his extracts from Saalchi. Prof. Pott of Halle follows with a philological paper; in which he points out where he differs from Max



Muller in his classification of the Turanian languages, as explained in the letter written by the latter for Bunsen's late work. Dr. Levy remarks on the Chaldaic inscriptions and vessels found by Layard; and Dr. Burgsh continues his Egyptian researches. The last original article consists of further materials for the history and Geography of Soodan contributed by the African traveller Dr. Barth and worked up by Mr. Ralfe.

No. 4 of the same Journal opens with a paper by Prof. Stenzler on Indian trial by ordeal. Hang continues his Zend researches. Prof. Stähelin and Dr. Hitzig complete the No. by contributions on subjects bearing for the most part on Hebrew history. Among the many interesting extracts from correspondence, which are published in this No. is a letter on the Chinese residents of Java, written by the young prince of Ashantee, who has been educated in Holland and Germany, and is now an Engineer in the Dutch service at Buitenzorg.

The 2nd and 3rd part of Vol III. of the 'Indische Studien' begins with an Index to the harmonies and discrepancies in Bénéfey's edition of the Sama Veda. Nearly all the other contributions to the No. are by the learned and industrious editors, and nearly all bear on the literature and philosophy of the Vedas. There is, however, a review of Wagener's Essay on the connexion between Indian and Greek fables and a translation by Spiegel, of a paper by Westergaard on Ancient Iranian Mythology.

The 1st No. of the 5th vol. of the Journal of the American Oriental Society is entirely occupied by the Rev. Mr. Stoddard's Grammar of the Modern Syriac language as spoken in Ooroomiah, Persia and Koordistan.

Prof. Lassen will soon be publishing the 1st part of the 3rd vol. of his 'Indische Alterthumskunde.' We hear of an English translation of this valuable work having been made in London: if published in a condensed and cheap form, so as to admit of being readily re-translated into the Indian vernaculars, it would probably meet with a large sale in this country.

*Extract of a letter from Dr. WEBER, dated the 21st October, 1855.*

"E. Renan has published in Paris an "Histoire des langues Sémitiques," a work, which embodies all the discoveries of modern

science and is an important contribution to linguistic research. Regnier has printed a somewhat voluminous book "Sur l'idiome des Vedas," which, although containing not much that is new, is a work of patient enquiry and judicious arrangement. Barthelmy St. Hilairé's work "du Buddhisme," is a good compilation. I would draw your attention to Faustboll's very valuable edition of the Dheimmapadam, accompanied by Buddhaghosa's commentary (printed at Copenhagen). Westergard's edition of the Zend texts has been also completed. Spiegel is engaged in printing at Vienna a grammar of the Pehlvi language. Aufrecht is preparing a catalogue of the Sanskrit MSS. of the Bodleyan Library. Roth's and Bothlingk's Sanskrit dictionary has advanced to the letter ज, and the first volume, containing the vowels, will probably be issued at the end of this or the commencement of the next year. Kuhn has attacked in his journal the article in the Westminster Review (April, 1855) on the above mentioned dictionary. E. Cartius has just now published a short, but interesting paper "the Ionians," in explanation of the Oriental elements in the culture of the Greeks."

The Committee appointed by the Court of Directors to report on the Elliott MSS. have recommended the publication of the first 3 vols. at once. These were mentioned in Dr. Sprenger's notice two years ago to be ready for the press: the rest of the materials it will of course take time to examine thoroughly, but the impression is, we learn, that sooner or later the whole work can be published on the plan sketched by Elliott. It may be expedient perhaps to omit some of the selected texts, should these be published in the interim at Agra or elsewhere, but beyond this, it is to be hoped the original design will not call for alteration. Morley has undertaken to superintend the publication and is to be assisted by E. C. Bayley.

The British Museum have not purchased the Stacey collection of coins. They have already too many duplicates of the same classes that constitute the bulk of this collection to justify the Trustees in expending so large a sum in acquiring a limited number of valuable novelties. This Museum has been getting rich lately in Indian coins, having secured Lord Auckland's and Major Cunningham's latest collections, besides making some advantageous purchases at Dr. Bird's (of Bombay) auction. It has also received several important donations of coins from this country.

Our Society's Museum is the proper place for the Stacey collections if means could be found for effecting the purchase. Mr. Thomas valued the collection at £400, Major Cunningham at £500.

A reprint has been demanded of Colebrooke's Essays, and it is in contemplation to publish a vol. of James Prinsep's numismatic contributions to our Journal. This will supply a want much felt by students of Indian history, the first seven vols. of our Journal not being now obtainable. All the original copper plates from which these valuable essays were illustrated are in the possession of Mr. H. T. Prinsep.

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PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,

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FOR JANUARY, 1856.

At the annual general meeting of the Society held on the 2nd of January, 1856.

BÁBU RÁMGOPÁL GHOSE, Vice-President, in the chair.

The Secretary read the following report.

*Report.*

The Council have the satisfaction of submitting their report on the operations of the Society for the past year, and in doing so, wish to call attention to the state of its member-list which is in every respect satisfactory.

At the close of 1851 the number of ordinary members on the Society's list was 130, during 1852 this was increased to 138, the elections of 1853-54 added 17 more, making the total at the beginning of the last year 155. Since that time there has been an accession of 13 new members while the loss during that period has been 2 by death and 5 by retirement, leaving on the Society's roll at the close of the year 161 members, of whom 33 are absent from India.

The list of honorary members has received a single addition during the year: the individual elected is the distinguished Sanskrit scholar, Rájá Rádhákant Deb.

Amongst the members lost by death during the year under review the Council have to name Major Genl. W. N. Forbes, a distinguished and most zealous member and for sometime a V. P., whose loss the Society has recorded by a vote of respect to his memory passed at its ordinary general meeting in January last. The only other member lost by death is Mr. G. C. Cheap of the Civil Service.



*Finance.*

Memo. :

|                         |     |       |    |    |
|-------------------------|-----|-------|----|----|
| Contributions,.....     | Rs. | 7,166 | 0  | 0  |
| Admissions, .....       |     | 512   | 0  | 0  |
| Library, .....          |     | 631   | 14 | 0  |
| Journal, .....          |     | 784   | 8  | 0  |
| Government Grants, .... |     | 7,368 | 0  | 0  |
| Building, .....         |     | 1,230 | 0  | 0  |
| Balance of 1854, .....  |     | 5,681 | 14 | 5  |
| Miscellaneous, .....    |     | 825   | 8  | 10 |

The total of receipts for the year as per marginal memo. appears to be Rs. 18,517-14-10 and of disbursements Rs. 17,947-15-7, leaving a balance of Rs. 569-15-3 in favor of the Society on the year's transactions. The receipts

however, include a grant from Government of Rs. 1,200 obtained for the specific purpose of paving the ground floor of the Museum with Chunar flag stones, and if this sum be excluded from the ordinary income of the year as it should be, the expenses will be found to have exceeded the receipts by Rs. 630-0-9. With reference to this excess of expenditure over income the Council have to observe that the necessity of arranging the Society's collection

|        |       |   |
|--------|-------|---|
| A. Rs. | 229   | 0 |
| B. „   | 1,500 | 0 |
| C. „   | 552   | 8 |
|        | <hr/> |   |
|        | 2,281 | 8 |

of fossils (A) and providing large glazed cases for the Museum (B.) and the Library (C.) has involved heavy expenses, which, however, are not likely to recur.

The liabilities of the Society including the estimated cost of the last 4 numbers of the Journal and its Index and the new catalogue of the Library amount to Rs. 2,679-2-4. To meet this, there is an available cash balance of Rs. 7,603-2-1 or nearly three times more than the liabilities.

The outstanding assets remain very much the same as at the close of 1854.

The probable income and expenditure of the ensuing year may be estimated as follows :

*Income.*

|                                  |     |       |
|----------------------------------|-----|-------|
| Contributions, .. .. .           | Rs. | 8,000 |
| Government Grants, .. .. .       | ..  | 7,368 |
| By sale of books, .. .. .        | ..  | 900   |
| Journal, .. .. .                 | ..  | 900   |
| Secretary's office, .. .. .      | ..  | 16    |
| Interest of Co.'s Paper, .. .. . | ..  | 20    |

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17,204



*Expenditure.*

|                                            |        |
|--------------------------------------------|--------|
| Establishment, .. .. .                     | 1,800  |
| Museum and Contingencies, .. .. .          | 7,920  |
| Journal 7 Nos. .. .. .                     | 2,500  |
| Library, .. .. .                           | 2,200  |
| Miscellaneous, including Building, .. .. . | 1,000  |
|                                            | <hr/>  |
|                                            | 15,420 |

*Library.*

The Library has been enriched by the addition of nearly 300 volumes, including a handsome donation of about 80 volumes from the Royal Academy of Turin. Almost all the old books have been rebound and some new glazed cases have been provided for their preservation. Several of the leading scientific periodicals of Europe have been subscribed for, and a reading-room has been opened for the use of members.

The new catalogue of the Library has not yet been completed; about eight forms are still with the printer. They will, however, it is believed, be struck off within a month and the work published by February next.

*Museum.*

The whole of the tertiary fossils in the Society's collection amounting to upwards of 3,000 specimens have been carefully arranged and numbered. Dr. Falconer, who with the assistance of Dr. Walker kindly undertook this duty about the close of the last year, has left to the Society a detailed catalogue of the collection, which, it is hoped, will ere long be placed in the hands of the members in a printed form.

The accessions of new specimens in this department have been recorded by the Curators in their monthly reports; they include amongst others several valuable donations of earths and minerals from Upper Assam by Col. Hannay; of geological specimens from Rájmahal by Prof. Oldham, and of zoological specimens from the Somali country, by Lieut. Speke, and from Rangoon and Moulmein by Major Phayre and Mr. W. Theobald, Jr.

*Journal.*

The Journal has been published at intervals of about two months, and thus six numbers have been issued during the year: a seventh is nearly ready and will appear in a short time.

The Index, adverted to in the last report, has also been completed, and will be issued with the 7th number.

*Secretary.*

In July last Mr. Grote tendered his resignation of the office of Secretary, which he had held with so much zeal and ability for nearly four years, and the Council, as a temporary measure, appointed Mr. H. V. Bayley to officiate pending the appointment of a successor.

At the ordinary general meeting of the Society in August last, Mr. Grote was solicited to continue to render to the Society his valuable services. He was not, however, able to comply with this request owing to press of public duties, and the Society at the November meeting passed a vote of thanks for the services rendered to it by that zealous and distinguished officer.

At a subsequent meeting Mr. W. S. Atkinson was elected Secretary.

*Officers.*

The Council have much pleasure in recording their satisfaction at the zeal and assiduity with which the Curators and the Librarian continue to discharge their respective duties.

*Oriental Fund.*

The Bibliotheca Indica continues to be conducted with unabated vigour. Within the last twelve months no less than 28 Nos. have been issued from the press. Of these 14 are Arabic and the rest Sanskrit, and they include portions of ten different works edited severally by Mr. Alfred von Kremer of the Austrian Consulat at Alexandria, Dr. Roer, Mr. Hall, Bábu Rájendralál Mittra and the Maulavies of the Calcutta Madressah.

The names of the works are:—

1. A Dictionary of Technical Terms used in the sciences of the Musulmans, edited by Moulavies Mohamed Wayzh Abdul Haqq and Golam Kadir, Nos. 108, 109, 118, 129 and 132.

2. A Biographical Dictionary of persons who knew Mohammed, edited by ditto, Nos. 106, 111, 123 and 128.

3. Waqidy's History of Mohammed's Campaigns, edited by A. Von Kremer, Nos. 110, 112, 113 and 121.

4. The Surya Siddhánta with its commentary, the Gúdhártha Prakásaka, edited by F. E. Hall, Esq. M. A. Nos. 105 and 115.

5. The Taittíriya Bráhamana of the Black Yajur Veda, edited by Bábu Rájendralál Mittra, Nos. 125 and 126.

6. The Taittíriya Sañhitá of the Black Yajur Veda, edited by Dr. E. Röer, Nos. 117, 119, 122 and 131.

7. The Márkandeya Purána, edited by Rev. K. M. Banerjea, Nos. 114 and 127.

8. The Tale of Vásavadattá, by Subandhu with its commentary entitled the Darpana, edited by F. E. Hall, Esq. M. A., Nos. 116 and 130.

9. The Uttara Naishadha Charita, edited by Dr. Röer, Nos. 120 and 124.

10. Tusy's list of Shiah Books, edited by Dr. A. Sprenger, No. 107.

Of these, the Council would especially draw attention to the Black Yajur, which is the only portion of the Vedas not available in Europe, and which the Hon'ble Court of Directors expressed a desire that the Society should take in hand. The Surya Siddhánta has been undertaken on the recommendation of Prof. Brockhaus, and its publication, it is hoped, will render accessible to western criticism one of the most ancient works on Hindu Astronomy. The Naishadha Charita or the adventures of Nala, king of Nishadha, forms one of the six epic poems of the Hindus to which they apply the epithet "Mahá" or the great par excellence. It includes 22 cantos of which the first eleven were published in 1836. By the publication of the concluding half, the Society has now completed the last of the several unfinished oriental works which were transferred to it by the late General Committee of Public Instruction.

Waqidy's History of Mohammed's Campaigns is a valuable contribution to Arabic History, and the interesting Tale of Vásavadattá will, the Council believe, be welcome to the lovers of Oriental literature.

In pursuance of the notice given by him at the last monthly meeting, Capt. Thuillier proposed that the question of reducing the quarterly contributions payable by members be referred to the Council for careful examination and report, and that the next ordinary general meeting be made special for the purpose of taking their report into consideration. The motion, having been seconded by Mr. Grote, was carried unanimously.

The meeting then proceeded to ballot for the Council and officers for the ensuing year. Capt. Thuillier and Dr. Thompson were appointed Scrutineers and at the close of the ballot, the chairman announced the following to be the result.

COUNCIL.

|                           |                    |
|---------------------------|--------------------|
| Sir James W. Colvile, Kt. | PRESIDENT.         |
| Bábu Rámgorál Ghose,      | } VICE-PRESIDENTS. |
| Dr. G. G. Spilsbury,      |                    |
| A. Grote, Esq.            |                    |
| C. Allen, Esq.            |                    |
| Dr. A. C. Macrae.         |                    |
| C. Beadon, Esq.           |                    |
| Dr. T. Thomson.           |                    |
| Lt. W. N. Lees.           |                    |
| Dr. T. Boycott.           |                    |
| Capt. C. B. Young.        |                    |
| H. Walker, Esq.           |                    |
| Bábu Ramáprasád Roy.      |                    |
| Capt. H. C. James.        |                    |
| W. S. Atkinson, Esq.      | SECRETARY.         |

ABSTRACT STATEMENT  
OF  
RECEIPTS AND DISBURSEMENTS  
OF THE  
ASIATIC SOCIETY,  
FOR  
THE YEAR, 1855.



STATEMENT  
*Abstract Statement of Receipts and*

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## CONTRIBUTION.

|                           |    |           |           |
|---------------------------|----|-----------|-----------|
| Received from Members, .. | .. | 7,166 0 0 |           |
|                           |    | <hr/>     | 7,166 0 0 |

## ADMISSION FEE.

|                                  |    |         |         |
|----------------------------------|----|---------|---------|
| Received from new Admissions, .. | .. | 512 0 0 |         |
|                                  |    | <hr/>   | 512 0 0 |

## LIBRARY.

|                            |    |    |          |
|----------------------------|----|----|----------|
| Sale proceeds of Books, .. | .. | .. | 631 14 0 |
|----------------------------|----|----|----------|

## JOURNAL.

|                                                                                   |    |    |         |
|-----------------------------------------------------------------------------------|----|----|---------|
| Sale proceeds of, and Subscriptions to, the<br>Journal of the Asiatic Society, .. | .. | .. | 784 8 0 |
|-----------------------------------------------------------------------------------|----|----|---------|

## SECRETARY'S OFFICE.

|                                                                                                |    |        |        |
|------------------------------------------------------------------------------------------------|----|--------|--------|
| Transfer on account of Postage paid for letters<br>to Dr. Ross and charged under this head, .. | .. | 1 8 0  |        |
| Discount on purchase of Postage Stamps, ..                                                     | .. | 1 13 3 |        |
| Lieut. Raverty, refund of Postage, ..                                                          | .. | 6 8 6  |        |
| Syud Kurmut Ali, ditto, ..                                                                     | .. | 0 4 0  |        |
|                                                                                                |    | <hr/>  | 10 1 9 |

## GENERAL ESTABLISHMENT.

|               |    |    |       |
|---------------|----|----|-------|
| Fine, .. .. . | .. | .. | 0 8 0 |
|---------------|----|----|-------|

## DR. J. T. ROSS.

|                                      |    |    |       |
|--------------------------------------|----|----|-------|
| Refund of Postage on his account, .. | .. | .. | 1 8 0 |
|--------------------------------------|----|----|-------|

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Carried over, .. 9,106 7 9

## No. 1.

*Disbursements for 1855.*

## CONTRIBUTION.

|                                                                                  |    |   |   |        |
|----------------------------------------------------------------------------------|----|---|---|--------|
| E. Thomas, Esq. refund of contributions received in excess of the amount due, .. | 96 | 0 | 0 |        |
|                                                                                  |    |   |   | 96 0 0 |

## LIBRARY.

|                                                   |     |    |    |           |
|---------------------------------------------------|-----|----|----|-----------|
| Salary of the Librarian, 12 months, at 70 pr. m., | 840 | 0  | 0  |           |
| Establishment, ditto at 8 ditto, ..               | 96  | 0  | 0  |           |
| Petty Charges, ..                                 | 49  | 9  | 0  |           |
| New Book Cases, ..                                | 552 | 8  | 0  |           |
| New Mat,..                                        | 22  | 7  | 3  |           |
| Book binding, ..                                  | 441 | 8  | 0  |           |
| Commission on sale of Books, ..                   | 32  | 11 | 10 |           |
| Stationery, ..                                    | 3   | 14 | 0  |           |
| Postage, ..                                       | 0   | 1  | 0  |           |
| Freight, ..                                       | 4   | 10 | 0  |           |
| Lithographing, ..                                 | 5   | 0  | 0  |           |
| Printing, ..                                      | 39  | 0  | 0  |           |
| Purchase of Books, ..                             | 248 | 4  | 0  |           |
|                                                   |     |    |    | 2,335 9 1 |

## JOURNAL.

|                                   |       |    |   |            |
|-----------------------------------|-------|----|---|------------|
| Freight, ..                       | 93    | 1  | 6 |            |
| Petty Charges, ..                 | 41    | 9  | 0 |            |
| Lead Cut,..                       | 6     | 0  | 0 |            |
| Colouring Plates, ..              | 45    | 0  | 0 |            |
| Commission on sale of Journal, .. | 6     | 2  | 9 |            |
| Lithographing, ..                 | 806   | 12 | 0 |            |
| Printing, ..                      | 1,633 | 4  | 9 |            |
|                                   |       |    |   | 2,631 14 0 |

## SECRETARY'S OFFICE.

|                                                         |       |    |   |           |
|---------------------------------------------------------|-------|----|---|-----------|
| General Establishment, 12 months, at 86.8 per month, .. | 1,038 | 0  | 0 |           |
| Secretary's Office Establishment, at 54 ..              | 648   | 0  | 0 |           |
| Petty Charges, ..                                       | 26    | 12 | 9 |           |
| Stationery, ..                                          | 94    | 3  | 0 |           |
| Inward Postage, ..                                      | 34    | 14 | 0 |           |
| Purchase of Postage Stamps, ..                          | 81    | 0  | 0 |           |
| Freight, ..                                             | 12    | 8  | 0 |           |
| Lithographing Circulars, ..                             | 21    | 0  | 0 |           |
| Copying MSS., ..                                        | 1     | 4  | 0 |           |
| Engraving a Seal, ..                                    | 2     | 0  | 0 |           |
| Printing, ..                                            | 3     | 12 | 0 |           |
|                                                         |       |    |   | 1,963 5 9 |

## DR. J. T. ROSS.

|                                                            |   |   |   |  |
|------------------------------------------------------------|---|---|---|--|
| Paid Postage (by transfer) on letters addressed to him, .. | 1 | 8 | 0 |  |
|------------------------------------------------------------|---|---|---|--|

Carried over,.. 7,028 4 10

Brought forward, .. 9,106 7 9

## MUSEUM OF ZOOLOGY,

Received from the General Treasury, at 300

|                          |       |    |   |
|--------------------------|-------|----|---|
| per month, .. ..         | 3,600 | 0  | 0 |
| Savings of Salary, .. .. | 60    | 0  | 0 |
| Fine, .. ..              | 2     | 10 | 6 |
|                          | <hr/> |    |   |
|                          | 3,662 | 10 | 6 |

## MUSEUM OF ECONOMIC GEOLOGY.

Received from the General Treasury, at 314

|                  |       |   |   |
|------------------|-------|---|---|
| per month, .. .. | 3,768 | 0 | 0 |
|                  | <hr/> |   |   |
|                  | 3,768 | 0 | 0 |

## VESTED FUND.

|                                        |    |   |   |
|----------------------------------------|----|---|---|
| Interest of Government Security, .. .. | 29 | 3 | 7 |
|----------------------------------------|----|---|---|

## DEPOSITS.

|                                         |       |    |   |
|-----------------------------------------|-------|----|---|
| F. E. Hall, Esq. on account-current, .. | 91    | 7  | 0 |
| On account Spilsbury Testimonial, ..    | 425   | 0  | 0 |
| Rev. S. Hislop, .. ..                   | 5     | 0  | 0 |
| Rájá Apurbakrishna Báhádur, ..          | 50    | 0  | 0 |
| Major J. C. Hannington, ..              | 32    | 0  | 0 |
| Major Loftie, .. ..                     | 16    | 0  | 0 |
| Bábu Dwarkanauth Chatterjee, ..         | 66    | 8  | 0 |
| D. Grant, Esq., .. ..                   | 32    | 0  | 0 |
|                                         | <hr/> |    |   |
|                                         | 717   | 15 | 0 |

## H. PIDDINGTON, Esq.

|                                                         |   |   |   |
|---------------------------------------------------------|---|---|---|
| Refund of Freight paid on his account, ..               | 3 | 0 | 0 |
| E. THOMAS, Esq.                                         |   |   |   |
| Refund of Postage paid on his account, ..               | 0 | 5 | 0 |
| LIEUT. RAVERTY.                                         |   |   |   |
| Refund of cost of paper purchased on his account, .. .. | 0 | 5 | 0 |

## • BUILDING.

|                                                                |       |   |   |
|----------------------------------------------------------------|-------|---|---|
| By sale of Old Beams, .. ..                                    | 30    | 0 | 0 |
| Government Grant for paving the Society's Rooms with stone, .. | 1,200 | 0 | 0 |
|                                                                | <hr/> |   |   |
|                                                                | 1,230 | 0 | 0 |

## BALANCE OF 1854.

|                              |        |    |    |
|------------------------------|--------|----|----|
| In the Bank of Bengal, .. .. | 5,184  | 8  | 4  |
| Cash in hand, .. ..          | 28     | 13 | 10 |
|                              | <hr/>  |    |    |
|                              | 5,213  | 6  | 2  |
| Inefficient Balance, .. ..   | 468    | 8  | 3  |
|                              | <hr/>  |    |    |
| Carried over, ..             | 24,199 | 13 | 3  |

Brought forward, .. 7,028 4 10

MUSEUM OF ZOOLOGY.

|                                                        |     |    |       |           |
|--------------------------------------------------------|-----|----|-------|-----------|
| Salary of the Curator, E. Blyth, Esq.                  | 250 |    |       |           |
| pr. m., 12 months, ..                                  | ..  | .. | 3,000 | 0 0       |
| House-rent, 40 ditto ditto, ..                         | ..  | .. | 480   | 0 0       |
| Establishment, ..                                      | ..  | .. | 290   | 0 0       |
| Petty Charges, ..                                      | ..  | .. | 396   | 1 6       |
| Contingent Charges on account of arranging fossils, .. | ..  | .. | 229   | 14 6      |
| Paid for 6 Glazed Cases for the fossils, ..            | ..  | .. | 1,500 | 0 0       |
| Freight, ..                                            | ..  | .. | 27    | 4 0       |
| Purchase of Stoppered Bottles, ..                      | ..  | .. | 20    | 0 0       |
| Printing, ..                                           | ..  | .. | 60    | 0 0       |
|                                                        |     |    |       | <hr/>     |
|                                                        |     |    |       | 6,003 4 0 |

MUSEUM OF ECONOMIC GEOLOGY.

|                                                |       |   |           |
|------------------------------------------------|-------|---|-----------|
| Salary of the Curator, H. Piddington, Esq., .. | 3,000 | 0 | 0         |
| Establishment, ..                              | 420   | 0 | 0         |
| Contingent Charges, ..                         | 291   | 5 | 6         |
|                                                |       |   | <hr/>     |
|                                                |       |   | 3,711 5 6 |

DEPOSITS.

|                                                                      |    |    |     |         |
|----------------------------------------------------------------------|----|----|-----|---------|
| Bábu Romanauth Banourjee on account of Mr. R. Houstoun's Deposit, .. | .. | .. | 176 | 0 0     |
| F. E. Hall's do., ..                                                 | .. | .. | 52  | 4 0     |
| M. Kremohlz for a portrait of Dr. Spilsbury, ..                      | .. | .. | 400 | 0 0     |
| Messrs. Mandy & Co. for a guilt frame for the above, ..              | .. | .. | 45  | 0 0     |
|                                                                      |    |    |     | <hr/>   |
|                                                                      |    |    |     | 673 4 0 |

H. PIDDINGTON, ESQ.

|                                 |    |    |   |     |
|---------------------------------|----|----|---|-----|
| Freight paid on his account, .. | .. | .. | 3 | 0 0 |
|---------------------------------|----|----|---|-----|

E. THOMAS, ESQ.

|                                             |    |    |   |     |
|---------------------------------------------|----|----|---|-----|
| Postage Stamps purchased on his account, .. | .. | .. | 0 | 5 0 |
|---------------------------------------------|----|----|---|-----|

LIEUT. RAVERTY.

|                                    |    |    |   |     |
|------------------------------------|----|----|---|-----|
| Paper purchased on his account, .. | .. | .. | 0 | 5 0 |
|------------------------------------|----|----|---|-----|

W. ELLIOTT, ESQ.

|                                 |    |    |   |     |
|---------------------------------|----|----|---|-----|
| Freight paid on his account, .. | .. | .. | 2 | 0 0 |
|---------------------------------|----|----|---|-----|

DADOBA PUNDURANG, ESQ.

|                                 |    |    |   |     |
|---------------------------------|----|----|---|-----|
| Freight paid on his account, .. | .. | .. | 2 | 8 0 |
|---------------------------------|----|----|---|-----|

REV. HISLOP.

|                                             |    |    |   |      |
|---------------------------------------------|----|----|---|------|
| Postage Stamps purchased on his account, .. | .. | .. | 0 | 10 0 |
|---------------------------------------------|----|----|---|------|

MESSES. WILLIAMS AND NORGATE.

|                                      |    |    |    |     |
|--------------------------------------|----|----|----|-----|
| Books purchased on their account, .. | .. | .. | 11 | 0 0 |
|--------------------------------------|----|----|----|-----|

REV. J WILSON.

|                                 |    |    |   |     |
|---------------------------------|----|----|---|-----|
| Freight paid on his account, .. | .. | .. | 2 | 8 0 |
|---------------------------------|----|----|---|-----|

BUILDING.

|                    |    |    |     |          |
|--------------------|----|----|-----|----------|
| Sundry repairs, .. | .. | .. | 76  | 0 0      |
| Assessment, ..     | .. | .. | 196 | 14 0     |
|                    |    |    |     | <hr/>    |
|                    |    |    |     | 272 14 0 |

Carried over, .. 17,711 4 4

Brought forward, .. 24,199 13 3

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Company's Rupees, 24,199 13 3

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*1st January, 1856.*



Brought forward, .. 17,711 4 4

## MISCELLANIOUS.

|                                         |    |     |   |   |                 |
|-----------------------------------------|----|-----|---|---|-----------------|
| Petty Charges on account Meetings, &c., | .. | 201 | 6 | 3 |                 |
| Printing, Advertising Meetings, &c.     | .. | 17  | 1 | 0 |                 |
| New Mat,                                | .. | 18  | 4 | 0 |                 |
|                                         |    |     |   |   | <u>236 11 3</u> |

## BALANCE.

|                        |    |       |    |   |                    |
|------------------------|----|-------|----|---|--------------------|
| In the Bank of Bengal, | .. | 5,820 | 13 | 7 |                    |
| Cash in hand,          | .. | 62    | 10 | 7 |                    |
|                        |    |       |    |   | <u>5,883 8 2</u>   |
| Inefficient Balance,   | .. |       |    |   | 368 5 6            |
|                        |    |       |    |   | <u>24,199 13 3</u> |
| Company's Rupees       |    |       |    |   |                    |

E. E.

W. S. ATKINSON,  
*Secretary.*

STATEMENT

*Abstract of the Oriental*

CASH.

---

SALE OF ORIENTAL PUBLICATIONS.

Sale proceeds of, and subscriptions to, the Bibliotheca Indica, 1,012 15 3

VESTED FUND.

Interest of Company's Paper, .. .. 361 1 0

PRA'KRIT GRAMMAR.

Received back from Bábu Rájendralál Mittra by transfer,.. 50 0 0

GOVERNMENT ALLOWANCE, .. ..

6,000 0 0

CUSTODY OF ORIENTAL WORKS.

Fine, .. .. 0 9 6

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Carried over, .. 7,424 9 9

No. 2.

*Fund for the year 1855.*

## SALE OF ORIENTAL PUBLICATIONS.

|                                      |       |    |    |          |
|--------------------------------------|-------|----|----|----------|
| Freight, .. .. .                     | 57    | 1  | 0  |          |
| Petty Charges, .. .. .               | 20    | 0  | 6  |          |
| Stationery, .. .. .                  | 9     | 0  | 0  |          |
| Postage, .. .. .                     | 20    | 9  | 0  |          |
| Commission on sale of Books, .. .. . | 59    | 15 | 10 |          |
|                                      | <hr/> |    |    | 166 10 4 |

## UTTARA NAISHADHA.

|                           |  |  |  |         |
|---------------------------|--|--|--|---------|
| Printing Charges, .. .. . |  |  |  | 448 0 0 |
|---------------------------|--|--|--|---------|

## COPYING OF MSS.

|                           |  |  |  |        |
|---------------------------|--|--|--|--------|
| Copying of ditto, .. .. . |  |  |  | 67 1 9 |
|---------------------------|--|--|--|--------|

## COPYING OF PURA'NS.

|                           |  |  |  |        |
|---------------------------|--|--|--|--------|
| Copying of ditto, .. .. . |  |  |  | 69 3 9 |
|---------------------------|--|--|--|--------|

## PRA'KRIT GRAMMAR.

|                          |  |  |  |        |
|--------------------------|--|--|--|--------|
| Editing Charges, .. .. . |  |  |  | 50 0 0 |
|--------------------------|--|--|--|--------|

## FUTOOH-UL SHA'M.

|                           |  |  |  |         |
|---------------------------|--|--|--|---------|
| Printing Charges, .. .. . |  |  |  | 444 4 0 |
|---------------------------|--|--|--|---------|

## CUSTODY OF ORIENTAL WORKS.

Salary of the Librarian, Bábu Rájendralál

|                                             |       |    |   |          |
|---------------------------------------------|-------|----|---|----------|
| Mittra at 30, .. .. .                       | 360   | 0  | 0 |          |
| Establishment at 12, .. .. .                | 144   | 0  | 0 |          |
| Book-binding, .. .. .                       | 119   | 2  | 0 |          |
| Petty Charges, .. .. .                      | 23    | 15 | 6 |          |
| Stationery, .. .. .                         | 6     | 7  | 0 |          |
| Postage, .. .. .                            | 2     | 4  | 0 |          |
| Purchase of a copy of Ziz Alogbegi, .. .. . | 60    | 0  | 0 |          |
|                                             | <hr/> |    |   | 715 12 6 |

## DICTIONARY OF TECHNICAL TERMS.

|                           |       |   |   |           |
|---------------------------|-------|---|---|-----------|
| Printing Charges, .. .. . | 1,708 | 8 | 0 |           |
| Editing Charges, .. .. .  | 588   | 0 | 0 |           |
|                           | <hr/> |   |   | 2,296 8 0 |

## BIOGRAPHICAL DICTIONARY.

|                           |       |   |   |         |
|---------------------------|-------|---|---|---------|
| Printing Charges, .. .. . | 504   | 0 | 0 |         |
| Editing Charges, .. .. .  | 249   | 8 | 0 |         |
|                           | <hr/> |   |   | 753 8 0 |

## WAQIDY.

|                  |       |   |   |        |
|------------------|-------|---|---|--------|
| Postage, .. .. . | 34    | 0 | 0 |        |
| Freight, .. .. . | 11    | 6 | 0 |        |
|                  | <hr/> |   |   | 45 6 0 |

## CONQUEST OF SYRIA.

|                           |  |  |  |         |
|---------------------------|--|--|--|---------|
| Printing Charges, .. .. . |  |  |  | 783 0 0 |
|---------------------------|--|--|--|---------|

## APHORISMS OF THE VEDANTA.

|                           |  |  |  |         |
|---------------------------|--|--|--|---------|
| Printing Charges, .. .. . |  |  |  | 298 6 0 |
|---------------------------|--|--|--|---------|

Carried over, .. 6,137 12 4

Brought forward, .. 7,424 9 9

## BLACK YAJUR VEDA.

|                                                       |    |    |    |         |
|-------------------------------------------------------|----|----|----|---------|
| Received back (by transfer) from Dr. E. Röer, the sum |    |    |    |         |
| advanced to him, .. .. .                              | .. | .. | .. | 100 0 0 |

## LALITA VISTARA.

|                                                           |         |
|-----------------------------------------------------------|---------|
| Received back (by transfer) from Bábu Rájendralál Mittra, | 220 0 0 |
|-----------------------------------------------------------|---------|

## BLACK YAJUR BRA'HMANA.

|                                                           |         |
|-----------------------------------------------------------|---------|
| Received back (by transfer) from Bábu Rájendralál Mittra, | 330 0 0 |
|-----------------------------------------------------------|---------|

## BALANCE OF 1854.

|                         |    |    |            |           |
|-------------------------|----|----|------------|-----------|
| In the Bank of Bengal,  | .. | .. | 1,985 11 8 |           |
| Cash in hand, ..        | .. | .. | 45 6 11    |           |
|                         |    |    | <hr/>      | 2,031 2 7 |
| Inefficient Balance, .. | .. | .. | ..         | 5 0 0     |

|                               |       |
|-------------------------------|-------|
| Company's Rupees, 10,110 12 4 | <hr/> |
|-------------------------------|-------|

1st January, 1856.

|                           |    |    |    |                          |       |    |   |
|---------------------------|----|----|----|--------------------------|-------|----|---|
|                           |    |    |    | Brought forward, ..      | 6,137 | 12 | 4 |
| BLACK YAJUR VEDA.         |    |    |    |                          |       |    |   |
| Printing Charges, ..      | .. | .. | .. | ..                       | 228   | 6  | 0 |
| TUSY'S LIST.              |    |    |    |                          |       |    |   |
| Printing Charges, ..      | .. | .. | .. | 516                      | 0     | 0  |   |
| Editing ditto, ..         | .. | .. | .. | 32                       | 0     | 0  |   |
|                           |    |    |    |                          | 548   | 0  | 0 |
| SURYA SIDDHA'NTA.         |    |    |    |                          |       |    |   |
| Postage, ..               | .. | .. | .. | 22                       | 4     | 0  |   |
| Printing Charges, ..      | .. | .. | .. | 224                      | 0     | 0  |   |
|                           |    |    |    |                          | 246   | 4  | 0 |
| LALITA VISTARA.           |    |    |    |                          |       |    |   |
| Editing Charges, ..       | .. | .. | .. | ..                       | 220   | 0  | 0 |
| CHAITANYA CHANDRODAYA.    |    |    |    |                          |       |    |   |
| Printing Charges, ..      | .. | .. | .. | ..                       | 249   | 4  | 0 |
| VA'SAVADATTA'.            |    |    |    |                          |       |    |   |
| Postage, ..               | .. | .. | .. | ..                       | 3     | 2  | 0 |
| BIBLIOTHECA INDICA.       |    |    |    |                          |       |    |   |
| Freight, ..               | .. | .. | .. | 129                      | 0     | 6  |   |
| Postage, ..               | .. | .. | .. | 5                        | 13    | 0  |   |
|                           |    |    |    |                          | 134   | 13 | 6 |
| BLACK YAJUR BRA'HMAṆA.    |    |    |    |                          |       |    |   |
| Editing Charges, ..       | .. | .. | .. | ..                       | 330   | 0  | 0 |
| BALANCE.                  |    |    |    |                          |       |    |   |
| In the Bank of Bengal, .. | .. | .. | .. | 1,064                    | 0     | 8  |   |
| Cash in hand, ..          | .. | .. | .. | 19                       | 9     | 10 |   |
|                           |    |    |    |                          | 1,083 | 10 | 6 |
| Inefficient Balance, ..   | .. | .. | .. | ..                       | 929   | 8  | 0 |
|                           |    |    |    | Company's Rupees, 10,110 | 12    | 4  |   |

E. E.

W. S. ATKINSON,  
Secretary.



## STATEMENT No. 3.

*Liabilities.**Assets.*

## CASH.

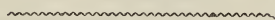
|                                             |                |                                      |             |
|---------------------------------------------|----------------|--------------------------------------|-------------|
| Bank of Bengal,.....                        | Rs. 5,820 13 7 | Hon'ble Sir J. W. Colville Kt. ....  | Rs. 291 8 0 |
| Cash in hand, .....                         | 62 10 7        | J. W. Laidlay, Esq. ....             | 418 7 0     |
| Inefficient Balance,.....                   | 368 5 6        | Journal, Nos. IV. to VII. say, ..... | 900 0 0     |
| Government Agent, .....                     | 500 0 0        | Printing of Index, .....             | 350 0 0     |
| Williams and Norgate, .....                 | 838 8 0        | Ditto of Catalogue,.....             | 500 0 0     |
| Bank of Bengal on account of Journal, ..... | 108 12 5       | Sundry small deposits, .....         | 219 3 0     |
|                                             |                |                                      |             |
|                                             | 7,699 2 1      |                                      | 2,679 2 0   |

## OUTSTANDING.

|                                        |            |
|----------------------------------------|------------|
| Contributions and Admission Fees,..... | 7,701 7 8  |
| Subscriptions to the Journal, .....    | 1,050 12 0 |
| Sale of Journal, .....                 | 68 8 0     |
| Library, .....                         | 479 0 0    |
| Sundries and Postage, .....            | 45 15 0    |
|                                        |            |
|                                        | 9,345 10 8 |

LIST OF ORDINARY MEMBERS  
OF THE  
ASIATIC SOCIETY OF BENGAL.

The \* distinguishes non-subscribing Members.



- \*Anderson, Lieut.-Col. W. Bengal Artillery, England.
- Abbott, Major J. Bengal Artillery, Ishapur.
- Avdall, J. Esq., Calcutta.
- Allen, C. Esq. B. C. S., Calcutta.
- Atkinson, W. S. Esq., Calcutta.
- Banerjee, Rev. K. M. Professor, Bishop's College, Sibpur.
- Batten, J. H. Esq. B. C. S., Almorah.
- Beaufort, F. L. Esq. B. C. S., Chittagong.
- Birch, Col. R. J. H., Calcutta.
- Bogle, Lieut.-Col. Sir, A. Tenasserim Provinces.
- Blaggrave, Capt. C. S. 26th Regt. B. N. I., Trans-Sutledge Provinces.
- Barlow, Sir R. Bart, B. C. S., Calcutta.
- \*Brodie, Capt. T. 5th Regt. B. N. I., Europe.
- Beckwith, J. Esq., Calcutta.
- Burgess, Lieut. F. J. 17th Regt. B. N. I., Pellibheet.
- Baker, Lieut.-Col. W. E. Bengal Engineers, Calcutta.
- Blundell, E. A. Esq., Singapore.
- Beadon, C. Esq. B. C. S., Calcutta.
- Byng, Hon'ble Capt. R. B. P. 62nd Regt. B. N. I., Cherra Punji,  
Cossiah Hills.
- Bayley, H. V. Esq. B. C. S. Calcutta.
- \*Benson, Lieut.-Col. R. Europe.
- Boycott, T. Dr. B. M. S., Calcutta.
- Bushby, G. A. Esq. B. C. S., Hyderabad.

- Bivar, Lieut. H. S. 18th Regt. B. N. I., Northern Cachar.  
Campbell, Dr. A., B. M. S., Darjeeling.  
Colville, Hon'ble Sir J. W., Calcutta.  
Colvin, J. R. Hon'ble B. C. S. Nynee Tal.  
Colvin, B. J. Esq., B. C. S., Calcutta.  
\*Colvin, J. H. B. Esq. B. C. S., Europe.  
Colebrooke, E. Esq., Calcutta.  
\*Cust, R. N. Esq. B. C. S. Europe.  
\*Christison, A. Esq. B. M. S., Europe.  
Cunliffe, C. W. Esq., B. C. S., Bareilly.  
Chapman, C. Esq., B. C. S., Bhágálpur.  
Dwárkánáth Basu, Bábu, B. M. S., Gurudáspur.  
Dalton, Capt. E. S. 9th Regt. B. N. I., Assam.  
Dickens, Capt. C. H., Calcutta.  
Drummond, E. Hon'ble, B. C. S., Calcutta.  
Elliott, W. Esq., M. C. S., Vizagápátam.  
Edgworth, M. P. Esq., B. C. S., Jullunder.  
Edmonstone, G. F. Esq. B. C. S., Calcutta.  
Elphinstone, Lieut. N. W. 4th Regt. B. N. I., Pesháwur.  
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JOURNAL  
OF THE  
ASIATIC SOCIETY.

No. II. 1856.

*Report upon the Progress of the Magnetic Survey of India and of the researches connected with it in the Himalaya Mountains, from April to October, 1855.—By ADOLPHE SCHLAGINTWEIT and ROBERT SCHLAGINTWEIT.*

To Captain ATKINSON,  
*Officiating Secretary to the Government of India,*  
*Military Department.*

SIR,

1. We have the honor to lay before Government a Report upon the progress of our researches in the Himalaya mountains during the last season; we also beg to subjoin a short account of our journey in Thibet, which may be considered as an Appendix to the Scientific Report. We should feel much obliged if Government would do us the favor to communicate the Reports, &c., to the Asiatic Society of Calcutta, for publication.

2. We beg further to communicate to you for the information of Government, that, having completed, for this season, our researches in the Himalayas and Gurhwal, we left the Himalayas on the 8th of November, after having staid three weeks at Mussoorie, to put in order our books of observation, the maps and drawings, &c. We arrived at Agra on the 20th of November, and we propose leaving on the 28th or 29th instant.



In conformity with the plans sanctioned by the Honorable Court of Directors, we propose to go down, during the present cold season, to Subulpore, Nagpore, and if possible south of it into the Madras Territory, to examine the Physical Geography and Geology of the interesting Mountain systems of Central India.

We have the honor to be, &c.

(Signed) ADOLPHE SCHLAGINTWEIT.

„ ROBERT SCHLAGINTWEIT.

*Agra, November 24th, 1855.*

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### GENERAL OUTLINE OF THE ROUTE.

We left Calcutta on the 25th of March, and went by Raneegunge and Gya to Patna. It was originally intended that we should carry on our researches during the summer in the Himalayas of Nepal. But being informed at Patna, by the Resident, Major Ramsay, of the difficulties which we should find in Nepal, and of the great reluctance of the Nepalese Government to grant us permission to go to any distance from Kathmandu, we thought that the object of our scientific researches would be better advanced by our going during this season further westward to the British Provinces of Kumaon and Gurhwal.

We proceeded therefore, in accordance with verbal instructions received beforehand in Calcutta, one of us (Adolphe) by Ghazeepore, the other (Robert) along the Grand Trunk Road to Benares. After staying two days at Benares (from the 5th to the 7th of April) in order to make a set of magnetic observations, we went up, by Allahabad, Futtehghur and Bareilly to Nynee Tal, in Kumaon, where we arrived on the 15th of April, having been engaged during our journey chiefly with Geological and Meteorological observations. We remained at Nynee Tal and its environs till the 15th and 20th May. We stayed several days at Chunar and at Heriakanta, two isolated mountains in the neighbourhood, which gave us a very good opportunity of making several physical and topographical observations. One of us, (Robert) left Nynee Tal on the 15th of May, taking the route by Almora, Bagesur and Momespanee to Milum, the highest village in Johar; the other (Adolphe) went on the 20th

of May to Pindaree and over the Pindaree or Trail's Pass (17,950 E. F. high) to Milum, crossing at the Pass the high snowy range of Trisoal and Nanda Devi.

During the month of June, we were both of us engaged at Milum, and at several elevated places and glaciers at some distance from it, with a series of Physical and Geological observations. We left Milum on the 6th of July and went by the Uta Dhura (17,670 E. F. high) and Kyangur (17,300 E. F.) Passes into the Thibetan Province of Gwarikhorsum; all the baggage which was not absolutely wanted being sent round by Hoti and Niti to Badrinath. After many negociations with the Lhasa Officials forming the Government of these parts of Thibet, we made it possible to go as far as the Sutlej, and afterwards as far as the Chako La Pass (17,350 E. F. high) which lies in the range separating the Sutlej from the Indus, where we arrived on the 25th of July.

We succeeded in reaching from thence, between the 26th and 28th, the valley of the Upper Indus, near Gartok, which had only once before been visited by Europeans, i. e. in 1812, by Moorcroft and Hearsay.

From two stations, one near the Indus, the other at a fine isolated peak, Gunshankoerr, (29th July, 19,640 E. F. high) not far from Chako La, we had an opportunity of taking several series of angles with a Theodolite, which will serve to lay down the Mountain systems round the origin of the Indus and North of it.

From Chako La we proceeded by Gyungal, Daba and Mangnang to the foot of the great glacier stretching out to the northward into Thibet from the high peak Ibi Gamin (called also Kametinrite), where we arrived on the 13th of August.

After having explained the merely scientific nature of our researches and made the necessary arrangements, we met with no further trouble in any way, and enjoyed throughout our journey quite a friendly intercourse with the inhabitants.

We started from this point on the 16th of August, to examine the structure and dimensions of the Ibi Gamin glaciers, with the intention also of attempting to ascend as high as possible on the flanks of the Ibi Gamin.

After encamping on the 18th of August on the highest Moraine of the Ibi Gamin glacier, at an elevation of 19,220 E. F. we succeeded, on the 19th of August, in ascending on the Northern flanks of Ibi Gamin, covered with deep snow, to a height of more than 22,200 E. F. (22,260 E. F.) calculated from Agra.

The very difficult ground, and a strong North wind, made it impossible to advance any higher on the flanks of the Ibi Gamin, whose summit is about 25,500 E. F., according to Captain R. Strachey.

We had an opportunity, during this ascent, of making several observations on the temperature, the hygrometric conditions, and the transparency and blueness of the atmosphere, and of examining on a large scale the Geological and Orographical structure of the great group of the Ibi Gamin Mountains. We may be permitted to remark, that, as far as we know, it is the greatest height in any Mountain system at which, till now, any observations of a similar kind have been made.

Encamping the next three days on different parts of the Ibi Gamin glaciers, between 17,800 to 19,000 E. F., we crossed, on the 22nd of August, a high glacier pass, leading from the Western branch of the Ibi Gamin glaciers, along the Sursutti glacier, down to the valley above Mana and Badrinath.

This pass (20,430 E. F.) is certainly one of the highest in the Himalayas; it has only once been crossed, by people from Mana, some 30 or 40 years ago.

We arrived at the village of Mana, above Badrinath, on the 24th of August. From Mana, we took two different routes, one of us, (Adolphe,) left on the 2nd September and went again into Thibet by the Mana Pass (18,365 E. F. high) for the special purpose of completing the Geological investigations on the composition of the sedimentary fossiliferous strata on the North side of the Himalayas.

He succeeded in crossing the Sutlej a second time near Toling, and, accompanied by a few mounted men, reached on the 9th of September, without being in any way molested, the high pass of Phoko La (18,700 E. F. high) lying in the ridge which separates the Sutlej from the Indus, North-West of our former station, Chako La.

He took a series of angles from this place, and went back to Toling, Tsaprang, and from thence to the village of Puling.



On the 19th of September, he returned by the Nelong Pass (18,110 E. F.) from Thibet into the Himalayas properly so called, arriving at Nelong on the upper branch of the Bhagarutti, or Western Ganges, on the 24th of September, and reaching the village Mukba, a little beyond Gangotri, on the 27th of September.

A high pass, (3rd October 17,610 E. F.) leading from Mukba to the origin of the Tonse River, offered a good opportunity for examining the very remarkable Geological structure of the high groups of the Jumnotri and Dundar peaks.

From the Tonse, he went up to Kedar Kanta (12,630 E. F.,) an isolated Mountain, commanding a very extensive view, and after staying there two days (12th and 13th of October), went down along the Jumna valley to Mussoorie, which he reached on the 18th of October.

The second of us, Robert, left Badrinath on the 7th of September, having been engaged for some days with Photographical experiments.

He went down by Tosheemath and Okimath to Kedarnath Temple, where he employed three days, (21st to 23rd September,) in examining the structure of the Kedarnath glacier and the Topography of the Mountain system between Kedarnath and Gangotri. Sending round the baggage by the ordinary road, he himself crossed over a series of passes from 11 to 12,000 feet to Salung, on the Bhagarutti River, where he arrived on the 3rd of October. These passes offered a good opportunity for the determination of the limits of vegetation in the central parts of the Himalaya for comparison with similar observations which had been previously made on the higher passes leading out to Thibet.

From the Bhagarutti he crossed over the Chaia and Bainsura Passes (15,280 E. F.) to Jumnotri, and there examined the remarkable hot-springs; the temperature of the warmest is  $89^{\circ}$  centigrade, being nearly equal to the temperature of boiling distilled water at this place ( $90.50^{\circ}$  cent). He filled here, as well as at the hot springs of Badrinath, Gaurikund, Uri and Banassa, a considerable number of fine glass bottles with water, and we hope that the chemical analysis of these waters may not prove without some interest hereafter. He went down along the Jumna River to Mussoorie, where he arrived on the 21st of October.

We beg finally to state the great obligations we are under to Mr. Batten, the Commissioner, and to Captain Ramsay, the Assistant Commissioner, of Kumaon, who did every thing in their power to assist the progress of our researches in the Himalayas, and who kindly procured for us every where the men best able to give us all the necessary information about the country.

*Physical Geography and Meteorology.—Magnetic Observations.*

1st.—Complete Magnetic Stations have been made at—

1. Benares.
2. Nynce Tal.
3. Milum in Johar.
4. On the Sutlej near its confluence with the Gyungal River, where only the Magnetic Dip and Declination could be determined.
5. Mana in Gurhwal above Badrinath.
6. Nelong (declination only).
7. Ussila, near the origin of the Tonse River.
8. Mussoorie.

We may be excused for not entering at present into any detail of the result of the Magnetic observations themselves, since we are anxious, before giving the general results of these observations, to compare our data with the corresponding observations made by our brother, Hermann Schlagintweit, in the Himalayas of Sikkim, in the Khasia Hills, and in Assam.

The necessary calculations and reductions will, however, be completed in a short time, and we shall have the honor to submit to Government, as soon as practicable a full comparative account of the whole of these observations.

*Barometric and Hypsometric observations.*

2nd. We have been able to make during the whole of our journey continuous observations of the Barometer and of our delicate Hypsometers or boiling point Thermometers.

Our two Hypsometers have arrived quite safely at Mussoorie. Of the Barometers which are very difficult to carry during a long time over a mountainous country, one by Adie, of London, arrived in perfectly



good order in Mussoorie. In two others, some air introduced itself; they will however, be easily boiled and put again in perfect order, in Lieut.-Colonel Waugh's office at Dehra. Two small Mountain Barometers, by Newman, with which Captain Thuillier kindly supplied us at Calcutta, were of great use to us whilst going up along the Ganges to Nynee Tal, enabling us constantly to make comparative observations with the help of our assistants, but we found that their construction was not well adapted for travelling in the Himalayas, where a considerable quantity of air soon introduced itself into the tubes.

3rd. We have determined the elevations above the sea of from 350 to 400 places, and have endeavoured as much as possible to obtain for each place not only one, but several readings of the instruments at different hours. At some stations like Nynee Tal, Chineir Peak, Laria, Kanta, Milum, Tanti Pass, the Sutlej near Gyungal, Mangnang, Mana, Kedar Kanta and Mussoorie, we have obtained a regular series of Barometric observations during several days or several weeks, we ourselves or our assistants reading the instruments hourly, or at intervals of two hours.

We may be excused for not subjoining to this Report any larger list of heights, since it would take a very considerable time to make the necessary calculations with all the accuracy and the detail which is required for exact and final results, and the great distances over which we shall have to go to complete the observations made last year, make it impossible for us to stop a long time in one place. In reference to the heights quoted in this report, we wish to state that they have been calculated from corresponding observations made at Agra and at Bareilly. The observations at Agra were made with great care in the Office of W. Muir, Esquire, Secretary to the Government of N. W. P., for those at Bareilly we are indebted to the scientific zeal of Dr. Payne. Mr. Muir obligingly transmitted to us regularly the monthly registers.

The heights thus deduced must not be considered as quite final results, since at a later period, when we have an opportunity of calculating the whole of our heights from several corresponding stations, and introduce certain corrections in reference to the exact mean temperature of the air between the higher and the lower

stations (deduced from simultaneous observations at intermediate places), our present results may be altered in some degree.

*Temperature of the air and of the ground.*

4th. The Meteorological observations of the dry and wet bulb Thermometer, of the temperature of the ground from the surface to a depth of five or six meters, of the temperature of rivers, &c. have been regularly made in connection with the Barometric observations; a regular series of observations being made at all the stations where we halted for some time. We found that the moisture of the atmosphere considerably decreased as we advanced from the southern branches of the Himalayas northwards to the high valleys. In Thibet, the dryness of the atmosphere was constantly very great. It is also worth remark that in Thibet, during the warmest months of the year, in July and August, the temperature of the air is sometimes very warm, rising in the shade at elevations of 13,000 and 14,000 E. F. to from  $22^{\circ}$  to  $25^{\circ}$  (centigrade). The temperature of the surface of the ground exposed to the sun rises to  $45^{\circ}$  centigrade.

The *variations* of temperature are, at the same time, very great, and sudden clouds, which prevent for a time the heating of the soil by the sun, produce, after a short time, a great decrease in the temperature of the air, amounting to  $10^{\circ}$  and  $12^{\circ}$  cent. Passing clouds, sending down suddenly a light fall of rain, or more often of fine-grained snow, are also of very common occurrence, both in the Sutlej valley and on the Passes.

5th. The rainy season extends, though with much diminished force, up to the highest valleys along the southern water-shed of the Himalayas. It begins later and ends earlier than in the outer ranges, and on many days the threatening clouds travel up from the southward to the higher valleys, without producing any sensible fall of rain. The rainy season cannot be said to extend properly speaking across the Himalayas into the basin of the Sutlej. The regular succession of the dry and rainy seasons of India is unknown there, and, from very good information which we obtained, there is no month of the year which can be considered free from rain. But nevertheless the *influence* of the Indian rainy season is still felt in

Thibet. During the time of heavy rain-falls on the southern side of the Himalayas, we very often saw for several days together masses of clouds, which came from the south, hanging over the Sutlej plain. They occasionally produced rains, which fell in great quantities, but never lasted an entire day.

6th. The *winds* in the Himalayas and in Thibet during the summer months, are generally of great regularity, blowing up constantly nearly every day from the South, South-West or South-East.

(a.) In the upper Himalaya valleys, the wind generally sets in at from 9 hours to 10 hours A. M., its strength increasing considerably towards the evening.

(b.) The intensity of the wind seems to be greatest on the passes leading from Thibet into the Himalayas elevated from 17,000 to 19,000 E. F. where we experienced sometimes in the afternoon a most furious Southerly gale. In going from thence to the Southward, the intensity of the wind decreases in a very striking way, and on Kedar Kanta, and on the stations in the outer Himalayan ranges, the intensity of the wind is, comparatively speaking, very slight. This increase in the intensity of the wind on the high northern passes seems to be due to two causes—the first of them is, that the wind may in part originate in the hot valleys of the Southern Himalayas themselves; the second, and we presume the more important cause, will be that the wind produced by the great ascending current over the heated Indian plains is fast travelling Northward at a very great elevation, and only sinks down when it reaches the colder and higher chains of the central Himalayas.

In support of the latter view, we may mention that we often saw very high clouds above us moving at a great rate, whilst the wind at our own elevation had a much smaller velocity.

7th. Our observations of the temperature of *springs* and of the *ground* at various depths have shown—

(a.) That the temperature of springs and the temperature of the ground at depths varying from one to three meters, is, at *equal* heights, considerably higher in Thibet than in the Himalayas; the cause of this will be that, in Thibet, we have a plateau whose mean elevation is from 14,500 to 16,000 E. F., whilst the Himalayas, at



the same height, offer only a series of ridges, intersected in all directions by large and deep valleys.

(b.) The height at which the temperature of the ground is  $0^{\circ}$  cent. or  $32^{\circ}$  Fahr. seems to be along the passes which lead from the Himalayas, into Thibet, about 17,000 F. F., at this height we several times found the temperature of the ground at a depth of 2 or 3 meters to be  $0^{\circ}$  cent., and some good springs a little lower showed temperatures of only  $0.2^{\circ}$  and  $0.5^{\circ}$  cent.

8th. In the outer ranges of the Himalayas, and in the valleys between them, at elevations of about 4,000 E. F., the temperature of good springs on an average may be assumed at  $18^{\circ}$  cent., the decrease of temperature from this height to the line of zero would therefore be one degree cent. for an ascent of about 720 E. F. It seems pretty certain that the decrease of the temperature of the ground and of the springs from the foot of the Himalayas up to the line of zero is more rapid than in the Alps of Europe, where we formerly found 700 or 730 French feet for a decrease of temperature of one degree cent.

9th. We endeavoured as often as possible throughout the journey to determine the height of *the different lines of vegetation*, the height of the snow line, &c., by aid of our barometers. We found, as a general rule, that the limits of shrub vegetation, of grass, and phanerogamic plants, rise considerably higher on the Thibetan Mountains than in the Himalayas. We found that some very isolated phanerogamic plants ascend generally speaking, in these two Mountain ranges to heights of 17,800 to 18,400 E. F.; the maximum of height, to which we saw some very few phanerogamic plants rising, was on a sunny rocky island, between the snow masses of the Ibi Gamin glacier, at an elevation of 19,800 E. F., which, if we are not mistaken, is the *greatest height* at which till now phanerogamic plants have any where been found. The line of the lower limit of snow without doubt rises higher on the Northern Thibetan side of the Himalayas than on the Southern India face of the mountains, as Humboldt maintained a long time ago.

In reference to the periodical development of vegetation, which forms an interesting element in considering the Physical Geography of a country, we may mention, amongst other results, that in Thibet,

in valleys of 12,500 to 14,000 E. F. elevation, the ripening of grain (a sort of wheat) takes place at a considerably earlier period than in the valleys of the Himalayas which are situated only at heights of from 10,000 to 11,500 E. F.; the principal cause of this appears to be that, in the higher Himalayan Mountains, the great amount of snow retards vegetation in the spring, and tends after melting to cool down the temperature of the surface of the ground for some considerable time, whilst in Thibet the fall of snow in winter is never large, and, as we have been informed, it constantly melts away again some days after its fall.

*Influence of height upon Man.*

10th. The influence of height upon the constitution of man varies exceedingly in different individuals. It depends much on the physical strength, and the acclimatization of a few days at great elevations certainly tends very considerably to diminish its effects; but there is no doubt that this influence exists; it generally produces more or less severe headache, and difficulty of respiration, and in some instances we saw that some of our people were spitting blood; complaints of the eyes too are of frequent occurrence, produced in part by the bright light of the snow, in part by heavy winds which blow small dust into the eyes. It certainly is difficult to ascertain how much is due in these phenomena to the diminished pressure of the atmosphere, and how much to the great bodily exertion.

We had occasion ourselves to test the great effect of acclimatization; when for the first time we crossed heights of 17,500 and 18,000 E. F. we felt more or less headache, but after having crossed several others of these passes, and slept and lived on them for some days, we found ourselves quite free from any complaints at heights of 18,000 and 19,000 E. F., when, however, we ascended Ibi Gamin to a height of more than 22,000 E. F. neither we nor any one of our people escaped headache, difficulty of breathing and severe pains in the eyes.

*Geography and Geology.*

11th. We had with us two Theodolites, a large one minutely divided by Pistor, at Berlin, and a smaller one by Jones, which have remained in perfect order during the whole of the journey.



We made great use of them in the parts of the Himalayas North of the Snowy Range and in Thibet, and we endeavoured, by taking a series of angles from several elevated stations, to furnish materials for ascertaining the position and height of the ranges between the Sutlej and North of the Indus; the principal stations were near Milum and on the Milum Glaciers, the Sutlej near Gyungal, the Indus near Gurtok, Gunshankoerr (19,640 E. F.), on the Ibi Gamin Glacier (19,220 E. F.), on the Mana Pass (18,365 E. F.), Chako La (17,350 E. F.), and Phoko La (18,700 E. F.), the Nelong Pass 18,110 E. F.), &c.

We hope that our observations, combined with the excellent researches formerly made at other points by Captains Henry and Richard Strachey, may serve to give a pretty correct general view of the interesting geography of the large basin of the Sutlej.

11th. Our topographical maps refer more especially to the different glacier systems in the central groups of the Himalayas, several of these maps will be found in the book of drawings, &c., which we have the honor to submit to Government for inspection, together with this Report.

We think it essential to state that these maps, as they are at present, being mere *topographical* sketches made during the journey and on the ground, have, comparatively speaking, only small parts of our bearings and angles protracted upon them. They will all require revision and correction, after the final computations of our angles; we hope therefore, that these maps may not be used for publication, till we have had the opportunity of making all the necessary revisions as accurate as possible.

We must content ourselves with enumerating in a few paragraphs some of the results to which we think the geological investigation of this part of the Himalayas must lead us.

12th. The extent of the real crystalline rocks, as granite, gneiss, and true mica schists, is, comparatively speaking, much smaller in the Himalayas than has been sometimes assumed. They are strictly limited to the high central groups of this mountain system.

These groups seem to form, from a distance, one *continuous* line of high peaks, covered with snow, generally known under the name of the *Snowy Range*; but in reality, it is by no means a continuous

chain of mountains, but a succession of *several* groups separated very often by deep vales.

These groups do not even follow each other from East to West on one and the same line; but some of them, as, for instance, the group of Nanda Devi and Trisoal, lie very much to the South, while the next great group, that of Ibi Gamin, lies thirty or forty miles more to the Northward. There are also instances of several central groups, or at least several nearly quite independent parts of one system, lying behind each other, in making a section from South to North, so that you have in going straight to cross a series of snowy ranges.

The best examples of the latter structure with which we are acquainted at present, are the high groups of Bunderpunch and Shergeroin near Jumnotri, with the high Dundar peaks North of them, and the high mountains to the North and South of the Baspa valley in Bisser.

This arrangement of the central Himalayan groups reminded us very much of the structure of the Alps.

Altogether, indeed these central groups of the Himalayas have much resemblance to the highest parts of the European Alps, both in reference to the distribution and general form of the valleys filled with numerous glaciers, as well as with regard to the forms of mountain peaks and the character of vegetation.

But these are nearly the only parts of the Himalayas which can be compared with the Alps, the geological structure of all the rest is extremely different.

The *prevailing* rock of most of the Himalayan groups is gneiss, *passing* into mica schist. It was only in some of them, as in the Gangotri and Jumnotri groups, that we met with large and predominant masses of true granite; in some places this granite passed into the remarkable rock *protogine*, or talc granite, which composes the Mont Blanc group in the Alps.

We felt considerable interest in investigating whether the "fan-like" structure which prevails in many groups of the Alps, was also to be found in the Himalayas.\* As far as we have ascertained at

\* By "fanlike structure" is understood the curious phenomenon first discovered in the Alps by Saussure, that in several instances the strata or planes of foliation

present, it seems that this structure cannot be considered as very general in the Himalayas. We only found one clear example of it in the Jumnotri and Bussa group.

There we see the gray slates constantly dipping *under* the granite, which overlies them in thick masses, forming the high peaks of Bunderpanch, Shergeroin, &c.

13th. The Feldspathic crystalline rocks of the centre, are accompanied by large masses of grey schists, which are especially developed along the Southern side of the central groups; to the Northward of them they often form only a very small band, passing into stratified azoic slates. These schists can by no means be considered as a real crystalline rock.

As in the Alps, they are of a very irregular and varied composition; they are generally of a greyish colour, and contain large quantities of clay and more or less lime. The quartz is generally not present in regular small grains, but either disseminated throughout the rock or entirely absent. The mica is generally present in exceedingly small laminæ. Sometimes considerable quantities of limestone are found between the schists.

These grey schists extend very nearly from the central groups down to the Southern edge of the Himalayan mountains. There they pass very often into clay slates of a more sedimentary character.

We have not been able to discover any fossil remains in the grey schists *themselves*, but in the clay slates into which they graduate to the Southward, we found, in the neighbourhood of Nynsee Tal, numerous Foraminifera, evidently identical with those which accompany the eocene numulitic formation; our observations during next year must teach us, whether we shall be justified in drawing a general conclusion from this fact, as to the age of the outer ranges of the Himalaya composed of similar clay slates.

14th. It was observed a long time ago, that in the great mass of grey schists which must be traversed before reaching the central group of the Himalayas, a remarkable uniformity in the dip of

of the gneiss dip from both sides *under* the highest part in the centre, where they stand vertical, so that by drawing a geological section we get a somewhat fan-like form.



apparent stratification prevails. Our observations have perfectly convinced us that this is no real stratification, but merely *cleavage*, produced, as is now generally assumed, by a great tension in the interior of the highly altered rocks.

The general dip of the cleavage planes is in a Northerly direction, deviating in some parts of the mountains to the North-west, and in others to the North-east; and it seems that *in many cases at least the cleavage of the central gneiss masses dips in the same direction North North-east, or North North-west.*

If, after crossing the central groups we continue a geological section into Thibet, we observe that, in the sedimentary fossiliferous strata which are then met with, there occur, independently of each other—(a) a true stratification and (b) a cleavage, which dips in the same direction, like the cleavage of the crystalline rocks which underlie the sedimentary strata.

15th. This very general Northerly dip of the cleavage continues in the sedimentary formations until we reach the alluvial plain of the Sutlej valley. But it is a fact well worthy of remark, that a perfect change in the dip of the cleavage takes place in the mountain ranges which rise between the Sutlej and the Indus, and to the North-east of the Indus.

We had occasion to examine these mountains along two sections over the Chako La and Phoko La Passes, distant more than 20 miles from each other, in a North-westerly direction. The mountains are composed of various metamorphic schists, intersected with greenstone dykes, running on an average parallel with the mean direction of the chain.

In these mountains, as well as in the similar rocks brought to light by the great denudation of the Sutlej river, we *constantly* found the cleavage dipping under angles of  $45^{\circ}$  to  $70^{\circ}$  to the *South* or *South-west*.

This dip is exactly opposite to the dip of the cleavage in the Himalayas.

*It therefore seems that, taking a general view, the cleavage in the Himalayas of Kumaon, and in the mountain ranges which face the Himalaya to the Northward, forms one great fan, of enormous dimensions, the cleavage dipping in the Southern part of this fan to the*

*Northward, and in the Northern part to the Southward.* It is only with some hesitation that we venture to bring forward this opinion. Our observations during next summer in a part of the Western Himalayas, and of Ladak, must show whether this structure can be considered a general one or not.

### *Sedimentary Strata.*

16th. In the sedimentary strata, which, as it has long since been ascertained, compose the northern flanks of the Himalayas, we met with—

(1) The silurian and devonian formations, the latter being characterised by the appearance of numerous large and long-winged spirifera; and (2) the trias with several ammonites, closely allied to those which characterise the trias of the Alps, and the Jurassic formations. The latter is divided stratigraphically into two great groups, the lower one composed of black and bluish slates and marls, containing in many places large numbers of well-preserved ammonites, the upper group consisting of limestones and marly limestones of different colours, which seem not to contain any ammonites, but are very often full of bivalve shells, comprising small and large oysters, pecten, a very characteristic and common species of *Astarte*, a *Trigonia*, which we think will not be distinguishable from the wide-spread *Trigonia costata*, found also, if we recollect rightly, in Cutch, &c.

Amongst the numerous ammonites which we had occasion to collect in the lower group from different localities, we found nothing which would indicate an age as old as the lias.\* They all are of forms which characterise, in Germany and England, about the middle part of the jurassic formation. Whether the lias formation exist in these parts or not, is a question which as yet we are not quite prepared to decide.

We have no books at hand to examine as minutely as necessary, some small fossil remains of pentacrinus and terebratula, which we found in such a stratographical position, that they may perhaps belong to this formation.

\* The collections made by Captain R. Strachey in 1848, were, we believe, the first which showed clearly that the ammonitic deposits were younger than the lias.



We have been unable to find any traces of a cretaceous or nummulitic formation in these parts of the Himalayas, the tertiary strata of the Sutlej basin repose immediately upon the Jurassic formation.

*Valley of the Sutlej.*

17th.—The alluvial deposits which we meet after traversing the sedimentary strata on the northern flanks of the Himalayas, do not form an elevated plain bordering the Himalayas to the Northward, as the plain of Hindustan does in the Southward; they are merely alluvial and lacustrine deposits, filling up the inequalities of one of the largest longitudinal valleys of the world. On the other side of the Sutlej, and of the Indus, new high mountain ranges rise covered with snow, and very probably bearing glaciers, which evidently belong to the same system of mountains. Looking from a high station like Gunshankoeerr peak near the Indus (19,640 E. F.) over the Himalaya mountains to the South, and the long range of mountains to the Northward, the mind is strongly impressed with an idea of the unity of both mountain systems, in reference to orographical and geological structure.

It is evident that the Himalayas form only one incomplete part of the great mountain system of High Asia; the numerous large rivers descending from the Himalayas to the South into India, all run through lateral transverse valleys, which might perhaps be compared with regard to their position in the general mountain system (though of course *not* with regard to magnitude) with the numerous parallel transverse valleys running from the Pennine Alps into the Rhône, or from the Tauern chain in the Tyrol into the Salzach and the Draw.

18th. The tertiary deposits in the basin of the Sutlej are of a fluviatile and lacustrine nature; they have been deposited in a large fresh-water lake, probably formed by a rocky barrier, formerly existing at the place where the Sutlej now penetrates the Himalayas.

We found in them numerous fresh-water shells near Mangnang and Tosing; besides these they contain many remains of vertebrata, we were able ourselves in the neighbourhood of Mangnang to pick out from the rock some of these fossil remains, and ascertained the localities where others which we bought were procured.

The deposits consist in part of gravel and sand, in part of very finely grained clayey and calcareous strata, of a light yellowish colour. They are interstratified with each other; the shells are chiefly found in the marls and clays, which are specially predominant in the central parts of the basin; and at Mangnang, Tosing, &c. the fossil bones are found both in the marls and in some fine grained sands which accompany them.

The strata lay everywhere quite horizontal. The thickness of these deposits is very variable, since the original rocky surface of the valley is very undulating, as is shown in the deep valleys of denudation along all the rivers.

The average thickness may be assumed to be from 1,000 to 1,500 E. F. but the maximum exceeds 3,000 E. F.

19th. The Sutlej and its numerous tributaries in Thibet, form one of the finest examples of the mode in which the erosive power of water acts upon loose deposits and upon solid rocks, under various circumstances. The rivers have excavated valleys of denudation 2,000 and sometimes even 3,000 English feet in depth. These valleys are not excavated in the lacustrine tertiary deposits only, but very generally along the Sutlej, solid rocks are cut through to a depth of 1,000 and 1,500 E. F. This great depth of the valleys of denudation is evidently due to the fact, that the Sutlej afterwards enters the Himalayas where the fall of the river per mile is enormous. The great acceleration experienced there, has been gradually reaching upwards, and has affected the whole river system of the Sutlej basin.

When re-entering the Himalayas, afterhaving examined these great denudation valleys, we proposed to ourselves to investigate the effect produced by the Himalayan rivers, which have such an enormous fall per mile, upon the excavation of their valleys. We soon convinced ourselves that, though the general direction of these valleys was without doubt originally caused by faults, and by the general arrangement of the mountain chains, their forms had afterwards been altered to an immense extent by the action of the rivers, and by the rain falling in enormous quantities during the rainy season. We have ample proofs by the existence of ancient river deposits, and water marks, at great heights above the present rivers, and from

the form of the valleys themselves, that most of the large transverse valleys of the Himalayas have been excavated to a depth of more than 3,000 and 4,000 E. feet by the action of water alone.

20th. We noticed also the absence of true erratic blocks both in the Himalayas and in Thibet, which are so numerous round the Alps of Europe.

### *Glaciers.*

21st. Glaciers sometimes of great extent are found everywhere in the Himalayas round the central groups. They even exist in Thibet, where the fall of snow is so much less, and we have every reason to believe, both from what we saw ourselves, and from the information which we received, that glaciers are again met with in the ranges to the North and North-east of the Indus.

The two largest glaciers which we have been able to examine, are the glacier of Milum and the Ibi Gamin glacier, issuing from Ibi Gamin into Thibet and giving origin to the Mangnang river. These two glaciers are certainly larger than any in the Alps, but, as a general rule, we may say, that the glaciers of the Himalayas are not so much larger as we might expect from a consideration of the great extent and elevation of these mountains. One cause of this phenomenon may be, that the high valleys of the Himalaya have, in general, a greater and more precipitous slope than the corresponding valleys in the Alps, so that the ice is carried down too quickly to lower and warmer places; the heavy rains during the warmest part of the year, will also tend to melt away the ice.

22nd.—During the course of our journey, we visited and examined, to some extent, more than 40 glaciers, which, according to the classification in the Alps, must be termed glaciers of the first order. The largest accumulation of great glaciers in the Himalayas of Kumaon, Gurhwal and Bisser, is around the great group of the Ibi Gamin peaks.

The physical structure of the glaciers of the Himalayas, the laws of motion, the distribution of the moraines and of the crevasses, is precisely the same as in the glaciers of the Alps. We could constantly trace also the blue bands of ice, or “ogives” which form such a characteristic physical phenomenon in the Alpine glaciers.



Amongst the results of our observations we may briefly mention two points.

23rd.—We have collected many proofs that, as we formerly maintained, in accordance with Professor T. Forbes' views, the original stratification of the snow which fills the upper part of the glacier basins, is perfectly destroyed during the process of the transformation of the snow and néves into glacier ice; the blue bands and ogives of the glacier, properly speaking have no connection with the former stratification of the snow.

24th.—At several glaciers, especially at the great Ibi Gamin glacier, we found the curious phenomenon which we formerly described in the Alps, under the name *moraines de néve*; that is to say, we observed in several instances, that different affluents of one glacier were separated, not by the layers of stones called *moraines*, but by a small band of néves squeezed in between the two affluents. Lower down in the course of the glacier when the néves disappeared, they remained nevertheless distinctly separated by considerable depression between them; moreover, the individuality of each affluent was proved by a perfectly independent arrangement of the blue bands and ogives. This phenomenon shows well, that the heaps of rocks which generally lie along the line of demarcation between two affluents of a glacier, are quite of a superficial nature, and that the real separation is entirely due to the interior structure of both tributaries.

25th. As a general phenomenon we must finally mention that, on all the glaciers of the Himalayas which we examined, with scarcely one exception, we found most evident proofs that they are at present smaller than they were at some former period. We constantly found heaps of *moraines* at a distance of from several hundred to some thousand feet, in a few instances even of some English miles, from the present ends of glaciers; the height and thickness of the ice had also been proportionally larger. The Thibetan glaciers afford peculiar facilities for the investigation of these phenomena. Their *moraines* consist principally of fine gneiss rocks brought down from the higher mountains. The ancient *moraines* of white gneiss deposited upon dark sedimentary schists, can be very distinctly traced to a distance of from four to five miles from

the present ends of the glaciers of Ibi Gamin, of Joharna, and of Photi, and are elevated some hundred feet above the present level of the ice. This greater extension of the glaciers has evidently belonged to the historical period, since the ancient moraines repose constantly upon all the older tertiary and diluvial strata, and if we are not mistaken a diminution in the extent of *some* of these glaciers is still going on at present.

We wish especially to remark, that this greater extension of the Himalayan glaciers, at some former period, is a phenomenon very different from that which gave rise to what has been called in Europe the "glacier theory," by which an attempt was made to explain, on the hypothesis of a former enormous extension of the Alpine glaciers, the existence of the great erratic deposits all around the Alps, where the erratic blocks are in situations very different from the ancient moraines in the Himalayan glaciers.\*

We are not as yet prepared to give an opinion about the physical causes (changes of climate, and general subsidence or elevation,) which may have produced this difference in the extension of the glaciers.

(Signed) ADOLPHE SCHLAGINTWEIT.  
ROBERT SCHLAGINTWEIT.

*Agra, November 24th, 1855.*

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*A short account of the Journey from Milum in Johar, to Gartok in the Upper Indus Valley, and of the ascent to the Ibi Gamin Peak, by ADOLPHE SCHLAGINTWEIT and ROBERT SCHLAGINTWEIT.*

We left Milum on the 6th of July, with Mani, the Putwarri of Johar, and a good number of Jubboos and people, since we wanted to send all our baggage by the upper road to Niti. After crossing the Uta Dhura Pass, we went up, with a few people only, to the Janti Pass, (18,650 E. F.,) where we staid for three days, which

\* That I may not be misunderstood, I must refer here to the remarks on this difficult subject, contained in the first and second Volumes of the Researches in the Alps, published by my brother Hermann and myself.—ADOLPHE SCHLAGINTWEIT.



gave us an excellent opportunity of making several physical experiments at a somewhat considerable height.

From this point we went on to Laptel, where we were much disappointed at finding that the Thibetan authorities had done us the honor to give us a guard of nine Hunias, who wanted peremptorily to prevent us from crossing over into Thibet Proper. We staid at Laptel three days, and there as well as at Janti succeeded in making a tolerably complete collection of fossil remains from the Silurian up to the younger jurassic strata.

In order to deceive our Hunia guard, we went along the Niti road as far as Selchell, and from thence tried to make our escape in the night of the 16th of July; we left all our camp behind, and took only four Bhutias, and the most necessary instruments and provisions with us. We had mounted our four Bhutias, and four horses were sufficient to carry all our baggage. We went on during the night and during all next day, and in the evening we had arrived on the alluvial plain which fills up the broad valley of the Sutlej. We thought ourselves now pretty safe from discovery, and were just about to put up for the night in a little valley, when we discovered our Hunias on horseback following our track. Mani especially told us not to shew the least fear of them; they came on crying and hurraing, and the two first of them who got up to us tried to get hold of the bridles of our horses; but we gave them some severe blows with our hunting whips right over the face, which took them much by surprise. They immediately dismounted, making their salams, and saying that they were our friends, (we had given them some rupees at Laptel,) but that they had received strict orders to accompany us as a guard. One of them was a Kuchop, or Thibetan Chuprassi; they said that these strict orders had been given on account of the present wars with the Nepalese, since the authorities were afraid that we might be plundered or killed, and that they might afterwards be held responsible for it by the Indian Government. We ordered one of them to go to Daba (which was not very distant,) and to tell the Jungpun, or head Thibetan authority there, to come out and make the necessary arrangements with us. As we had expected, the Jungpun did not make his appearance himself, but his head clerk, or Dink, a decent looking young Lama

from Lhasa came out the next morning, saying that his master had gone to Chaprang (which was of course a mere lie). We had convinced ourselves that during the present war it was impossible for us to go to Mansarower, since even the Bhutias had been robbed and molested by the disorderly Thibetan soldiers, but we determined to try whether it might not perhaps be possible to proceed to the Upper Indus valley, near Gartok, which had only hitherto been visited by Moorcroft in 1812. After endless negociations with our Dink, supported by rupees, brandy, &c., we succeeded in obtaining permission to proceed as far as the Sutlej. We signed a written agreement, stating that we were allowed to remain three days on the Sutlej, and that we were to pay a fine of Rs. 600 if we crossed that river. Accordingly we went on to the Sutlej near its junction with the Gyungul river. After staying there two days, engaged with astronomical and geological observations, we were met by the Bara Mani (Mani's cousin) who had come out to our assistance. He is the welthiest of the Milum people, and has really got much influence in Thibet. He had come a day or two before to Daba, where the Jungpun is his friend and owes him some thousand rupees, and he and the seven Niti Pathans, who happened to be in Daba, negociated with the Jungpun, and must have made a considerable disturbance in the place, telling the Jungpun that we were not people to be ill-treated and driven out of the country with impunity. After two days, the Bara Mani and two of the Jungpun's clerks came to our camp; our brave Bhutias had really succeeded in obtaining permission for us to proceed as far as the Chako La Pass, which lies in the ridge which separates the Sutlej from the Indus. The Hunias had now become quite friendly, and the two Lhasa officials exchanged with us some little presents. We bought from them a number of Chinese articles at an extravagant price, and before long they had all got the conviction that there was no harm in our staying for some days in their country.

Permission had been granted us to remain five or six days on Chako La and the two Manis had pledged themselves in writing to pay a considerable sum if we should go any farther or remain any longer. We were only accompanied by two people of our guard, the others had found it more comfortable to remain at the foot of

the cold mountains near the Sutlej. We lost no time in making the best use of the few days granted to us. On the 26th we arrived on the Chako La, and placed our camp as close as possible under the pass itself.

On the 27th in the early morning, we went away. Numerous Bhutias (who all did what they could to assist us) and Hunias were constantly crossing the pass with their sheep. To avoid suspicion, we left our little tent and the greater part of our baggage, and one of our Bhutia servants behind; one Hunia, who knew exactly where we wanted to go, accompanied us; two horses carried our theodolite, hypsometric apparatus, and some provisions. We told the people that we only wanted to go to a mountain near the pass, to look at the "compass." After crossing the pass, we left the usual track, and went on through a lateral valley. To our great astonishment, we found that the lower part of the valley was filled with more than a hundred of armed Hunias, and our people got much frightened, saying that these men were sent out by the Garpon or resident of Gartok, to catch us, &c. We lay down in a small hole and despatched one of our men to get information. He was soon, however, discovered and surrounded by the Hunias.

We saw with our large telescope that much crying and quarrelling was going on below; they searched his horse and got hold of his gun. After some time, however, they let him go. He had found among these people, who came from Chumurti and were going to the seat of war, one old friend, who had settled every thing. He had told them that we were Gurhwal people and had been afraid of being plundered if we went down into the valley. In the evening we went down a little lower along a small valley, just on the limit of the highest shrubs. The night was unhappily a very bad one. Without a tent, and with only a few blankets, we lay down as close together as possible; in the morning, we were covered with snow more than three inches deep. The sun, however, melted away the snow from the ground, and we were glad to find that the greater part of the troublesome Hunias had gone on early in the morning. We rode as far as we could across the valley where their camp had been, and upon a mountain on the other side of it. The weather had become beautifully clear, and in the afternoon we had the



pleasure of finding ourselves in the Indus valley, some miles above Gartok.

From a little hill on the left side of the valley we had an excellent view over the large valley, and over the mountain ranges which border it to the North-east, and we were able to take numerous angles with our theodolites, and to make some drawings. On the 28th we went on to the Indus river itself, and after taking altitudes of the sun, &c., were obliged by the most absolute want of provisions to return without delay along the usual route to our camp on the Southern side of Chako La, which we only reached late at night. The next day, the 29th, we went out over Chako La again with fresh horses, to one of the peaks of this mountain range, Gunschankoerr, which from its isolated position and somewhat considerable height (19,640 E. F.) promised to be a good station for studying the orography of the surrounding country. The view which we had from the top of the mountain was really magnificent. To the North we had high snowy mountain ranges from East of Kailas along the Indus valley far beyond the confluence of the two great branches of the Indus; right at our feet we saw the great plain of the two Sacred Thibetan Lakes (the water itself was only visible in a few small patches) and the pass which separates the Sutlej from the Brahmaputra. To the South the Himalaya was visible from distant snowy peaks in Nepal far East of the Brahmaputra pass, over Gurla Gumin beyond the high peaks of Bessez, Koenower and Spiti. On the 30th we returned to the Sutlej, and from thence we went by Gyungal and Daba to Mangnang. By degrees we had now got upon a very friendly footing with the Thibetans, and they even allowed us to go into the villages of Gyungal and Mangnang. In the latter place they have a fine temple and some high poplar trees. They showed us the interior of the temple, gave us some books, &c., and constantly expressed their surprise that we were not half so bad a set of people as their Lhasa rulers wanted to make them believe all Europeans to be. We had also taught our Kuchop, or Thibetan chuprassie, what the real duties of a good chuprassie were; and he went every day to considerable distances to procure fresh milk, sheep, &c. from the shepherds. From Mangnang we proceeded Southwards to the foot of the great Ibi Gamin glacier (Gamin or

Ibi Gamin is the real Thibetan name for Kamet); we were met there by some coolies from Mana, with provisions, some additional instruments, &c. Ibi Gamin, which, seen from Gunschankoerr over-towered all the Himalaya peaks, seemed to us to be one of the most favorable mountains to ascend with the view of attaining some considerable height. Furnished with axes, ropes and every thing we wanted for the ice, we left our camp on the foot of the glacier on the 16th of August. We were rather surprized to find that the glacier was one of very considerable ascent; it is an exceedingly regular and very fine glacier, somewhat similar to the Aar glacier in Switzerland, but considerably larger. Ibi Gamin seemed to become more distant, the further we proceeded along the glacier, and at last we discovered that the summit was situated in the most remote corner, at its very source. For three days we went up in short stages along the glacier, sleeping on the heaps of rocks, "Moraines," which border it. On the third day, we encamped at the very foot of the Ibi Gamin, at an elevation of 19,220 E. F., where the glacier valley terminates. We had altogether fourteen people with us; instead of wood we were generally obliged to burn a sort of grass called peaug (a species of *Cherleria*, if I am not mistaken), which we found on the mountains near the lower parts of the glacier. The night of the 18th had been very cold and stormy, but the following morning was pretty clear; we therefore went out at 8 o'clock to see how far we could get upon Ibi Gamin. Only eight of our people were willing to accompany us; the other hands got quite apathetic, saying that they and we were all about to perish. We soon began to ascend over steep snow, often crevassed, which covers the flanks of Ibi Gamin; halting frequently and making a very circuitous route in order to avoid *crevasses*, or places which were too steep to climb, we rose gradually higher. At last at 2 o'clock it became absolutely impossible to go on any higher: two of our people had got sick and had remained behind, and all the rest of us felt exceedingly tired and exhausted, more so indeed than we had ever been before in our lives. The view which we enjoyed was not very extensive; clouds had been constantly passing around us, but in the clear intervals we had a very instructive view over the glacier masses and



ridges which surround Ibi Gamin. The highest point which we reached had an elevation of more than 22,200 E. F. (22,260 E. F. calculated from Agra). At 2 o'clock a strong North wind began to rise, and this especially obliged us to descend as quickly as we could; the wind became very strong indeed lower down, and we were glad enough when we had all reached our camp safely in the evening. Ibi Gamin re-appeared for some moments between the clouds, beautifully coloured by the setting sun, and it may be imagined that we all looked back with great pleasure upon our route which was distinctly traceable upon the highest point which we had reached. We had got much accustomed to the influence of height, especially during our Thibetan journey, but here not one escaped unhurt; we all felt head-ache and more or less severe pains in the eyes, the latter being especially caused by the furious wind which constantly blew the fine snow dust into our eyes. The night was a very bad one, we had scarcely any fuel left for cooking, the wind threatened every moment to tear to pieces our light tent, the cold was intense, and our people, with the exception of one, had entirely lost courage and the faculty of thinking. In the morning at 9 o'clock, as soon as the cold was a little less intense, we commenced our descent to our second camp, which was in a somewhat more sheltered position. This day we very nearly lost one of our men. This poor fellow, a man called Dolpa, from Milum, an excellent servant, who had been with us during all the Thibetan journey, was taken ill the day before, when going up Ibi Gamin, and had a dangerous effusion of blood. We of course ordered another man to accompany him in going down to the second camp; but his companion made his appearance soon after us at our lower station, saying that he had lost sight of the sick man in the heavy snow-storm which we encountered on the glacier. We immediately sent back two of our people to look for him and when they returned without him three others started, but they could discover no traces of the missing man. The next day we left behind two other men, with strict orders to look after Dolpa, but all in vain. After our arrival in Mana, we had already made all the arrangements with the Putwarri for the family of the supposed dead man, when to our great delight the poor fellow came in three days after us. He had been

lying between some large stones on the Moraine where nobody could see him, and the second day he slowly went down to our first camp at the foot of the glacier. Unhappily our men with the horses and yobus had already left, and the poor man remained three days without food in the wilderness, when he met some Mana people, who brought him on. He was bad enough, and had his feet injured by frost, but we think that he will entirely recover before long. In the afternoon of the 20th the weather again became fine and clear. We completed our survey of the Gamin Glaciers, and made our preparations for the next day's march. At the camp we had found some wood and fresh provisions which had been sent up by Mani, whom we had left at the lowest station, and all our people recovered again satisfactorily. The great Gamin Glacier, and all the part of the country where we had now been, lies within the boundaries of Thibet. To reach Badrinath we had still to cross a high Glacier Pass. We had heard of the existence of this Pass (quite a different one from the regular Mana Pass) only a few days before from a Mana coolie who was with us; he said that formerly it had once been passed with sheep, but that now it was quite deserted. Neither he nor any other man of Mana had ever made the Pass, but he knew about the direction in which it was likely to lie, and he undertook to find the road and to lead the party. On the 21st we went up along the Western branch of the Ibi Gamin Glaciers and slept on the highest Moraine. On the 22nd, with beautiful clear weather, we proceeded further and after some detours and mistakes, we happily reached the pass as early as 2 o'clock. It was much higher and much more difficult than we or our people had expected. It is no doubt one of the highest passes in the Himalayas, being 20,430 E. F. above the level of the sea. We were extremely glad to have found a passage, since otherwise we should have been obliged to make a long and tedious detour down the whole of the glacier and round the Mana Ghat. From the top of the pass we discovered a large glacier trending to the South-west, and saw before us a considerable part of the range separating the Mana from the Nelong valley. The Glacier was the Sursutti Glacier; we went down along it and at night encamped again on the "Moraine," near a place where we found the first peaug. We

broke to pieces all our sticks, tent-poles, &c., and they gave sufficient fuel to prepare some dinner, of which we and our companions were much in want. At last on the 23rd we arrived at Sursutti at the foot of the Glacier, in the valley leading down to Mana and Badrinath. We can readily understand why the people of Mana have given up this dangerous and fatiguing pass, which is certainly ten times worse than the Pindari Pass, on account especially of its great distance from wood and from the nearest villages where any supplies can be procured. We slept a little below Dhanran, where we were fortunate enough to meet some people going to Thibet, who provided us with some rice; and in the evening of the 24th we arrived at Badrinath, where the people had been looking out with some anxiety for our arrival.

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*Notice on the دوا دا القلب of Mohásaby being the earliest work on Súfism as yet discovered, and on an Arabic Translation of a work ascribed to Enoch.—By A. SPRENGER, M. D.*

Much has been written of late years on Súfism. The greatest advantage of these essays, consists in the ignorance of the authors of what Súfism means. They took a quotation from one book and a quotation from another book without much regard whether they treated on the same subject—and by the illicit process of *humano capiti cervicem jungere equinam* they produced the most phantastic systems, which were sure to be welcomed by an age which loves the *piquant*. Illusion is the greatest pleasure in life, and hypotheses are the charm of science, it is therefore, with some remorse, that I introduce the work of Mohásaby to the notice of the reader, as it may tend to destroy illusions which some worthy orientalists have conjured up. I am consoled, however, by the consciousness that my notice is extremely imperfect.

It is considered as a settled question that Súfism was from its commencement a system of metaphysics or pantheism; or at least that pantheism was its root and life, and asceticism a later addition. We know that during the Middle Ages, members of religious orders became pantheists but when will the day come that the followers of Spinoza or Schelling will turn ascetics? As to whence this system



came to the Musalmans opinions are divided. Some think from Greece and others from India. What has not come from India! I have observed that people in India smile when they are pleased, and cry to express grief, and as this habit also prevails in Europe, I am convinced it has been introduced from India, and I should think by the great mercantile road of ancient times because in Arabia and Syria I observed the same extraordinary practice. If these learned persons would only mention the works on Pantheism which have been translated from the Sanskrit into Arabic, or the Sufies who in early times have visited India. It is true we read of translations of some few medical and astrological works, but it is equally true that this does not imply that also works on Pantheism have been translated. But supposing it did. We cannot point out a single principle in Avicenna or any other Arabic author on medicine which has been taken from the Sasruta. These translations from the Sanskrit were, therefore, sounds in the desert air. I have seen at Cawnpore a very elaborate work in Arabic on the Copernican system of astronomy, which was written under Akbar. This system can be expressed in one word and it changes the whole aspect of the science. Yet observatories have been built in India after that time and astronomical tables have been calculated with great expense and labour, and this system has been completely ignored, though astronomy is not connected with religion. Notwithstanding this and similar examples, people consider themselves excessively learned, if they start a theory so silly as that the Musalmans have taken from the Brahmans, a system of philosophy and asceticism, which is intimately connected with their own religion, and which in the form in which we find it among the Sufies, never existed in India; and we are expected to receive this theory as a fact, though not one single historical proof is adduced in confirmation.

Báyazyd Bistámy who died in 261 says, *apud* Dáráshikóh, *Hasanát al'árifyn*, "The seed of theosophy معرفة has been put into the ground at the time of Adam, at the time of Noah it came forth from the ground, at the time of Abraham it was in flower, at the time of Moses the grapes began to grow, at the time of Christ they came to maturity, and at the time of Mohamammad pure wine was made of them, and the drunkards among his followers indulge in it,

until they get so much drunk that they lose all control over themselves and exclaim "Praise to me, is there any greater being than myself," or "I am the *Verum* (das Wahre in the sense of Hegel, i. e. God. The word in the original is الحق). There is no God by I."

This idea on the origin and progress of the pantheistic system of theology and philosophy is wild, but it is much more sensible than that of European writers. 'Abd al-Karym Jyly goes farther and attempts to show that Paganism, Magism, Judaism and Christianity were successive steps in the development of our ideas regarding God which came to perfection in the Islâm or rather in the system of the Sûfis. 'Abd al-ghanny Nábolsy has written a monography on this subject which has the title اسرار الاديان عن الكشف والبيدات.

The MSS. of which I intend to give a notice belongs to the Syrian Society at Beyroot, No. 601, 8vo. 600 pp. of 26 lines. It is one of the oldest I have seen, having been copied at Alexandria in 486. At the end is the following note نسخت  
قال في اخر الام التي نسخت  
هذه الكتاب منها قال قوبل جميعه بالام وهي بخط ابن عزرا رحمه الله تعالى  
على قدر الطاقة والاجتهاد

The title of the work is رسالة دوايد القلوب و معرفة همم النفس and it contains instructions of a Pyr to his disciple, who it appears took them down and whose name is Aḥmad b. 'Aḥim Antáky (i. e. of Antioch). The book, in a great measure is in the shape of a dialogue which is very well managed. The name of the Pyr is mentioned in several places, viz: Abú 'abd Allah and in the postscript, the date of the demise of Moḥásaby is recorded, viz. 243. For the traditions which occur in the book, invariably the isnád is given in full, and it appears from it that one of the teachers of Abú 'abd Allah is Moḥammad al-Ḥabáh, who according to the Kamál died in 227. All his other teachers, whose dates I ascertained, flourished about the year 200 of the Hijrah. We may therefore be justified in identifying Abú 'abd Allah the author of this work with Abú 'abd Allah al-Ḥārith b. Asad Moḥásaby, of whom we find the following account in Asnawý's Sháfi'y Biographies :

ابوعبد الله الحرث بن اسد المحاسبى سمي بذلك لكثرة محاسبة نفسه ذكره  
الشيخ وكذلك بن الصلاح في طبقاته فقال ذكره الاستاذ ابو منصور التميمي  
في الطبقة الاولى من اصحاب الشافعي وقال هو امام المسلمين في الفقه



والتصوف والحديث والكلام وكتبه في هذا العلوم اصول من يصنف فيها ولو لم يكن في اصحاب الشافعى في الفقه والكلام والاصول والقياس والزهد والورع الا هو لكان مغبر في وجوه مخالفته والحمد لله على ذلك انتهى كلامه وقد اعترض عليه ابن الصالح وصحبته للشافعى لم ار احدا ذكرها سواه وليس هو من اهل هذه الفن فيعتمد عليه فيما يفرد به والقراين شاهدة بانتفايها توفي سنة ثلاث واربعين ومائتين ببغداد \*

“Mohāsaby has this name because he kept such a strict account (Mohāsabah) of his own conduct. Abú Maṇṣūr places him *apud* al-Shaykh and Ibn al-Ḥalāh, into the first tabaqat of the followers of Shāfi’y and says, ‘Mohāsaby is the Imām of the Moslims in law, Sūfism, knowledge of traditions and dialectical theology. His writings on these subjects are the works to which later authors are chiefly indebted for information. If the sect of Shāfi’y did not count any other man, who distinguished himself through his knowledge of law, piety and other great qualities, the name of Mohāsaby alone would be sufficient to discomfit its adversaries.’ Ibn al-Ḥalāh opposes this view and maintains that he no where else saw Mohāsaby mentioned among the followers of Shāfi’y, and says that he is not to be counted among theologists at all, though he is the great authority in his own science. Ibn al-Ḥalāh’s assertion seems to be borne out by facts. Mohāsaby died at Baghdād in 243.”

Jāmy, *Nafahāt*, No. 32, states that he was a native of Baṣrah but was settled and died at Baghdād, and that he left several works. Qoshayry informs us that his father left at his death a large estate but that he refused accepting any thing of it, because he had been a Predestinarian. Qoshayry, Sha’rány, Jāmy and others give also an account of Antáky but mention neither any date nor any interesting fact. I possess another work of Mohāsaby which has the title of مقاصد الرعاية.

The first chapter of the book is inscribed :

### *On Reason.*

Reason العقل is the most precious gift of God, because by its means we come to the knowledge of the other gifts which God has bestowed upon us, it leads us to thank Him and to resist the demands of our appetites. The sign that reason is alive in man is, that he

is able to distinguish between what is evil and good (literally the *verum* see Logic note 21) and what is vain and transitory, between what is useful and what is hurtful, and between what is beautiful حسن and what is hideous and the object of his lusts. He who does not make these distinctions, is the slave of his appetites. The most precious of all gifts of God is faith in our Creator. The essence of this faith is that we act up to the duties which God has imposed upon us. If you ask me what is the Yaqyn (intuitive knowledge);\* I answer it is the very essence of faith, the fruits of which are purity of life—action, but action in which our object is not honor or any reward, except the reward from Him. He that has received his reward in this world, has to expect no more on the day of resurrection.

The most fruitful intuitive knowledge (Yaqyn) is that which increases in your eyes the importance of the intuitive knowledge which you already have and lowers the importance of every thing else, and which increases your fear of a future retribution. The most useful fear is that which guards you against sin, and leads you to repentance for past sins. The most useful hope is that which makes it easy for you to do that which leads you to the accomplishment of your hope. The best poverty is that which you bear patiently and with a cheerful heart. The best riches are those which remove the fear of poverty from your mind. The most useful knowledge is the knowledge of ignorance which brings you injury and the knowledge which increases your contrition and impels you to action. The most useful humility is that which guards you against pride and extinguishes anger in your heart. The most useful despair الياس is that which kills cupidity in you, for cupidity is the key of debasement, it deprives a man of his reason, soils his sentiments of honor العرفى and his generous feelings, and extinguishes the light of knowledge. The virtue which has the most pernicious consequences is the one which you look upon with complacency, and on which you place your reliance—it is not virtue but conceit with

\* Yaqyn means that which is certain, *certum*. Continued contemplation leads the ascetic to the intuition (i. e. a view with the eye of his mind) of what is supernatural, and this view becomes more and more distinct and is the only certain and positive knowledge which man possesses. It is faith raised to the highest power.

which you deceive yourself. The places where you are most private are your cell *صومعة*\* and the interior of your house, and in fact every place where you attract no notice, and where disturbance cannot reach you.

The most precious favours of God are three: sufficient reason to combat passion, sufficient knowledge to combat ignorance, and sufficient wealth to combat the fear of poverty. The best religious war is war against our own lusts, in order that the heart may become more susceptible of truth; and the most dangerous of our enemies is the one who is nearest to us, who is most concealed and who encourages all other enemies to attack us: it is the devil who inspires evil thoughts into our hearts. The most pernicious of all sins is obedience to God's commands in ignorance. What, asked the disciple, it is more pernicious than disobedience in ignorance? Yes, replied the teacher. Do you not see that you expect no reward for a sin, but you expect a reward for good works done in ignorance (*اعمال الطاعات بالجهل*) whereas you deserve punishment for them. A sin which you never forget and of which you continually repent is more useful for you than a good action which fills you with conceit.

*On the knowledge of one's ownself and on contrition.*

He who does not know his ownself wanders in error, but he who knows his ownself and the secrets of his heart will be in fear. Indeed the want of fear and the want of shame is a sign that a man does not know his ownself. Again, a want of fear produces a want of contrition, and a want of contrition leads to the destruction of the heart (conscience). A house which is not inhabited falls into ruin, in like manner a heart which is not tenanted by fear and contrition rushes into its own destruction. It is security which destroys the heart, and fear and contrition which build it up and illuminate it. It is, however, not the fear and grief of this world which quicken the heart—they are maladies and destructive to it—but the fear and contrition about the world to come. The contrition for the world to come has a sweetness and a pleasure which increases as the contrition increases, but the grief for the sake of this world is bitter, and its bitterness increases in proportion as the grief increases, because the former leads to God and the latter from

\* *صومعة* means hermitage but not monastery.

God. Fear and contrition for the sake of the world to come awaken the unwary from the sleep of neglectfulness, they give him strength to keep awake during the night and to bear the thirst of day, they give him patience in adversity, they accustom him to behold the unity of God and make him despise the world, they induce him to retire from society and make up to him for privations. If man is in this state of mind, his longing for the next world awakes, and he is endowed with energy. The root of all this is knowledge of one's ownself.

*On the various classes of men.*

Men may be divided into four classes: either they are ignorant and give themselves up to their lusts, or they are learned and filled with conceit. In proportion as their learning increases so their pride increases, and on account of their erudition, they look down upon others. Or they are devotees, but ignorant, they look down upon those who are less devoted than themselves and lay claim to being respected and venerated. Or finally, they know the right path and delight to walk upon it, they are humble and being unable to act up to what they know to be their duty, they are in contrition and sorrow. This is the best class of men. Some one told me that he heard Yúsof b. Asbát say, "The aspirants *مريدون* are lost for they are unable to resist the attractions of this world, and lose thereby the road of the life to come. And God does not excuse any one who does not act up to his commandments, nor does he accept a good work which does not proceed from the purest motives.\* And a man is judged by his actions." This is a very hard sentence and few are able to act up to it on account of the influence which our desires exercise over us.

*Caution in speaking.*

God has servants who out of fear of the punishment [of hell] are extremely cautious not to speak more than is necessary, and they are of opinion that monastic life *رهبانيه* consists in acting instead of speaking. Among this class there are men of high intel-

\* The word which I translate by "purest motives" is *çidq* (literally veracity and sincerity) it is said in another passage "the most useful *çidq* is to confess to God our own faults and the wickedness of our actions. The author uses *اهل الصدق* for "pious men."



lect, yet who go so far in taciturnity that you would take them for idiots. They are aware that much evil arises from too free a use of the tongue, but that if employed in prayers, it leads to eternal happiness.

*On Vanity* التزين.

The vanity [of pious men] is of three kinds : wilful vanity, vanity committed in ignorance (out of want of self-knowledge), and vanity which consists in the profession of the absence of vanity. The last description is the greatest vanity and the one most welcome to the devil.

Next follow two chapters on covetousness, which the author considers as practical infidelity, and in praise of contentment with moderate and honestly acquired means. The words which he addresses to the rich bear a close resemblance to the declamations of the Pseudo-Enoch to be quoted lower down. He begins يا خادم الفتنة واسير العادة وضيع النحلة ونزيل الرحلة ما اقنعتك درها حتى عدوت عليها و لم ترع ما اقتصر الذيب منها حتى دبغت جلدتها وخرطت عظمها و اغتزلت وبرها و رايت اكبر الحظ لك ان يكون جوفك مقبرة لبيت الحبران الخ \*

O tool of disturbance, prisoner of fashion, imitator of the opinions of others, and guest in this earth, you are not satisfied with what it offers to you, but use violence ; nor are you as contented as the wolf, but you tan the hide of your prey, you turn its bones in the lathe and spin its hair. Your greatest happiness consists in making your belly the tomb of dead beasts, &c.

In these two chapters the author indulges to some extent in that cynicism of which most oriental ascetics are guilty. But to his justification it may be said that owing to the uncertain tenure of property under an absolute government, it is not honest industry which leads to wealth in the east. The only men who enjoy a shortlived affluence are the oppressive official and the sordid usurer, both of whom are equally detestable. Again for the same reason, wealth is not employed in any enterprize of public utility, but for display and to gratify sensuality. We can therefore "hardly be surprised if they show but little respect for what we call industry. On the whole, it must be admitted that the ideas of the author are as pure and elevated as those of Thomas à Kempis and far more



sensible than those of Gerson. The following chapter proves that he was not without common sense.

*On reliance on God. التوكّل*

Every man ought to arrange his conduct, both as regards the affairs of this world and those of the world to come, with prudence and caution, and whenever he enters on an enterprize, he ought first well to consider every thing, but having done so he ought to place his reliance on God, and after he has done his best, he ought to expect more from the assistance of God than from his own endeavours. He must for the rest never forget that God in his wisdom has arranged so the affairs of this world that success depends on circumspection and caution *حسن النظر والاحتياط*. The sign that a man places his reliance on God is satisfaction *رضا* and submission *تسليم* [to his will], if God bestows any thing upon him he accepts it gratefully, and if he has no success he bears it with fortitude and satisfaction. Satisfaction *رضا* must be distinguished from contentment *قناعة*. The latter term means the opposite of cupidity. Satisfaction means cheerfully to submit to the will of God in adversity and prosperity.

The author takes generally the revelation in its literal meaning, and considers heaven and hell as the principal inducements for leading a pious and virtuous life. Later *Súfies* insist exclusively on the love of God for his own sake and treat these considerations with scorn. The only speculations which I could perceive in Mohásaby's book are contained in the following two chapters, which are partly a repetition of what has already been said.

*On the root of piety.*

The root of all what we have said is the *Ymán* (faith) and the *Yaqyn* (this word means originally "that which is certain" and is used by *Súfies* for intuitive knowlege). Faith and intuitive knowledge are the root and the branches and the life of the servant of God, as water is the life of a plant. If a plant is watered, first its roots absorb it, then it rises into the stem and is distributed to its branches. In like manner if a servant of God is firm in his faith and in the intuitive knowledge, first his heart within him becomes strong and then there grow from it those virtues which cannot exist without sincerity (*ʿidq*), fear of God, reliance in God, simplicity of

heart, humility and contrition. These are all internal virtues, the results of sentiments of the heart, but as soon as they have gained strength, they will show their fruits through your hands and tongue, for if the heart is truly pious there is no difference between sentiments and actions.

### *On faith.*

The disciple said: Are not faith, intuitive knowledge and belief in the unity of God, terms for one and the same thing? Again, is not the law of God for his servants and the law of the prophet for his church equally identical? The spiritual guide answered: No, every one has a separate meaning. Belief in the unity of God means the *hanyfy* faith (see my *Life of Moḥammad*, p. 169), Islám means the church, faith (*Ymán*) means belief [in the truth of the religion] and acting up to its precepts, and intuitive knowledge is the very essence of faith, and it shows itself by the purity of action *التوحيد اسم ومعناه الحنيفية والاسلام اسم ومعناه الملة والايان اسم ومعناه التصديق وحقيقته العمل بالفرائض واليقين اسم ومعناه محض العمل والايان ومصادقة اخلاص العمل*. The law (*Sunnat*) of God for his servants is stern and consists in hardship and misery in this world, but the law of the prophet consists in mercy and blessing.

[To represent the law of Moḥammad as the law of mercy is a very striking idea, but it is ancient and founded on the sayings of Moḥammad himself.]

### *On the bounty of God.*

God has not created this world at random nor has he allotted it to man for his dwelling-place without object. He has had a high purpose in the creation. He has commenced the work of creation by bounty, and he has thereby imposed the duty of thanksgiving upon us, and has promised us an increase of his bounty if we are grateful. His bounty is not confined to the pious, but it extends also to the sinner, and it is of two descriptions: evident and secret. Only the intelligent and those who study the mysteries of God recognize the latter. Motion and rest, pleasure and misery, solitude and society, laughing and weeping, privation and plenty, health and sickness, all have a benevolent object, and for all we owe equally, thanks to our Creator.

*On obscurity.*

Al-Haytham b. Jamyl says, I asked Fizáry his advice regarding the choice of a residence, and he said, Choose the most retired and obscure place where your voice cannot be heard.

*On duties and what is in excess of duty, also on good actions and bad actions.*

You must be just before you can be generous, you must perform your duties before you attempt to perform meritorious actions which are not enjoined by law, and you must avoid sin before you do good works. To abstain from sin is the foundation, and meritorious actions are the superstructure. If the basis is firm the superstructure may fall and the basis may remain, but it is impossible that the basis should fall and the superstructure should remain. It is self-deception if you feel a desire for good, without a desire to avoid evil. The necessity to avoid bad is much greater than that of doing good, for it is our duty to avoid every evil action, but not to do every good one.

Here follow fifteen short chapters which do not appear to contain many new ideas, and after them a few pages seem to be wanting. After the *lacuna* are six pages of traditions without heading and then follow the Shubhát (scruples) which fill the main body of the volume, viz. 184 pp. whereas what precedes them fills only 38 pages. There is no doubt that the whole is by the same author, but the scope of the shubohát is so different from that of the preceding pages, that it is not unlikely that they form a separate work, of which the commencement is lost.

In the Shubhát doubtful questions on law and ethics are illustrated by quotations from the sayings of the prophet, and his most distinguished pupils, and by the example of the primitive age of the Islám. The author says that many persons if there is a doubt whether an action is wrong or right, think it safest to declare that it is wrong, but he adds such a proceeding is as sinful as to declare that a wrong action is right. He therefore takes great pains to distinguish between both, and to found such distinctions on the safe basis of revelation and prophetic ordinance. He recommends however wherever he is unable to decide whether any given action is lawful or not, to go the safest way and to abstain from it.



Most of the questions which he discusses bear on property. The manner in which the land conquered by the early Musalmans was disposed of, gave rise to discussions which seem to have much occupied learned and pious men during the first three centuries. I will give an example. The country about Tarsus was obliged to surrender to the Moslim arms unconditionally, and consequently it was, according to the principle laid down by 'Omar, the property of the Moslim *community*, but the reigning Khalif, who according to the original notion of the Islám is merely the servant of the community, divided it among his adherents, generals and partisans. He had no right thus to dispose of it, nor were these persons justified in accepting it and consequently, though the land may have frequently changed owners from the time of the conquest down to the age in which our author lived, he considers it as unlawfully acquired property which no man of principles would purchase, nor would he purchase the produce thereof, and he goes so far as to recommend to those who resided temporarily in those regions for the sake of repressing the inroads of the Greeks, to send for their provisions to Egypt or Syria. Most of the other questions which he discusses are of the same description. The principal theme of the whole work is an unqualified condemnation of every thing that the executive *السلطان* ever did since the demise of the first four Khalifs. The only sovereign whose acts he considers legal is 'Omar b. 'abd al'azyz. We must not suppose that he challenges the right of any of them to rule. This question he does not discuss, and from one passage, it would appear that he conceives that a man who reigns *de facto*, reigns also *de jure*. But he seems to consider the sovereigns as well as their officers as a band of thieves and robbers, and goes so far as to lay it down as a general rule, that, as the whole or at least part of the property of public officers has been acquired unlawfully, their heirs are not justified in accepting it. Herein he preached not only in words but by example, for he refused to accept seventy thousand dirhams which his father left him, because he (his father) believed in predestination *القدر* and he thought it wrong to share in the inheritance of a heretic. There can be no doubt, that the Khalifs and their officers violated the constitution of the Islám at every step. We should however very much misunderstand the author if

we conceived that he has any political views. His only object is to save his soul, not however by praying and fasting alone but by scrupulously acting up to the commandments of God as laid down in the Qorân and Sunnah. He goes very far in his scruples. Starting from the principle that a person who purchases, or accepts, or makes use of unlawfully acquired property, he considers it unlawful to pray in a mosque or purchase the necessities of life in a market, which stand on ground to which the owner has not a clear right, or which have been built from means which have not been lawfully acquired. It is hardly necessary to say that he condemns in the strongest terms even those who accept from the servants of the government or other persons, whose hands are not pure, pecuniary assistance for performing the pilgrimage, or for proceeding as volunteers to the frontier for fighting against the enemies of the Islâm. Abstain from sin, before you attempt to do works of piety, is his motto. He therefore praises Yûsof Ibn Asbât (d. 196,) who says, that he had come all the way from Transoxania to Syria not in order to fight for the Islâm, but to gain his livelihood by tilling a ground which was in the hands of its lawful proprietors.

It appears from quotations of the sayings of pious men of the first and second centuries that this resignation and contempt for the world were very common immediately after the termination of the civil wars between the family of the prophet and the Omayyides, which ended in establishing a selfish despotism. He often quotes Awzá'y (d. 157 at the age of 72), Hasan Baçry (was born during the reign of 'Omar and died in 110), Sofyân Thawry (was born in 97, d. 161), Tâwûs (d. 106), Ibn Syryn (d. 110 at the age of 77 years), and Fodhayl b. 'iyâdh (d. 187) who held the same opinions. It farther appears (particularly from pp. 185 *et seqq.*) that they arose from the disgust with which these men were filled in witnessing the oppressions of the government. The origin of Sûfism therefore is not due to the introduction of some exotic system of philosophy from India or Greece. As leaves, flowers and fruits are the natural results of the development of the seed that is put into the ground, in like manner Sûfism is the result of the development of the Islâm. As manure promotes the growth of a plant, thus Sûfism has in the earliest times profited by works of edification (like the books



of Enoch) and mystical books (like the *Theologia* ascribed to Aristotle) translated from the Greek into Arabic. But the number of these works is extremely limited, and their influence was so small as to be hardly perceptible. At a later period, repeated attempts have been made to recast it in the mould of Aristotelian dialectics, and in the seventeenth century of our era, some works on theosophy have been translated from the Sanskrit into Persian for the special edification of *Súfies*. Notwithstanding those extraneous elements, *Súfism* is probably the most original and genuine phasis of the development of the Islám, and well worthy of the attention of the student of *Mohammadan* history. In a notice which I intend to write on the *Risálah* of Qoshayry, I trust to be able to point out how from the system of ascetism which we find unmixed in the work under review, a system of theosophy grew up which gradually became more and more pantheistical and grew to such importance, that many authors consider pantheism and *Súfism* as identical.

In the same volume and written in the same hand is another work, which is equally of great interest. It is an Arabic translation from the Greek of four books of Enoch. I have not seen the apocryphical work of Enoch, which has lately been translated into English, but from what I have read regarding it, I conclude that these books are not identical with it.

The translation is in rhymed prose, but no sacrifice is made of the sense to the rhyme which would have been the case if it was an original Arabic production. The style and language are very peculiar and almost unintelligible. I should not be surprised if farther researches were to show that it is not in the dialect of the *Hijáz*, which through the *Qorân* became the written dialect, but in the dialect of one of the Christian tribes, like the *Taghlibites* or the *Hyrians*, and that it has been translated into Arabic before *Mohammad*.

The MS. under review was copied from one in the hand-writing of the Grammarian *Abú Bakr Mohammad b. al-Hasan*, for whom it was probably interesting on account of its lexicographical importance. It is not unlikely that by referring to ancient philological books, we shall be able to ascertain to which dialect some of the words are peculiar which occur in this translation, and are not met with any where else.

The title page of the work runs :

كتاب فيه ذكر الصحيفة الغراء والصحيفة المعروفة بالرحمة والصحيفة  
المعروفة بالصغرى لأدريس النبي عليه السلام منقول الفاظهم من اليوناني الى  
العربي تعبيراً عنهم من خط أبي بكر محمد بن الحسن النحوي

This book contains the Admirable Book, and the revelation called Mercy and the revealed book called Gold, of the prophet Idris, freely translated from the Greek into Arabic. It has been transcribed from a copy which is in the hand-writing of Abú Bakr Mohámmad b. al-Hasan the Grammarian.

These four books contain exhortations to a pious life. The first fills five pages and begins *سافرت الافكار في عظمة الله جل جلاله ولطفه* *بخلقه فاوغلت في المسير وتسفت الخطير ثم رجعت حسيمة قد زادها ما استعرضته تقصيرا عما التمسته فنادت يا مالك السراير ومرشد البصائر ايقنا انه لا مذهب وراك ولا حول لغيرك وان كل فعل صدر عن احد من خلقك لم يصحبه اخلاص لك ويحدوه سايق من توفيقك فهو مضلة للأذهان وحيرة للالباب ومعدل عن السبيل الساجح اليك المعتمد عليك يا لذة الخطيئة حلت بين المذنب وبين رشده وارتهنته بسخط ربه ثم اجليت عنه وخلفته صوفراً بالتبعات متعبداً بالشهوات قد عدل به الشوق اليك عما خلق له وانساه ما توعده*

My thoughts were wandering in the greatness of God—may his glory be exalted and his mercy towards his creation increase—they proceeded on their road in perturbation, and were agitated by great objects. Then they returned panting, for their observation convinced them of the inability of obtaining what they went in search of, and they exclaimed: O Lord of the thrones, O guide of our intellect, we are now convinced that there is no way beyond thee, and no one possesses power besides thee. We are convinced that no work which man performs behind thee is accompanied by sincere devotion towards thee, a power turns it so that it misses thy aid: it is a stumbling block for the intellect, causes confusion to the hearts and turns men away from the road which leads to thee and rests, upon thee. O illicit pleasures, you step in between sinners and the guidance of God, you pledge man to the wrath of God then you exile him from God and leave him suffering under the consequences and a slave to lust. His love towards thee, O pleasure, leads man away from the object of his life and makes him forget retribution.

The second book fills only three pages and begins :

ضجت الملائكة من خطا المذنبين و جور المتسلطين و تكبر الموحدين  
 و قنوط الممتحنين فناداها مالک سرها و جهرها لما اثرت اقبح مما انكرت انک  
 مجبولة على حسن الطاعة خالية من العلايق الشاغلة قد بصرت رشداً و جذبت  
 الى حظک و اسكنت من الملكوت بنحوه تتقاصر عنها الفتن ولا ترقا اليها المحن  
 و عبيد الدنياى سجون من اجسامهم و ما تقتضيهم اياة مما يعدل بهم عن فوزهم  
 تجذبهم حواسهم الى عصيان عقولهم قد حجب عنهم ما يفضون اليه من مدد  
 اعمارهم \*

The third is not named in the title page, it is inscribed *الصحيفة*  
 يا من اُمهّل فطغى and fills only four pages, Bg. المعروف بالغمامة  
 و قوي فبغى و ساهم فعدى و لم يرا فتوهم انه لا (sic) يرى كم تنظلم منك  
 جوارحك و يشتكى قبيلحك مشاعرك و تنمادي فى خطك و تنقاد لذلك قد  
 جعلت ما اُهدى اليك دريعة لما حظر عليك اطاعت السموات و عصيت و خشعت  
 الجبال و نابت يصف عملك و يقوى املك و يقرب اهلك و يبعد و جلك تستغش  
 المايل اليك و تستصبح الحاطب عليك و تنفرد من القريب منك و تستبطي  
 النازح عنك قد انساك شكر الشهوة عايد التجربة و غلبة الهوى ثمرة الموعظة \*

The fourth fills 15 pages of 27 lines and is divided into seven Sifrs, which are inscribed.

1. مخاطبة النفس الناطقة. 2. مخاطبة a word cut away. 3. مخاطبة  
 4. Wanting. 5. مخاطبة الفقرا. 6. مخاطبة الراغب. 7. مخاطبة  
 اصناف الناس.

بجود الله ظهرت معلولاته و بحمله تشرد عنه من لم يعجرة  
 يا ايها النفس العادلة عن حاطها و الجائرة في قصدها و التي شغلت بجماعها  
 عن صلاحها اما تستحي من ضيق محبسك الطامس لفضايلك و المانع لعوارفك  
 و انخفاضك عن منازل الرفعة و متذلل لك بعد تكامل المتعة و عزوف ما كان  
 متيسرا لك \*

The above specimens will convey an idea of the peculiarities of  
 the style and language of this singular work. In order to show  
 more fully its tendency, I give some further extracts :

السفر الثالث في مخاطبة الملك يا ايها الملك الحقير في المكان الصغير  
 فى الزمان القصير ابكى الملائكة من رحمتك و بهرتهم بجرأتك و ساورت ما به  
 اكثر الفضل عنك انك لا تملك من لا يملك

Here the codex is defective.

السفر الخامس مخاطبة الفقرا \* مرحبا بفريق تجردوا من مزارع الفتنة  
 three lines not legible  
 محالهم وكفوا همس الحاسد و خديعة القاصد ومودة المخالق واستشعروا  
 الصبر ووقفت امالهم على كفاف العيش وترجيه ايام الحياة فظهورهم خفيفة  
 ومصادرهم امنة وطرق رجايمهم مستقيمة لم تتشعب مأخذها (sic) بين  
 الوعر والمخطر والسهل المردى اي قوم انتم ان غليتم كلب الحسايف ووقدة  
 الحاجات واقتضاء العادات وسوء جوار الاغنيا لكم بما يظهر مما في طباعكم  
 الاستهتار به وحذين اطفالكم الى ما في ايديهم وما تقارعون من حس  
 الشكوي وتسلط البلوى \* ان الدنيا دار عمرها الغيا عنها وكلوا بمصالحها و  
 وعدوا وتعدوا فيها وضمن لهم ما يقيم اجسادهم البالية وحاجاتهم المستقيمة  
 وعرفوا قصر مددهم وحصولهم على مجازاة اعمالهم فذسى اكثرهم ما وكل  
 به وطلب ما وضع عنه واستسلف ليومه ما في غدة ولوردة حيرات صدره وكان  
 ظنه بما حواه احسن من ظنه بما وعدة باريه فتخطا الشايخ وذسى مواقف مسايله  
 حتى اذا دعى اليها خرج منها وحده من بين ما اثره و غلب عليه وهو يتمنى  
 انه كان اقام فى الدنيا مقامكم وتهايا له بها ما اتفق لكم ان صابركم مصاب لفتن  
 الدنيا مجاهد لها فان شكا بئنه واطاع مشورة الفاقه عليه انهزم منها ورجع  
 بين البوس والذلة وان اقام على مجاهدته هزمها وكان حرا بطبعة مرضية  
 عند ربه جل ثناؤه \*

Eight lines not legible.

[ كثرة المال ] التى هى لجماعتهم كالماء الزايد على حاجة ما سقاه من  
 الشجر يعفن اصوله وينقص من مطعوم ثماره و رايح ازهاره \* يا هاولا ابعدوا  
 من الاغنيا فانهم لا يربحونكم في ذات ايديكم شيئا الا خسرتم اكثر منه في  
 ذات انفسكم انكم ترون لهم مجتمعات سريعة الافتراق ورايقات لا ثبات لها  
 و لا عهد لشي منها يحول بين المر والتجرد بما قصد له وتحنه على  
 مسالمة الايام والاباق من ربه الى الاثام والتشاغل عن تأجج فضيلته  
 وظهورها باستعراض معاء المحظورات المقهورات التى اسرها قسمه وهى  
 متصدية لمن هى اقوى منه فان احببت ان ترى فضلك عليه فاستبقا جميعا الى  
 سنه متعبه او فضيلة مستصعبة حتى ترى تخلفه بالعادة المرذولة والعلايق  
 الذميمة وغدوك اليها خفيف الظهر قليل الوزر هذا فى محياط فان حضرك



مذيتك سرّ خروجك الى ربك طاهر الاثبات قليل الاحتكار وان حضرته  
تتابعت عليه الاحزان من مفارقة احبابه و التأسف على فوارطه ثقيل الظهر  
خائب السعى قد ترك ما خول وقصر فيها قدم \* انك بالفاقة متهى باثواب  
الزهادة وهو ارضى ملابسك عند باريك وليس يصل اليه من لم يخلع ثوب  
الترفة ولو حاول الغنى خلعه اغول عليه شمله واخوانه واحبته والاته وذحايره  
حتى يردّه الى فقر النفس بهذا الكلف السيبية العهد الكثيرة الافات \* انكه  
بفاقتك مقلت من حبايل الشيطان وتعلق الاخوان وتكذب المنقطعين يصدقك  
من استبريت حاله فى ميله اليك وانحرافه عنك وتتحقق اوزان معاملتك  
والغنى يتقى جانبه ويرجى بايله فهو مجزف اللقاء مسدود المشاعر لا  
يصدق فى المشورة ولا يلقى بالحقيقه بين محروم يحسده ومرزوق يمدقه  
مخدوع مدة كفايته وغناه فاذا قصرت الاحوال به تجلت غياهبه وندم على  
فوارطه وخضع لمن لا بلوى عليه وحار فى امره حتى تنفقه انت لما بلوته  
عند صحوك فى سكره three words illegible ان اغلظ ما اخائه عليك  
الاحتشام من الاغنيا فى بذاه one or two words illegible فتتشبهوا بهم  
فى زيههم فتكونوا بمنزلة قوم قد صحت ابصارهم يحتشموا من لقا مكافيف  
فى مقصر عن زيههم ان الترفة قد طمست بصاير الاغنيا واذهلت قلوبهم حتى  
اعتمدوا على الزى الظاهر الذي ارضا الاخساس وتركوا زي الباطن الذي  
به لهم العقول ورضى محرکها قد شغلهم تاليف فضائل ما جمعوها عن العنام  
على انفسهم و اظهار فضائلها فهى كالسيوف التى ركبها الصداة من اغباب  
الاستعمال ومنعها عن قوة التأثير واعتمد اصحابها منها على كثرة الحلية  
انهم مثل الثمرة ظاهرها لذيذ باطنها منيع وانتم مثل جوزة بطينها حليب  
وظاهرها خشن ان اربح الاغنيا من تصور ولهج بها واخسر الفقرا من امل  
الغنى ولهج به ان المتشبهه منكم بالغنى مع امتناع مواده يشاكل الوارم  
يرى البعيد ورمه ويتوهمه خصبا لبدنه من حسن قوته وتمكن صحته وصاحبه  
يجد الهمه ومن قرب منه وفتش عنه يعلم انه منه فى علة مبرحة به ان  
ايام الغنى محصلة عليه فكلما زادت زاد جرحه ويضاعف وزره ونسى ما به  
الحاجة اليه \* وان ايام الفقير يغوى فيها صبرة ويزيد حنكته ويتضاعف اجرة  
استحييت من شكر الفقير الصابر سحلى ما ينوبه وعجت الارض من تسخط  
الغنى لذأخر ما فضل عن حاجته وحلم الله عزوجل سائر والى مالک السراير  
المجازاة عليها و السلام الكامل على الصابرين الى اوان لقايه تم السقر  
لخامس \*

*A second series of experiments to ascertain the mean quantity of Silt held in suspension by the waters of the Hooghly in various months of the year : as also the quantity carried out to sea. With an Appendix on its sectional Area and average discharge.—By HENRY PIDDINGTON, Curator Museum Economic Geology.*

It will perhaps be recollected by the readers of the Journal that at the close of my former notice on this highly interesting geological and physical problem, (Journal, Vol. XXIII. p. 283,) I recorded there Major (now Lieut.-Col.) Baker's remark, that the water at the surface would hold a less, as that at the bottom would hold a greater proportion of silt in suspension than the true mean amount, and I announced then that I had contrived a simple method of obtaining water at small depths.

This is, simply, a bottle attached mouth downwards to one side of a double line, near the bight, at which there is a leaden sinker ; so that when the bottle is lowered by that side of the line, the sinker carries it down, mouth downwards, and the air within the bottle prevents any great quantity of water from being forced in, while being lowered to the required depth (in this case 3 fathoms or 18 feet). The other side of the line, hitherto left slack, is then hauled upon, and the bottle thus being reversed fills quickly with water and is hauled up. This is of course not as strictly accurate as a more complex contrivance would be, but it is sufficiently so for all practical purposes. I may add that all the water at Calcutta for the whole year was taken up by myself about sunrise, on the dates which will be found prefixed to each month. I am not always at liberty on any fixed day, or the weather was sometimes unfavourable during the rains, so that the intervals are not exactly months. As before, the time of tide has been wholly disregarded to obtain a good average. In the few months during which the bottles of water were kept, no deposit of carbonate of lime, except slightly in one or two months, took place. The following was the process followed to obtain the results. It is one quite familiar in all details to chemists, but may be useful or of interest to those who not being practical chemists might desire to repeat our experiments on the water of other rivers.

1. The water was filtered and accurately measured, a small allowance being made for that retained by the filters.

2. The filters were double, both were carefully dried at about  $100^{\circ}$  Faht. and that containing the solid matter weighed, the other placed to counterbalance it in the opposite scale, so that the weight of the silt only was taken.

3. The deposit was tested for carbonate of lime by putting a minute portion into a watch glass with acetic acid, when the effervescence would be immediately perceptible.

4. The filtered water was slightly alkalised by ammonia to neutralise the superabundant carbonic acid, and the lime being precipitated by oxalate of ammonia was obtained as an oxalate, for which the equivalent quantity of carbonate of lime is set down. The whole of the filters for twelve months were then burnt, and the carbonate of lime being converted into the dry sulphate, the remainder was estimated as magnesia, with a trace of iron. This amounted for the twelve months, at the surface, to 3.05 grs. or 0.254 of magnesia per month; and at the 3 fs. depth to 3.75 grs. or 0.312 of magnesia per month; a quantity too small to deserve notice, were it not for the remarkable contrast which the estuary waters at the Gasper channel will be seen to afford. The whole is set down as carbonate of lime, and this difference is referred to in a note at the foot of the tables, which are as follows:

TABLE I.

*Tabular statement of the amount of silt held in suspension by the surface water of the Hooghly, at Calcutta, for each month, April, 1854 to March, 1855.*

| No. | Date.             | Quantity of water. | Solid earthy matter. | Carbonate of lime in water. | Total of solid matter, silt and lime. | Lime found in the solid matter only. |
|-----|-------------------|--------------------|----------------------|-----------------------------|---------------------------------------|--------------------------------------|
|     | 1854.             | oz.                | grs. silt.           | grs.                        | grs.                                  |                                      |
| 1   | 3rd April, .....  | 22.70              | 0.50                 | 3.92                        | 4.42                                  | Trace.                               |
| 2   | 4th May, .....    | 21.80              | 0.60                 | 1.52                        | 2.12                                  |                                      |
| 3   | 5th June, .....   | 30.00              | 0.60                 | 2.61                        | 3.21                                  |                                      |
| 4   | 4th July, .....   | 23.75              | 4.25                 | 0.58                        | 4.83                                  |                                      |
| 5   | 5th August, ....  | 23.80              | 11.75                | 0.32                        | 12.07                                 | Trace.                               |
| 6   | 1st September, .. | 23.60              | 4.00                 | 1.17                        | 5.17                                  |                                      |
| 7   | 1st October, .... | 23.20              | 2.88                 | 1.44                        | 4.32                                  |                                      |
| 8   | 4th November, ..  | 22.00              | 1.20                 | 0.59                        | 1.79                                  |                                      |
| 9   | 1st December, ..  | 25.00              | 4.20                 | 1.35                        | 5.55                                  |                                      |
|     | 1855.             |                    |                      |                             |                                       |                                      |
| 10  | 10th January, ..  | 25.50              | 3.65                 | 0.47                        | 4.12                                  |                                      |
| 11  | 3rd February, ..  | 24.00              | 5.25                 | 1.95                        | 7.20                                  |                                      |
| 12  | 8th March, .....  | 24.30              | 0.75                 | 1.75                        | 2.50                                  |                                      |
|     | Totals,..         | 289.65             | 39.63                | 17.67                       | 57.30                                 |                                      |
|     | Means,..          | 24.14              | 3.30                 | 1.47*                       | 4.77                                  |                                      |

\* Less magnesia 0.254 per month.



TABLE II.

*Tabular statement of the amount of silt held in suspension at a mean depth of 3 fathoms by the water of the Hooghly, at Calcutta, for each month, April, 1854 to March, 1855.*

| No. | Date.             | Quantity of water. | Solid earthy matters (silt). | Carbonate of lime in water. | Total of solid matters, silt and lime. | Lime in the solid matter only. |
|-----|-------------------|--------------------|------------------------------|-----------------------------|----------------------------------------|--------------------------------|
|     | 1854.             | Oz.                | grs.                         | grs.                        | grs.                                   | grs.                           |
| 1   | 3rd April, .....  | 22.60              | 8.70                         | 1.60                        | 10.30                                  | 0.15                           |
| 2   | 4th May, .....    | 23.80              | 6.25                         | 1.00                        | 7.25                                   | Trace.                         |
| 3   | 5th June, .....   | 21.20              | 1.30                         | 3.12                        | 4.42                                   | 0.00                           |
| 4   | 4th July, .....   | 22.50              | 6.50                         | 1.00                        | 7.50                                   | 0.00                           |
| 5   | 7th August, ....  | 23.50              | 13.30                        | 0.08                        | 13.38                                  | Trace.                         |
| 6   | 1st September, .. | 24.50              | 7.62                         | 1.10                        | 8.72                                   | Trace.                         |
| 7   | 1st October, .... | 26.00              | 7.00                         | 0.72                        | 7.72                                   | 0.00                           |
| 8   | 4th November, ..  | 26.00              | 2.60                         | 0.89                        | 3.49                                   | 0.00                           |
| 9   | 1st December, ..  | 22.50              | 1.60                         | 0.75                        | 2.35                                   | 0.00                           |
|     | 1855.             |                    |                              |                             |                                        |                                |
| 10  | 2nd January, .... | 24.00              | 2.36                         | 2.60                        | 4.96                                   | 0.00                           |
| 11  | 3rd February, ..  | 23.80              | 8.50                         | 1.18                        | 9.68                                   | 1.00                           |
| 12  | 8th March, .....  | 24.00              | 6.50                         | 1.76                        | 8.26                                   | 0.00                           |
|     | Totals,...        | 284.40             | 72.23                        | 15.80                       | 88.03                                  | 1.15                           |
|     | Means,...         | 23.70              | 6.02                         | 1.32*                       | 7.34                                   | 0.09                           |

Before giving the results of the examination of the waters at the Gasper Floating Light Vessel it may be as well to remark on the results now obtained in comparison with those shewn in my first paper. To save the trouble of reference I set down here the mean results of each column from both examinations.

| Per month.                    | Surface water, in 1842. | Surface water, in 1854-55. | Water at 3 fs. depth in 1854-55. |
|-------------------------------|-------------------------|----------------------------|----------------------------------|
|                               | oz.                     | oz.                        | oz.                              |
| Mean Quantity of Water, ..... | 25.½                    | 24.14                      | 23.70                            |
| Solid earthy matter, silt,..  | 6.04                    | 3.30                       | 6.02                             |
| Carbonate of Lime in water,   | 7.95                    | 1.47                       | 1.32                             |
| Total of solid matter, i. e.  |                         |                            |                                  |
| Silt and Lime,.....           | 13.99                   | 4.77                       | 7.34                             |

\* Less magnesia 0.312 per month.

It would thus appear that either there are very extraordinary differences in the amount of silt and of lime in different years, or that some errors exist somewhere. The fall of rain at Calcutta for the whole year in 1842 was 76.14 inches, and from April 1854 to March 1855, 65.89 inches only ; or 10.25 in. or 13.33 per cent. less ; and this may partly, if not entirely, account for the deficiency ? Another, and a probable source of error was that, in 1842 I did not take up the water myself, but giving *more* pice to a good peon than the boat hire would amount to, I sent him to obtain a bottle full of water, strictly charging him to do so from the middle of the river. But as usual where we fancy we employ a trustworthy native it was not improbable that I might have been deceived, and I at first supposed that the peon, to pocket the whole of the pice, just took up water close to the shore by stepping into a boat at the ghaut ; and this would account for the larger quantity of silt shewn, but not at all for the very large quantity of carbonate of lime in 1842, which as related in my former paper formed crusts on the side and even stalactitic incrustations at the bottoms of the bottles ; so that about this—to say nothing of the impossibility of any practical chemist making any mistake as to carbonate of lime—there can be no question.

To clear up this doubt if possible, I took up on the 16th of November a bottle of water in mid channel opposite to the Governor General's Ghât (half way between Chaundpaul Ghât and Fort Point) and another bottle at not more than 20 yards from the shore. This was about at half or three quarters flood.

When examined for silt and carbonate of lime, the results were found to be, for the same measure of water.

|                                   | Solid matter. | Carbonate lime. |
|-----------------------------------|---------------|-----------------|
| In mid channel, . . . . .         | 1.36          | 1.52            |
| At 20 yards from the shore, . . . | 0.75          | 2.00            |

Hence we see, that the silt is less in shore, though the proportion of lime is twenty-five per cent. more than in mid-stream. In 1842, the table in my former paper gives for November, silt 2.12 and carbonate of lime 7.88, so that it is in this last constituent that the great discrepancy exists, and we can only attribute it to the heavier

fall of rain, and thence perhaps the higher rise of the great Ganges pouring in a larger quantity of calcareous matter.\*

We must therefore I think in fairness, *and for the present*, take a mean between the surface water of 1842, and that taken at 3 fathoms depth in 1854-55 for about the mean quantity of silt held in suspension by the Hooghly for a series of years? though it seems clear that nothing but water taken up at Nuddea where the Bhaghirutty, Jellinghee and Matabangah, the three off-shoots from the great Ganges which form the river Hooghly, meet, and where the influence of the tides is not felt, can give us the true quantity of silt and carbonate of lime brought down; and again that this must be done for a series of years to obtain a really good average.†

The means above proposed would be as follows :

|                                    | Water.<br>oz.     | Solid earthy<br>matter silt. | Carbonate<br>lime in water. | Total solid<br>(silt and<br>lime). |
|------------------------------------|-------------------|------------------------------|-----------------------------|------------------------------------|
| 1842, ..... Mean, ....             | 25. $\frac{2}{3}$ | 6.04                         | 7.95                        | 13.99                              |
| 1854-55 at 3 fs. depth, Mean, .... | 23.70             | 6.02                         | 1.32                        | 7.34                               |
|                                    | 49.03             | 12.06                        | 9.27                        | 21.33                              |
| Mean of both series, .....         | 24.51             | 6.03                         | 4.63                        | 10.66                              |

Now with the same data then as in my former paper, i. e. 1.73296 inches to the cubic (apothecary's) ounce of water, the above average quantity of water 24.51 oz. will be equal to 42.47385 cubic inches which, to save decimals, we will call 42.48 cubic inches of water containing 6.03 grs. of silt and 4.63 grs. of lime, which for a cubic

\* With which its waters are always charged, the lime depositing so fast when the river lowers that it forms beds of *kunkur*, (impure limestone) which are often serious obstructions to the navigation of the river.

† The Indigo Planters are well aware of, and often suffer from the caprices of the river in this matter of more or less silt (called by them *Polay*, see Researches Vol. XVIII. part II.) being deposited by the river on their inundated lands, where it sometimes leaves them a rich bed of it for their next year's crop, and at another barely enough to cover the old vegetation. We also see at the sections of the river banks that the laminæ of silt are of varying thicknesses.

foot of water will give 433.63 grs. or nearly  $\frac{9}{10}$ ths (nine-tenths) of an ounce for the whole solid contents of the cubic foot of water.

The proportion of carbonate of lime to the total of solid matter is also less, for in 1842 of the 13.99 grains of solid matter, 7.95 were carbonate of lime, which proportion should give 6.06 for the 10.66 grains of solid matter of 1854-55, whereas we find it to be 4.63 only, or one-third less.

Again: in 1842, the four months of March, April, May and June were those in which the largest amount of sediment was brought down whereas in 1854-55 the four months of July, August, September and October give the largest amount of solid matter; which is, for the whole year, as 7.34 only to 13.99 in 1842 and for the four heaviest months as follows.

|                       | In 1842.           | In 1854 55.        |
|-----------------------|--------------------|--------------------|
| Average quantity of   | by former paper    | at 3 fs. depth.    |
| water in the four     | 25.50 oz. or 44.19 | 24.12 oz. or 41.80 |
| heaviest months,.. }  | cubic inches.      | cubic inches.      |
| of silt, .....        | 24.77 grs.         | 7.83               |
| of carb. lime, .....  | 13.56 grs.         | 0.72               |
| of silt in each cubic |                    |                    |
| foot of water, .....  | 1678.92 grs.       | 353.46 grs.        |

which last (i. e. the 353.46 grs.) are equal to 0.8366 cubic inches or  $\frac{1}{2072}$  one two thousand and seventy-second part of its bulk; of which however only about  $\frac{1}{12}$ th is carbonate of lime.

The cubic inch of the dry solid silt, as deposited, I shewed in my former paper to weigh about 424 grains. To this our present result 433.63 grains to a cubic foot of water (see page 156) is so near an approach that we may take it as the average, and in round numbers say, for facility of recollection, that every cubic foot of water contains a cubic inch of silt; or more exactly in fractions, not  $\frac{1}{1333}$ , one thirteen hundred and thirty-third, part of its bulk of silt, as before found for 1842, but  $\frac{1}{1728}$ th (one seventeen hundred and twenty-eighth part.) This is still, however, an enormous proportion when we recollect the mass of water discharged by the Hooghly alone, which Mr. Bedford, the late River Surveyor, by careful sectional measurement calculates as follows at Moyapore, which is thirteen miles below Calcutta.



|                                                                                                                                             | Feet.                   |
|---------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| Mean depth, .....                                                                                                                           | 29.102                  |
| Mean velocity per second, .....                                                                                                             | 35.562                  |
| <hr/>                                                                                                                                       |                         |
| Discharge per second in gallons, (Imp. measure ?)                                                                                           | 3.214.758               |
| Which is in Cubic feet, H. P., .....                                                                                                        | 507.060                 |
| <hr/>                                                                                                                                       |                         |
| Col. Goodwin estimates the discharge at Calcutta to be per second, Cubic feet, .....                                                        | 444.960                 |
| At one inch of solid matter for every cubic foot of water, this would give, for the Moyapore average, per second, cubic feet of silt, ..... | 298. $\frac{894}{1728}$ |
| For the Calcutta average, cubic feet of silt, ....                                                                                          | 257. $\frac{894}{1728}$ |
| The mean of these two we may call in round numbers Cubic feet per second, of silt, .....                                                    | 278.                    |
| Or per hour, Cubic feet of silt, .....                                                                                                      | 1.000.800               |
| Or per day Cubic feet, .....                                                                                                                | 24,019,200              |

\* I copy the following from the work of Mr. Charles Ellet, Junr. "On the Inundations of the Mississippi and Ohio Rivers," (p. 173) published in 1853.

"The quantities of earthy matter contained in the water of the Mississippi in different conditions of its surface, have been investigated by several scientific gentlemen, whose results are not widely different. Preference is here given, however, to those published by Professor Riddell, of New Orleans, who, to his scientific reputation and skill as a manipulator, has superadded the claim to confidence which is due to great zeal in this subject.

"The experiments of Professor Riddell have led to the conclusion, that the proportion of sedimentary matter to the weight of Mississippi water containing it, is as follows.

Water 1 ; maximum weight of sediment  $\frac{1}{893}$

Water 1 ; mean weight of sediment  $\frac{1}{1153}$

Water 1 ; minimum weight of sediment  $\frac{1}{2310}$

"When solidified into coherent earth, at a mean, it was found that the bulk of the sediment was equal to the  $\frac{1}{3000}$  part of that of the water in which it was suspended.

"But the greatest amount of sediment is found when the river is in flood ; and it is when in that condition that the discharge into the lake would take place. We may assume, therefore, from these experiments, that when there is a great flood in the river, the bulk of sediment would be to that of the water containing it, about as 1 to 1800."

*Water at the GASPER Floating Light.*

To unprofessional readers, it may be as well to state that the *Gasper* Floating Light Vessel is moored a few miles below the South point of Saugor Island and 26 miles to the Northward and Westward of the Outer Floating Light Vessel ; so that the *Gasper* station is exactly where the last traces of the suspended silt of the river may be supposed to reach ; though as lying upwards of 30 miles up amongst the sands which form the Sandheads of the Hooghly, it cannot be said to be, like the Outer Floating Light, almost in the open ocean ; so that it is the fairest available spot at which to form an estimate of how much of the silt is carried down to the sea by the action of the surface water, for there is no doubt some action, probably a returning one, going on at the bottom, of which we are unable to form any estimate. It will be noticed that February is but an average from the preceding months, as no water taken in that month reached me. I am indebted to Mr. Parker, H. C. S., Chief Officer of the Star F. L. for this valuable series.

The following was the process adopted :

1. The water was first filtered to obtain the silt as before.
2. It was then evaporated to dryness and re-dissolved in a small quantity of water to obtain the sulphate of lime, no account being taken of the very little taken up by the water of solution.
3. Bi-carbonate of ammonia being added to the solution, threw down as carbonate of lime what had existed as a muriate, leaving the magnesia in solution.
4. The magnesia was precipitated by the phosphate of soda and the Ammonia-phosphate of magnesia was calcined to a red heat and the magnesia deduced from it.

To check the results again, the filters were burnt and the weight of the whole taken, with due allowance for the weight of ash of the filters.

For the solid matter ; the net weight after combustion was for

|                           |       |
|---------------------------|-------|
| the 11 months, .....      | 17.75 |
| By the table it is, ..... | 18.05 |

---

Difference only,.. 00.30

which is too small to notice being only .03 or three-hundredths of a grain per month.

The amount of magnesia was also checked by re-converting the phosphate of magnesia into the carbonate; and although the average of 7.60 grains in 24.89 oz. of the water may appear large, I found that water taken from the middle of the Bay of Bengal\* gave for  $23\frac{3}{4}$  ounces of water as follows:

|                                                            | <i>Middle of Bay.</i> | <i>Gaspar Channel, Decr.</i> |
|------------------------------------------------------------|-----------------------|------------------------------|
| Water, . . . . .                                           | $23\frac{3}{4}$ oz.   | 26.00 oz.                    |
| Mur. Soda, . . . . .                                       | 263.25 grs.           | 148.75 grs.                  |
| Magnesia, . . . . .                                        | 8.09                  | 7.04                         |
| Insoluble salts, sulphate and carbonate of lime, ‡ . . . . | 6.50                  | 8.75                         |

The following table will give at one view, the results of the eleven months for which I obtained water.

TABLE III.

*Tabular statement of the amount of silt and of earthy salts held in suspension at the mouth of the Hooghly below Saugor; at a mean depth from  $2\frac{1}{2}$  to 3 fathoms, at the GASPER CHANNEL Floating Light Vessel, in Lat.  $21^{\circ} 26' N.$ ; Long.  $88^{\circ} 04' East.$*

| No. | Date.               | Quantity of water. | Solid earthy matter (silt). | Carbonate of lime in water. | Sulphate of lime and ox. of iron. | Magnesia. | Total of solid matter; silt and solution. | Lime in the silt. | Remarks. |
|-----|---------------------|--------------------|-----------------------------|-----------------------------|-----------------------------------|-----------|-------------------------------------------|-------------------|----------|
|     | 1854.               | oz.                | grs.                        | grs.                        | grs.                              |           |                                           |                   |          |
| 1   | 1st March, . . . .  | 24.50              | 0.50                        | 8 40                        | 0.40                              | 12.       | 21.30                                     | 0.00              |          |
| 2   | 15th April, . . . . | 24.00              | 3.50                        | 5.20                        | 2.50                              | 7.90      | 19.50                                     | 0.00              |          |
| 3   | 1st May, . . . .    | 24.30              | 1.25                        | 4.45                        | 5.60                              | 2.54      | 13.84                                     | 1.25              |          |
| 4   | 15th June, . . . .  | 24.50              | 1.00                        | 9.50                        | 4.25                              | 14.48     | 30.23                                     | 1.00              |          |
| 5   | 15th July, . . . .  | 26.00              | 1.00                        | 6.50                        | 1.12                              | 4.20      | 12.82                                     | 1.00              |          |
| 6   | 24th August, . . .  | 22.50              | 2.75                        | 3.50                        | 0.60                              | 6.76      | 15.01                                     | 2.75              |          |
| 7   | 1st September, . .  | 25.50              | 1.00                        | 7.60                        | 3.25                              | 3.30      | 15.15                                     | 1.00              |          |
| 8   | 4th October, . . .  | 25.20              | 2.25                        | 10.25                       | 0.50                              | 4.60      | 18.10                                     | 0.00              |          |
| 9   | 1st November, . .   | 24.75              | 2.75                        | 4.00                        | 0.75                              | 4.58      | 12.08                                     | 0.00              |          |
| 10  | 2nd December, . .   | 26.00              | 1.50                        | 7.00                        | 1.75                              | 7.04      | 17.29                                     | 0.00              |          |
|     | 1855.               |                    |                             |                             |                                   |           |                                           |                   |          |
| 11  | 1st January, . . .  | 26.50              | 1.15                        | 9.90                        | 1.60                              | 10.20     | 22.85                                     | 0.00              |          |
| 12  | 1st February, † . . | 24.89              | 1.69                        | 6.94                        | 2.03                              | 7.60      | 18.92                                     | 0.64              |          |
|     | Total, . . . . .    | 298.64             | 20.34                       | 83.                         | 24.35                             | 86.20     | 217.09                                    | 7.64              |          |
|     | Means, . . . . .    | 24.89              | 1.69                        | 6.94‡                       | 2.03                              | 7.60      | 18.92                                     | 0.64              |          |

\* Of which I happened to have a bottle sent me by a friend some years ago.

† Average only from preceding 11 months.

‡ In solution this is of course a muriate.

Comparing now the results of our estimated mean average at Calcutta as given at p. 156 with these at the Gasper, we find them as follows.

|                     | Water,<br>oz. | Solid earthy<br>matter silt. | Carbonate of<br>lime. | Magnesia. | Sulphate of lime<br>and iron. | Total of solid<br>matter in wa-<br>ter ; silt and<br>solution. |
|---------------------|---------------|------------------------------|-----------------------|-----------|-------------------------------|----------------------------------------------------------------|
| Calcutta, . . . . . | 24.51         | 6.03                         | 4.63                  | 0.00      | 0.00                          | 10.66                                                          |
| Gasper channel,     | 24.89         | 1.69                         | 6.94                  | 7.60      | 2.03                          | 18.92                                                          |

So that we find that three-fourths of the more earthy detritus is already dispersed by being diluted by the water of the ocean, and indeed if the whole were to be deposited the river channels would quickly be choked up, and that the sea water has largely added magnesia as an element to the salts in solution ; for the river water at Calcutta which always contains a sufficiency of lime shews, as will be observed (p. 153), only a trace of magnesia as the *kunkurs* are found to do.

I thought it well worth while also, to know what is really the time which the whole of the sediment in the water takes to settle, and I found that the silt of the surface water of the Hooghly, in the month of November, took exactly nine days to sink through one foot of water in a cylindrical glass vessel ! this rate would give fifty-four days for a single fathom ! and in salt or brackish water the rate would be still slower from its greater density ; and this accounts for the finer sediment being carried so far out to sea, and for the slow rate of decrease of soundings in the sea channels and on the Sand Heads or ridges which extend along the head of the Delta.

#### POSTSCRIPT.

In connection with this research, and as affording us some little light as to the processes going on in the river, I may here mention that I have been favoured by Mr. Bensley, H. C. Pilot Service, now the river-surveyor, with two very interesting specimens ; being a *kunkur* now forming on the beach at Kedgerie and some dredgings from Lloyd's Channel which is between Kedgerie and Saugor roads, I describe them in the order in which I have mentioned them.



*Kunkur from the beach at Kedgerree.*

X This is a true *kunkur*\* as to external form, and may at a little distance be easily mistaken for one of the common iron laterites, to which indeed it in some measure approaches; for singular to say it contains a mere fraction of two or three per cent. of lime! and is in fact a loose and coarse-grained, siliceous sandstone *kunkur*, of which oxide of iron and not lime forms the cohesive element. When we recollect that this is in progress of formation on the shore of the estuary of a river, the waters of which are abundantly charged with lime and the tidal water, with magnesia, while the oxide of iron forms a mere trace in it, it is certainly a most singular Geological fact and one which may give rise to many speculations. For the present I only note it and that a fair average of it gave in 100 parts as follows.

|                                  |        |
|----------------------------------|--------|
| Earthy Silicates, . . . . .      | 84.75  |
| Carbonate of Lime, . . . . .     | 2.50   |
| Carbonate of Magnesia, . . . . . | 0.61   |
| Peroxide of Iron, . . . . .      | 12.00  |
|                                  | <hr/>  |
|                                  | 99.86  |
| Loss, . . . . .                  | 0.14   |
|                                  | <hr/>  |
| Total, . . . . .                 | 100.00 |
|                                  | <hr/>  |

*Dredgings from Lloyd's Channel.*

These are principally a fine micaceous sand which gives but a very little effervescence, and thus contains but an exceeding small proportion of carbonate of lime. It separated naturally in the bottle into two parts, of which the lower one was the sand above described, and the upper one a black foetid mud; so strongly impregnated with sulphuretted hydrogen, that it immediately and strongly discoloured silver foil placed in it, thus shewing that the vast amount of decomposing animal matter of which the Hooghly is, we know, made the receptacle, is by a wise provision of nature, so to say, imprisoned beneath the waters! where it doubtless serves as food for millions of the inferior animals.

\* Using the word in the native sense, *konkra*, any thing rough, jagged or puckered; for it is applied both to concretionary limestone and also to the ferruginous concretions usually called by us Laterite.

## APPENDIX.

I give the following data, which are all useful elements of the great problem of our yet unknown river, in the form of an Appendix because the researches are not my own, and because it is right that full justice should be done to the valuable labours of the gentlemen, to whom we owe them; for none but those who have been engaged in these pursuits can form any idea of the careful, and minute, and laborious details which are expressed in the few figures of the table below:—

| Observers, and place and time of observation.                                                                                  | Width of River.   | Mean depth.      | Sectional area.    | Mean velocity per second.  | Discharge per second.                   |
|--------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------|--------------------|----------------------------|-----------------------------------------|
|                                                                                                                                | Feet.             | Feet.            | Sq. feet.          | Feet.                      | Cubic feet.                             |
| LT. COL. GOODWYN, B. E. at Calcutta. Clive Street Ghat to Howrah, in March, ..                                                 | 2.060             | 36.0             | 74,160             | 4.5                        | 444,960                                 |
| A. BEDFORD, Esq. H. C. S. River Surveyor. At Moyapore 13 miles below Calcutta, March, 1854, .....                              | 3.300<br>(nearly) | 29' 10" 2        | ..                 | 2.88                       | 507,060 (H. P.)                         |
| A. BEDFORD, Esq. at Jiggerkolly Sema-phore, below Diamond Point and N. W. b. W. 2¾' from Culpee Pagoda, in March, 1854,* ..... | 8,800             | 32' 1" 4         | ..                 | 4.596                      | 1,277,009 (H. P.)                       |
| Averages of the Mississippi River as given in Mr. Ellet's work, ....                                                           | 3.300<br>(p. 30)  | 115.0<br>(p. 33) | 200,000<br>(p. 34) | Surface<br>7.00<br>(p. 36) | 979,240<br>below New Orleans<br>(p. 41) |

Col. Goodwyn and Mr. Bedford give also the following notes with these results, which as they could not be conveniently tabulated, I set down here.

## COLONEL GOODWYN.

1. Fall of the river bed about 4" per mile.
2. The mean velocity above given,  $\frac{4}{5}$ ths that of the surface.

\* And below the point where the Dummooda and Roopnarain join the Hooghly. The flood tide from the sea much augments the volume of water here, so that the discharge shewn is that of the whole tidal water of the estuary rather than that of the river.

3. As the velocities increase with the depths, there will be a much greater discharge during the freshes.

MR. BEDFORD.

*At Jiggerkolly.*

1. Mean level above Zero (of the tide guage, see below) 7 feet 1.3 inch.

2. Velocity per second, in inches at surface, is 62,57; at bottom 47,747. Mean (as in table) 55,159.

*At Moyapore.*

1. Mean level above Zero 8 feet 9.4 inches.

2. Surface velocity in inches 40,42; at bottom 28,704. Mean as in table 34,562.

3. The mean level above Zero is the mean of all the Registers taken every quarter of an hour on a guage, the Zero of which was on the same absolute level as the Zero of the Tide-guage at the old Kidderpore Docks.

4. The mean depth is the mean of all the perpendicular co-ordinates of the section taken at every 100 feet from the above mean level to the bed of the river.

5. The velocity at the surface in inches is the mean of the velocities taken every quarter of an hour from high water.

6. The velocity at the bottom is taken from the usual formula tables (De Buat's.)

7. The fall of the ebb tide between Calcutta and Jiggerkolly was about 6 feet 6 inches in the whole distance, which is about 68 geographical miles of 2028 yards each.

8. The foregoing two sets of observations for the discharge were taken at Jiggerkolly on the 16th March, and at Moyapore on the 29th March, 1854. The range of tide at Calcutta on these two dates differed but 3 inches, being so much in excess on the 29th March.

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MEMORANDUM.—Mr. Bedford's note giving the discharge in gallons, I have assumed that *Imperial* gallons of 277,274 cubic inches are intended, and have thus allowed 6.34 gallons to the cubic foot in converting his numbers to suit our table.—H. P.







T. Black. Assisted by Prof. C. G. G. G.

THE SAKPHA of TIBET, SAGFA HODGSONIÆ NOBIS.

*On a new Perdicine bird from Tibet.*—By B. H. HODGSON, Esq.

To General Jung Bahadoor, prime minister of Nepal, I am indebted for the gift of a fine sample, of what appears to me decidedly a new species, and probably also a new type, of the partridge group of birds. The General in his recent military expedition into Tibet procured the bird alive. But it died at Kathmandu and he sent me the spoils, in very fine condition.

*Perdicinæ.*

Genus *Sacfa mihî.*

Sakpha of the Tibetans.

*S. Hodgsoniæ\* mihî.*

The essential characters of the genus or subgenus are as follows:

Bill, strong with a heavy overlying upper mandible, scarped along the cutting edges. Nares subvertical and opening towards the head. Wings and tail longer, and less bowed and gradated, and stronger than in *Perdix*; but not so long or acuminate as in *Lerva*, and about equal to *Francolinus*.

Wings with 3-4-5, quills longest and nearly equal, 1-2 not much gradated: 1st, only  $\frac{1}{2}$  inch less than the longest.

Tail 16, rounded, firm.

Tarsi moderate, equal to the longest toe and nail, nude, biscaled in front, no spur?

Lateral toes subequal and furnished with the usual basal membrane. Nails blunt, scooped inferiorly and having a salient margin all round. Orbits subnude, as in *Arboricola*.

This fine species is denominated Sakpha by the Tibetans. It was obtained in the western part of the province of Tsang. I know nothing of its habits. My sample is a female and therefore the peculiar character of the bill, in this sex very marked, must be more so in the males, and resembles, in fact, that organ in *Lophophorus*, or the monâl. For the same reason, that is, my sample being a female, I am doubtful as to the presence or absence of

\* I take the liberty of dedicating this handsome species to Mrs. Hodgson, whose accurate and tasteful delineations of Himalayan scenery will do much to attract attention to this fine field for scientific research.

the spur on the legs. But it is probably absent or but slightly developed.

The other members have been sufficiently described in the generic character.

The colours are as follows :

Bill and legs, horn green. Orbital skin, reddish. Above transversely marked with black, rufous and chesnut, in frequent bars, the black being more developed on the wings, and the chesnut on the flanks, where indeed the black nearly disappears, while on the belly, it is so much developed as to constitute the main and almost only colour. Neck, above and laterally, and all the lateral tail feathers, full unmarked chesnut: cheeks, throat and breast, luteous or albescent buff. A black zone round the throat from the cap, and a black patch below the eye.

The size is as follows :

|                                   |                    |
|-----------------------------------|--------------------|
| Tip of bill to tip of tail, ..... | 1.1.0              |
| Expanse of wings, .....           | 1.6.0              |
| A closed wing, .....              | 0.6. $\frac{1}{8}$ |
| Bill to gape, .....               | 0.0. $\frac{7}{8}$ |
| Bill to brow, .....               | 0.0. $\frac{3}{4}$ |
| Tail, .....                       | 0.4.0              |
| Tarse, .....                      | 0.1. $\frac{3}{4}$ |
| Central toe and nail, .....       | 0.1. $\frac{1}{2}$ |
| Weight 1 lb.                      |                    |

In conclusion I may remark that the bird has much of the character of *Caccabis*, whilst in colours it resembles greatly the grey partridge of India, without however, losing certain *Caccabine* traits which the expert will at once detect on turning to the accompanying beautiful drawing, the work of my native artist.\*

*Darjiling, Sept. 1855.*

\* It most nearly approximates in type to *Perdix cinerea*.—Cur. As. Soc.



PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,

FOR FEBRUARY, 1856.

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At a monthly general meeting of the Society held on the 6th inst.  
Sir J. W. COLVILLE, Kt. President, in the chair.

The minutes of the December meeting having been read and confirmed, it was resolved on the motion of the President, seconded by Mr. Grote,

“That so much of the proceedings just read between the words, ‘and sanctioned’ and ‘Captain Thuillier’ be not published as part of the proceedings of the Society.”

Presentations were received—

1. From Captain Fairweather, two Abyssinian smoking pipes.
2. From Capt. Shute, ship *Sultany*, an old wooden quadrant and a meridian instrument found in the island of Madagascar. The instruments are supposed to have been in use by Nacodas about one hundred years ago.
3. From the Right Rev. the Bishop of Victoria, a copy of St. Luke's Gospel in Japanese, recently printed from wooden blocks in St. Paul's College, Hongkong.
4. From the Right Hon'ble the Governor in Council at Bombay through Lieut. E. T. Fergusson, Superintendent of Government Observatory, a copy of the Magnetical and Meteorological Observations made at the Bombay Observatory in 1853.
5. From the Government of the N. W. Provinces, seventeen gold coins found in the Gurruckpore district, with a request that the Society would select such as it required for the Museum.



The coins are of the Canouj series of the reigns of Chandra and Kumara Guptas.

Ordered that the Council be requested to make a selection.

6. T. Deveria, Esq. of Rungpore, on the part of his nephew M. S. Deveria, of the Egyptian Museum, Louvre, a copy of *Noub la Déesse d'or des Egyptiens*.

7. From Professor T. Oldham, Supt. Geological Survey, eight boxes of specimens, consisting principally of fossils and rocks from the Tenasserim Provinces, coal from the Irrawaddy river, and some old coins found on the site of the town of Tenasserim in the district of Mergui. The coins are undescribed, but appear to be allied to the symbolical coins of Arracan, noticed in XV. Vol. of the Society's Journal, p. 238.

8. From R. Hamilton, Esq. The Annual Report of the Ethnological Society of London for the year 1854.

9. From the Rev. S. Hislop, a large collection of fossils from Central India.

The following gentlemen duly proposed and seconded at the December meeting, were balloted for and elected ordinary members.

R. H. Russell, Esq. B. C. S. Chittagong.

Dr. G. B. Liebig, Presidency College, Calcutta.

Col. Smith, Madras Engineer.

J. W. B. Money, Esq.

The following candidates for election were named for ballot at the next meeting.

Bábu Rájendralál Mittra, proposed by A. Grote, Esq. and seconded by Sir J. W. Colville.

Major R. R. W. Ellis, 23rd Regt. B. N. I. Political Assistant, Bundlekund, proposed by Dr. Spilsbury and seconded by Dr. Thomson.

J. F. Curtis, Esq. proposed by Mr. Atkinson and seconded by Mr. Grote.

The chairman announced to the meeting that Bábu Rájendralál Mittra had notified to the Council his resignation from the 1st proximo of the office of Assistant Secretary and Librarian to the Society, and, after paying a high compliment to the industry and ability of that valuable officer, stated that the Council had appointed a

Sub-Committee to consider what steps should be taken to supply the vacancy.

The Council submitted reports—

1. Recommending that the consideration of the proposal for reducing the rate of subscriptions be deferred until a Sub-Committee appointed by them to take the subject into consideration had submitted their report.

2. Announcing that they have appointed the following Sub-Committees.

*Sub-Committee of Finance.*

C. Allen, Esq., A. Grote, Esq. and C. Beadon, Esq.

*Sub-Committee of Philology.*

A. Grote, Esq., Lt. Lees, Rev. J. Long, G. G. Morris, Esq. and F. E. Hall, Esq.

*Sub-Committee of Library.*

Bábu Ramáprasád Roy, Dr. Walker, W. Grapel, Esq., A. Grote, Esq. and Lt. Lees.

*Sub-Committee of Natural History.*

Dr. G. G. Spilsbury, Dr. Walker, A. Grote, Esq., Dr. A. C. Macrae, Capt. C. B. Young, Dr. T. Boycott and Dr. Thomson.

Communications were received—

1. From Babu Radhanath Sikdar, communicating abstracts of Meteorological Observations taken at the Surveyor General's Office in August, September and October last.

2. From Mr. Assistant Secretary Carmichael, forwarding a copy of Meteorological Register kept at the office of the Secretary to the Government of the N. W. Provinces for the month of November, 1855.

3. From Mons. Hermann Schlagintweit, communicating some notes on the Hydrography of the Brahmaputra.

4. From Col. R. J. H. Birch, C. B., Secretary to the Government of India in the Military Department, enclosing a report on the progress of Mons. A. and R. Schlagintweit's researches in the Himalaya mountains, during the last season. The Secretary read to the meeting extracts from the report.

5. From A. Grote, Esq. forwarding, for exhibition to the meeting

a large meteorite weighing 14 lbs. and the following note on the same by Dr. Evan McDonell.

"I was informed by a native on the 7th of March, 1853, that a shower of stones had fallen in the neighbourhood of Soojoulee on the preceding day at noon.

"I immediately sent a person to make enquiry as to the truth of what had been related to me. The person sent, returned the following morning and brought me three meteoric stones. He stated that many more had fallen, and had been picked up by other parties.

"In the meantime I met three of the Officers of the Irregular Cavalry at Soojoulee, who informed me that they had all remarked, and been much struck with the peculiar rumbling noise they had heard on the previous day at noon; it could not be mistaken for thunder, the sound being, as stated by them, totally different. An Italian priest stationed at Bettiah, seventeen miles West of Soojoulee, remarked the same kind of noise at the same hour, and he mentioned to me that all the natives around him were much alarmed, and the head "gooroo" of the Bettiah Rájá sent to ask him if he could explain what such strange sounds in the heavens portended. Another Italian missionary priest stationed six miles North-West of Bettiah, made the same remarks. The priest at Bettiah compared the noise to that of a heavy cart or waggon passing over a platform. The sounds were audible for forty seconds, the sky was cloudless and the sun shining brightly at the time. The wind was west and cool, the weather for some days previous to the 6th March was particularly cool. The Thermometer stood on the 4th, 5th and 6th at 44° at day-light. The number of meteoric stones which I know to have been picked up within a circle of a mile, amounts to at least thirty. The weight varied from  $\frac{1}{2}$  lb to 4 lbs. and one weighed as much as  $14\frac{1}{2}$  lbs. The shape in every instance was less or more pyramidal."

The Librarian and the Curator in the Zoological Department having submitted their usual monthly reports, the meeting adjourned.

#### LIBRARY.

The library has received the following additions during the months of December and January last.

*Presented.*

Die Lieder des Hafis, Persisch mit dem commentare des Sudi herausgegeben von Hermann Brockhaus, 1 ed. 2 heft.—BY THE EDITOR.

Half yearly Report of the Committee of the Bengal Chamber of Commerce, Calcutta, November, 1855.—BY THE CHAMBER.

Die Todtenbestattung bei den Brahmanen und die opfergebräuche im Veda, von Dr. Max Muller.—BY THE AUTHOR.

Noub la Déesse d'Or des Egyptiens par M. Th. Deveria, 8vo. pamphlet.—BY THE AUTHOR.

Address to the Ethnological Society of London, delivered at the Annual Meeting on the 25th May, 1855, by J. Conolly, and a Sketch of the recent Progress of Ethnology, by R. Cull, Secretary, 8vo. pamphlet.—BY R. HAMILTON, Esq.

A Manual of Ethnological Enquiry; being a series of Questions concerning the Human Race, 8vo. pamphlet.—BY THE SAME.

Selections from the Records of the Madras Government, No. III. The Navigation of the Godavery. No. XV. Reports on Important Public Works.—BY THE GOVERNMENT OF BENGAL.

Selections from the Records of the Bengal Government, No. XXII. On Vernacular Education, 2 copies.—BY THE SAME.

Geographical and Statistical Report of the District of Beerbhoom, by Capt. Sherwill, Calcutta, 1855, 4to.—BY THE SAME.

Notices of the Meetings of the Members of the Royal Institution of Great Britain. Part V.—BY THE INSTITUTION.

Magnetical and Meteorological Observations made at the Honorable East India Company's Observatory, Bombay, in the year 1853, under the Superintendence of Lt. E. F. J. Fergusson, Bombay, 1855, 4to.—BY THE GOVT. OF BOMBAY.

Report on the Government Central Museum, Madras, by E. Balfour, Esq. on the Iron Ores, the Manufacture of Iron and Steel, and the Coals of the Madras Presidency.—BY THE MADRAS GOVERNMENT.

Memoirs of the American Academy of Arts and Sciences, new series, vol V. p. I.—BY THE ACADEMY.

A History of the Fishes of Massachusetts, by D. H. Slorer, 4to.—BY THE AUTHOR.

Recueil des Actes de l'Académie imperiale des Sciences, Belles-Lettres et Arts de Bordeaux, 1854, 3 trimestre.—BY THE ACADEMY.

Les Auteurs Hindustanis et les sons Ouvrages par M. Garcin de Tassy, Paris, 1855, 8vo.—BY THE AUTHOR.

The Durbin, a Persian newspaper, for December and January last.—BY THE EDITOR.



The Upadeshak, No. 109.—BY THE EDITOR.

The Oriental Christian Spectator, for January, 1856.—BY THE EDITOR.

The Oriental Baptist, No. 109.—BY THE EDITOR.

The Calcutta Christian Observer for January, 1856.—BY THE EDITORS.

*Purchased.*

Annuaire des Deux Mondes, Histoire General des divers Etats, 1854-55.

Revue des Deux Mondes 1st and 15th Oct. and 1st Nov.

Annales des Sciences Naturelles, Nos. 4 and 5 of 1855.

Revue et Magazin de Zoologie, No. 9, 1855.

Journal des Savants, Aut, Septembre et Octobre, 1855.

Comptes Rendus, No. 17, 22nd October, 1855.

L' Athenæum Français, Nos. 36 to 43.

The Athenæum, for October, 1855.

The Edinburgh Review, No. 208.

The Annals and Magazine of Natural History, for Oct. and Nov. 1855.

Vuller's Lexicon Persico-Latinum, Fasciculus IV.

Franklin's History of Shah Alum, *London*, 1798, 4to.

Trésor de Numismatique et de Glyptique, ou Recueil général de Médailles, Monnies, Pierres, Gravees Bas-Reliefs, &c. tant anciens que modernes, les plus interessans sous le Rapport de l'Art et de l'Histoire, gravé par les procedes de M. Achille Collas, *Paris*, 1836, fol.

The Shekandárnámeh of Nizamy, 1 vol. 8vo. Persian.

A Commentary on the Gulistan, 4to. MS. ditto.

Nafhat ul Yaman, 1 vol. 4to. Arabic.

A Dictionary in Hindi and English by J. T. Thompson, Calcutta, 1846, 8l. 8vo.

Dow's History of Hindustan, 3 vols. 8vo.

Shareh Abul Fazl, 4to. Persian.

Intikháb Saudá, 4to. Urdu.

Tárikh Timuriá, 1 vol. 8vo. Arabic.

Waenen's Sententiæ Ali Ebn Abu Talib, *Oxon*, 1806, 4to.

Baillie's Arabic Grammar, 3 vols. demi 4to.

Euclid in Persian, 8vo.

Dastúr ul Amal, 8vo. Persian.

Shareh Múlla, 1 vol. 8vo. Arabic.

Baillie's Arabic Tables.

Shareh Bostán, 1 vol. 4to. Persian, Lithograph.

Bohtlingk's Vopadeva, 1 vol.

Viváda Chintamani, Sanskrit, 8vo.

Vopadeva's Mugdhabodha, *Serampur*, 1807, 12mo.

February 1st, 1856.

RA'JENDRALA'L MITTRA.

# JOURNAL

OF THE

# ASIATIC SOCIETY.

No. III. 1856.

*Original text and translation of a Scroll of Silver in the Burmese language, found in a Buddhist Pagoda at Prome.—By Major PHAYRE, Commissioner of Pegu.*

It is well known that the Buddhists of Burmah, like those of ancient India, when building the solid edifices called Pagodas, construct therein, generally towards the upper part of the fabric, a hollow chamber in which they deposit relics, and a variety of holy and precious objects. The Burmese also generally place therein, a writing on a thin scroll of silver or copper, setting forth the objects of the founder, and containing a prayer for the salvation of himself and his friends.

Near the town of Prome, there lately stood a small modern Pagoda of brick and mortar, from the chamber of which, a silver scroll was extracted, and as the writing records in simple language, the motives which urged the author, a Buddhist monk, to undertake in the year 1792, A. D. the restoration of the ancient building which formerly occupied the site, I have considered it worth publishing. It is hoped that this record of the motives and hopes which actuated the restorer of the Pagoda, called the “ardently desired,” will tend to prevent other Buddhist sacred buildings from being wantonly defaced and dug into, as has heretofore been too commonly the practice, since Pegu became a British Province.

The language of the scroll is sometimes obscure, but the translation has been made as literal as was consistent with clearness of

meaning. A few notes have been added to explain the text where it seemed to require elucidation.

The original Burmese is as follows:

ငဇယျာတု။ ။ရတနာသခပေါင်းတို့၏တည်ရာ။ ကျန်းဘောင်း  
ပြည်ကြီး ကိုခရီး ရတော်မူသောသခလောင်းမင်းတရား ကြီး  
သားတော်။ဘတုံ မင်းသားရွှေထီး ရွှေနန်း သိန်းမြန်း စမ္မာယံ  
တော်မူ၍သုန္ဒရီသို့ခ ရေံ။ လူတို့ ကောဇာ သက္ကရာဇ်  
ဘရဂု။၁ခတိတ် ဘာသနာတော် ၂ဥဥသို့ရေံလျှင်။ဘူး  
ကန်းခြောင်းတောင် ဘက်တွင်။ ရုဇ္ဇသမ္ဘဝ။ မဟာသမ္ဘ  
ဝမင်းညီနောင် ၂ရေံတို့သည်။ရသေ့ ကြော င်သွီးဘေဒါရီ  
မင်းသွီးနှင့် တွေကျ၍ရဲငန်ရာကိုခကြောင်းစွဲ၍ရွစောဟုသ  
မုတ် သောဘုရားသခင် သည်။ ကာလရှည်လျား၍ပြက်ပြား  
ဟောင်းနွမ်း၍ ရှိသည်ကို။ ကြည်ဥဒိသောစေတနာစောစိတ်  
ဥပ္ပတ်ပြဋ္ဌာန်း သောမဟာ ကုသိုလ်ခရုတို့သည်ရေံလျှင်  
ကဲ့သို့မပြတ်သေမည်ဘေးကိုခင် တလဲတဲခခင့်မေ့မိသ  
ည်ဖြစ်၍။ ခခသစ်ဘဝခန္ဓပြောင်းသွား ရသော ဘဝတိုင်း  
ခွံကိုပတ်ခရိတ်ကဲ့သို့မကွာ။ ပါရသောသခလား ကိုတရားနှင့်  
ခခညီ။ ဗြဟ္မကွဘဝခွံ။သိုပိုက်ထား ခခင်ဘဝတ္ထုတို့သ  
ည်။ပစ္စည်း တို့သည်တဆံချည်မျှမလိုက်။ စွန့်ပြစ်ခါခါ။သွား  
ရာသောလမ်းခရီးကို။နှလုံးပိုက်၍။သုံးဆောင်တိုက် သောပစ္စ  
ည်းကို။ခွေနှလုံးတော်ပိုက်၍။ဟေ့တော် မူခဲ့သော။ကုလဒု  
သကာခနေသနုရမာနလပနဇပ္ပနဝစိဝိတ္ထာရ။ ခခစရှိသောခ  
ခမ္မပစ္စည်းတို့ကိုရှော င်ရှား၍တရားနှင့်ခခညီ။တကာ၊တကာ  
မတို့သည်သဒ္ဓါဒေးယျရှိ၍ပင့်ခေါ်သည်။မဂလာခမဂလတို့တွ

င်း။ရရာသမှုပစ္စည်း။ထို့ကိုမဆိုမပြရ။ ကပ္ပိယကာရကသိန်းစ  
 ညးသိုဗိုက်ထုပ်၍။၁ခုပိုင်းပရံလက္ခ။ ၁ခကျာခတိုင်းပေး၍တ  
 ည်သခင်တိုက်နေရှင်သိလစာရပုဂ္ဂိုလ်သုမြတ်သည်။ရာခ  
 ပ်သောသိက္ခာပုတ်ခတိမ်း၊ သိမ်းလေးသောင်းသူသောသိလ  
 ၁ခတိုယိုဖြင့်တုခပ်သောသက္ကရာဇ်သဉ္စေတွင်ပဉ္စသျှး၁ခမြ  
 န်ကိုကောင်းစွာရပြီးမှ။ ၀၁၇၀ပြည့်တွင်။ ပြင်ဆင်လုပ်ဆော  
 င်။ဌာမနာ တော်ကား။ သိဒ္ဓါတ်မင်းသား တောတွက်ဟံခရ  
 ၁ခကျ။ဒုက္ခစရိယာ ကြင့်ဟံ။၁ခဌာဝိသတရ။ ကောင်မှုရှစ်ရ  
 ပ်။မွေတော်မာတ်ရှင်။လျှံပတ်တကွ။ပုလဲဆင်မင်း။ တင့်  
 ချင်းရုပ်ထုတော်ပေါင်းထို့ကို။လှိုခပ်သောကုသိုလ်တရား။ဝ  
 မ်းပါးကျသည်ဆမှရပ်။ မပြတ်ဌာန်းနိုင် ဘောဓေတနာ။ကို  
 ပ်မကွာသည်ပြစ်၍။စေတနာ၁ခသစ်။ပြစ်ကျသော တကာ၊  
 တကာမာခပေါင်းထို့နှင့်။ ခေါင်း တညပြု၍။ တာပနာဟော  
 င်း။တပ်လောင်းကောင်းမှ။ သဗ္ဗာတော်၁ခရာခခမ်းထို့ကို။  
 ဆွမ်းပန်းဘော ဖည်လုပ်ကျွေး ကောင်းမှပြု၍။ ၁ဘသနာ  
 တော်ရဝဝပတ်လုံး။ခပ်သိမ်း ဘောသူထို့၏ခကြီး။ ကိုပပ်  
 ၏ခစီး ၁ခပွား ဖြစ်ပွားစိန္တဘောဌာ။ရတ နာရွှေငွေ။ချယ်င  
 တွတင့် ဆုံး။ငမင်းလုံး ကြာပြီတသီး။စုရားသီး။ ထီးတော်၁ခ  
 ဆော်ဆဉ်ထို့ကို။တဆံမြူ။မကျရသခင်။ ပြည်စုံကောင်း  
 မွန်စွာရွက်ဆောင်၍။ ၁ခနမောဒနာ။၁ဘရသခဆုံးရှိဘာ။ရူ  
 ပကာပာတော်၏။တင့်တပ်ချင်း သို့ရေခံသခင်။ကျပ်ဆော  
 င်ရွက်၍။ချစ်သက်ချမ်းသာစွာ။ ကျိုးစားသခးထုပ်ပါသည်။  
 ဣမံမေပညာသဝက္ခယံဝဟံဟောတု။

။



*Translation.*

Be victorious.<sup>1</sup>

When the Bhadoon Prince,<sup>2</sup> the royal son of the great Aloung-Phra, who ruled over the great country of Koonboun<sup>3</sup>, that depository of all earthly treasures, had enjoyed the golden Palace and Umbrella for fourteen years; in the year of men 1154, and when<sup>4</sup> religion had reached (the year) 2336; (then) the Pagoda built on the south side of the Bookan<sup>5</sup> stream where the brother Princes,<sup>6</sup> Isoo-la-tham-ba-wá, and Maha-tham-ba-wá, met the daughter of the supposed hermit, named Princess Bhédaree, and (in after times) from their having on that spot become engaged lovers, the Pagoda was called "The ardently desired;" (the same) having from the lapse of time become decayed; (therefore) from a sincere benevolence, with a fixed and decided desire to engage in a great work of religious merit, which like a placid stream of water ceased not; and continually remembering the evil—Death; that one transmigration from a living body goes on to another, and that according to universal law, we pass to another state of existence as surely as the shadow follows the substance; that of the goods we treasure up in the present life, nothing to the extent even of one hair can follow us, but that we must part from them; laying to heart that there is a road we must all one day travel, and valuing only such things as are worthy to be used (in a religious building); remembering the words of the Divine preacher, and rejecting all unlawful goods; and accepting only what devout men and women bestow in righteousness; forbidding not what is offered at joyful festivals or mournful assemblies; receiving all contributions and offerings, and purchasing bricks and paying masons' hire; the excellent Abbot Sheng Thee-la-tsa-ya, who resides in the Lee-oung monastery, by virtue of the observance of the rules incumbent on priests, which accumulated his religious merits as it were to the thickness of the earth 230,000 yoodzana,<sup>7</sup> had in the year 1116 reached the grade of a Pyeen-tseng,<sup>8</sup> and when he had accomplished forty yearly fasts, he prepared a relic shrine, in which to place a representation of Prince Theid-dat<sup>9</sup> going forth to the wilderness; of his enduring sorrows; images also of the twenty-eight Buddhas of a former world period;

casts of the eight holy places;\* the precious intelligent relic of Buddha, all handsome as the elephant Poo-la-lai. The religious merit aspired to, though it may not be attained, yet the desire for it cannot be obliterated, (therefore) joining with those of the laity, men and women who were acting in accordance with each other, and (I) taking the lead of them, the ancient relic chamber was repaired; and the implements required for the good work and for the clergy, that is, refreshment and flowers, being provided, may the leader of all those men derive advantage therefrom throughout the 5000 years<sup>10</sup> of this religion. Jewels, gold and silver, (were given) to beautify the building. The lotus and every part thereof with the Htee<sup>11</sup> and all its apparatus were complete, so that carrying on the work well until it was finished, at the time of meeting to inaugurate the building, the sacred fabric was beautifully adorned by (my) exertions given joyfully and as a labour of love.

On account of this good work, may I at last attain that blissful place, where passion troubleth no more.<sup>12</sup>

#### NOTES.

1. *Be victorious*.—The original is a Pali word generally used at the commencement of religious documents, and implying, I believe, that the disciples of Buddha must strive to overcome their passions.

2. *Bhadoon Prince*.—This king was the fourth son of Aloung Phra, the founder of the present dynasty of Burmah.

3. *Koonboun*, is the name of the original district of the family of Aloung Phra.

4. The era of religion dates from 543 B. C. when Gautama attained Paree-neibban. The year of religion 2336 therefore = A. D. 1793.

5. *Bookan* is the name of a small stream which enters the Irrawaddy, a short distance South of the town of Prome.

6. *Isoo-la-tham-ba-wa*, and *Ma-ka-tham-ba-wa*, were the sons of the king of Tagoung, an ancient kingdom to the North of Ava, believed to have been founded by a race of Buddhist kings from India. These Princes being blind were expelled their country as unworthy to reign. Being put on a raft they floated down the Irrawaddy, and from incidents which occurred on their voyage, many of the names of the cities and towns on the banks of that river are derived. While floating down they had their sight restored by the interposition of a Bhee-loo-ma, or female

\* There appears to be some error here, or an allusion which I do not understand. The Burmese reckon seven holy places, where Gautama performed seven characteristic acts, after he attained Buddhahood.

monster, and seeing for the first time the sky stretching over the earth like a cover, and the earth within, they exclaimed "Mo-boon" (sky cover) and "Myé-dai" (earth within), from which those places received their names. They came on to the Bookan stream, and there met the hermit's daughter, who had come to draw water. This is believed to have occurred about 484 years B. C. The hermit or *Ra-thé* proved to be the maternal uncle of the Princes, who had long before left Tagoung, and after having a daughter born to him became a hermit in the hills adjoining Prome. By his advice the people of the country who were of the Pyú tribe, chose Prince Maha-tham-ba-wa, as their ruler, he married the hermit's daughter Bhe-da-ree, and they founded the city of Ra-thé near to Prome, where the descendants of Maha-tham-ba-wa, reigned for twenty-seven generations.

7. *Yoo-dza-na*.—A measure of distance reckoned to be about 13 English miles.

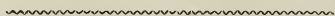
8. *Pyeen-tseng*.—A grade of the Buddhist priesthood.

9. *Prince Theid-dat*, i. e. Gautama the son of the king of Kapili-vasta, who abandoned his kingdom to become a Buddhist monk.

10. The religion of Gautama it is believed is destined to last five thousand years, (2398 of which have now passed) after which the Buddha A-ri-ma-té-ya will be developed.

11. *Htee*.—The iron net-work shaped like an umbrella which crowns a Burmese Pagoda.

12. The last sentence in the scroll is in the Pali language, and has been rendered to me in Burmese.



*A slight notice of the Grammar of the Thadou or new Kookie language.—By Lieut. R. STEWART, 22nd Regt. B. N. I.*

The people to whom the term Kookie is given by the inhabitants of the Eastern Frontier of Bengal, occupy, together with other tribes, the hilly tracts lying to the North, South and East of Cachar, and Manipoor: they are divided into numerous clans each under a petty hereditary chief or Rájáh.

The appellation of Kookie is unknown among themselves, and they have no title embracing their whole race, but they call one another by the names of their different clans.

They all speak the same language, with very slight modification in the dialects, and it is called among them Thadou Pao, from the name of one of their principal clans.

As there is no written character among the Kookies, the following Roman ones have been adopted by me, which appear to answer very fairly all the requirements of the language.

## VOWELS.

a e i o u

## CONSONANTS.

b c d f g h j k l m n p r s t v w y z

The vowels have a long and a short sound thus:—

|   |               |   |            |
|---|---------------|---|------------|
| á | as in father. | a | as in man. |
| é | there.        | e | men.       |
| í | police.       | i | pin.       |
| ó | note.         | o | not.       |
| ú | pull.         | u | but.       |

oo as in moon, soon.

When two vowels come together each has its distinct sound, ai, as in *aisle*, ei, as in *mite*, ui, like *we*, &c.

The Consonants are pronounced as in English with the following modifications:—

C, is never used by itself, or in any other position except in combination with H, to express the sound, *ch* as in *Church*.

G, is always hard. H, is always aspirated.

J, has a sound much softer than in English, and resembling more that of the combination of the letters *zsh*. Ñ, is slightly nasal.

W and Y, have no vowel sound.

The compound consonants are—

Ch, pronounced as the *ch* in *Church*.

Gh, ..... Persian غ *ghain*.

Gn, an intensely nasal sound.

Kh, pronounced as the Persian خ *khe*.

Ng, ..... ng in “singing,” but when over-lined thus ng, still more nasal.

Sh, pronounced as the Persian ش *shín*.

## ARTICLES.

There is no article, definite or indefinite, in the language, the numeral *khut*, *one*, coming after the noun, sometimes stands in lieu of the indefinite article, and the demonstrative pronouns, *Hi*, *this*, and *Hú*, *that*, sometimes supply their place.



## NOUNS.

Number is often left undistinguished, and is generally defined by means of numerals, thus—

Mí, *man* or *men*.

Mikhut, *a man*.

Míthúm, *three men*.

Mítum, *many men*.

A plural form exists, however, though it is seldom used except in pronouns, and with reference to human beings, thus—

Mí, *man*.

Miho, *men*.

Númei, *woman*.

Númeiho, *women*.

Chapung, *child*

Chapungho, *children*

or

Míte, Númeite, Chapungte, *men, women and children*.

Gender is usually expressed by subjoining to the noun the words Chul, *male*, and Noo, *female*, some of the ruder Kookies, however, retain a more primitive mode of distinguishing the sex, and subjoin Jung, *penis*, and Shoo, *vulva*, instead, thus, Kel, *goat*.

Kéichul or Kéljung, *a he goat*.

Kélnoo or Kelshoo, *a she goat*.

Some nouns expressive of individuals of the human family have distinct terms in both sexes, thus—

Pá, *father*.

Noo, *mother*.

Mi, *man*.

Númei, *woman*.

Pashul, *son*.

Chanoo, *daughter*.

Jigñei, *husband*.

Jí, *wife*.

Pá, is also a sign of the masculine, and generally used with reference to trade or occupation, thus—

Ghálhátpa, *a warrior*.

Housapa, *a king*.

Thúgñeipa, *a commander*.

Kélchingpa, *a herdsman*.

Case is not marked by inflection, but by the use of *post-positions*, thus—

Nominative, .. Chem, *a dhao*.

Genitive, ... .. Chem, *of a dhao*.

Dative, ... .. Chem, *or Chemkhú, to a dhao*.

Accusative, .... Chem, *a dhao*.

Vocative, ... .. Vó Chem! *Oh dhao*.

Ablative, ... .. Chema, *or Chemhénga, from a dhao*.

Locative, ..... Chema, *or Chemshunga, in a dhao*.

Instrumental, .. Chemin, *with a dhao*.

A noun in the genitive case precedes the substantive belonging to it, in juxta-position, as—

|                    |                        |                      |                    |                       |                       |
|--------------------|------------------------|----------------------|--------------------|-----------------------|-----------------------|
| <sup>1</sup> Mi    | <sup>2</sup> loo,..    | ....                 | <sup>1</sup> A     | <sup>2</sup> man's    | head.                 |
| <sup>1</sup> Ka    | <sup>2</sup> pá        | <sup>3</sup> pón, .. | <sup>1</sup> My    | <sup>2</sup> father's | <sup>3</sup> clothes. |
| <sup>1</sup> Silat | <sup>2</sup> noi, .... |                      | <sup>1</sup> Cow's | <sup>2</sup> milk.    |                       |

The accusative precedes the verb in a sentence and is generally placed between it and the nominative, thus—

|                                                    |                      |                         |                         |                         |
|----------------------------------------------------|----------------------|-------------------------|-------------------------|-------------------------|
| <sup>1</sup><br><i>I teach the child,</i> .....    | <sup>1</sup><br>Kin  | <sup>3</sup><br>chapung | <sup>2</sup><br>kahile. |                         |
| <sup>1</sup><br><i>He beats his son,</i> .. . . .  | <sup>1</sup><br>Hipa | <sup>3</sup><br>áma     | <sup>4</sup><br>pashul  | <sup>2</sup><br>adéuge. |
| <sup>1</sup><br><i>I strike the gong,</i> .. . . . | <sup>1</sup><br>Kin  | <sup>3</sup><br>dápi    | <sup>2</sup><br>katúme. |                         |

The following examples mark the other cases—

|                                     |                              |                                 |                                     |                               |                                  |                              |                               |
|-------------------------------------|------------------------------|---------------------------------|-------------------------------------|-------------------------------|----------------------------------|------------------------------|-------------------------------|
| <sup>1</sup><br><i>The elephant</i> | <sup>2</sup><br><i>eats</i>  | <sup>3</sup><br><i>plantain</i> | <sup>4</sup><br><i>leaves,</i>      | <sup>1</sup><br><i>Saipin</i> | <sup>3</sup><br><i>mót</i>       | <sup>4</sup><br><i>ná</i>    | <sup>2</sup><br><i>ané.</i>   |
| <sup>1</sup><br><i>Give</i>         | <sup>2</sup><br><i>money</i> | <sup>3</sup><br><i>to the</i>   | <sup>4</sup><br><i>poor men,...</i> | <sup>4</sup><br><i>Mí</i>     | <sup>3</sup><br><i>chughakhú</i> | <sup>2</sup><br><i>danka</i> | <sup>1</sup><br><i>pétan.</i> |
| <sup>1</sup><br><i>Oh</i>           | <sup>2</sup><br><i>faol!</i> | <sup>3</sup><br><i>why</i>      | <sup>4</sup><br><i>dost thou</i>    | <sup>1</sup><br><i>Vó</i>     | <sup>2</sup><br><i>Miñgol!</i>   | <sup>3</sup><br><i>ídín</i>  | <sup>4</sup><br><i>ga</i>     |
| <sup>1</sup><br><i>I</i>            | <sup>2</sup><br><i>get</i>   | <sup>3</sup><br><i>fruit</i>    | <i>from the tree, .....</i>         | <sup>3</sup><br><i>Thingá</i> | <i>(or thing hén</i>             |                              |                               |
|                                     |                              |                                 |                                     | <sup>2</sup><br><i>ga</i>     | <sup>1</sup><br><i>kámúi.</i>    |                              |                               |

|              |              |              |               |             |                 |              |              |              |              |                |
|--------------|--------------|--------------|---------------|-------------|-----------------|--------------|--------------|--------------|--------------|----------------|
| <sup>1</sup> | <sup>2</sup> | <sup>3</sup> | <sup>4</sup>  |             |                 | <sup>4</sup> | <sup>3</sup> | <sup>2</sup> | <sup>1</sup> |                |
| <i>There</i> | <i>are</i>   | <i>large</i> | <i>plains</i> | <i>in</i>   | <i>Cachar,</i>  | Héngchá      | lái          | phai         | lín          | aúme.          |
| <sup>1</sup> | <sup>2</sup> | <sup>3</sup> | <sup>4</sup>  |             |                 | <sup>3</sup> | <sup>4</sup> | <sup>2</sup> | <sup>1</sup> |                |
| <i>Kill</i>  | <i>the</i>   | <i>dog</i>   | <i>with</i>   | <i>your</i> | <i>dhao, ..</i> | Na           | chém         | iu           | wí           | cha nathútnin. |

#### ADJECTIVES

are not inflected to express either number, gender or case. They are placed after the noun they qualify, thus—

|                 |                         |                |                    |        |                    |                       |                |                    |        |
|-----------------|-------------------------|----------------|--------------------|--------|--------------------|-----------------------|----------------|--------------------|--------|
| <sup>1</sup> Ní | <sup>2</sup> dup, ..... | <sup>2</sup> A | <sup>1</sup> cold  | day.   | <sup>1</sup> Sakól | <sup>2</sup> jánge,.. | <sup>2</sup> A | <sup>1</sup> swift | horse. |
| <sup>1</sup> In | <sup>2</sup> lín, ..... | <sup>2</sup> A | <sup>1</sup> large | house. | <sup>1</sup> Chém  | <sup>2</sup> hém,..   | <sup>2</sup> A | <sup>1</sup> sharp | dhao.  |

Adjectives admit of comparison by subjoining *dé* for the comparative, and *pén* for the superlative degree, as—

|                   |                     |
|-------------------|---------------------|
| Asa, hot.         | Atum, much or many. |
| Asadé, hotter.    | Atumdé, more.       |
| Asa pén, hottest. | Atum pén, most.     |

This method of comparison is however frequently rejected. "It is hotter to-day than it was yesterday" would be literally.

|                                                        |   |   |   |   |   |   |   |
|--------------------------------------------------------|---|---|---|---|---|---|---|
| 1                                                      | 2 | 3 | 4 | 1 | 3 | 2 | 4 |
| To-day, than yesterday, hot, Tooní jínka shángin asáe. |   |   |   |   |   |   |   |

Pi, attached to some adjectives, and even nouns, signifies bulk or quantity, thus—

|                              |                              |
|------------------------------|------------------------------|
| Alín, <i>large</i> .         | Alín pí, <i>very large</i> . |
| Atum, <i>much</i> .          | Atum pi, <i>very much</i> .  |
| Mei púm, <i>a firelock</i> . | Mei púm pi, <i>cannon</i> .  |

Moreover all formidable animals have this affix to their names, as Húmpi, *a tiger*, Vompi, *a bear*, Saipi, *an elephant*.

Cha is in the same manner used to express a deficiency in adjectives and diminutiveness in nouns, as—

|                      |                                |
|----------------------|--------------------------------|
| Neo, <i>small</i> .  | Neocha, <i>very small</i> .    |
| Nai, <i>near</i> .   | Naicha, <i>very near</i> .     |
| Kél, <i>a goat</i> . | Kelcha, <i>a little goat</i> . |
| Vá, <i>a bird</i> .  | Vacha, <i>a little bird</i> .  |

The Kookie mode of numeration is a decimal one, and exceedingly simple—

|          |           |
|----------|-----------|
| 1. Khut. | 6. Goop.  |
| 2. Ní.   | 7. Suggi. |
| 3. Thúm. | 8. Gét.   |
| 4. Lí.   | 9. Kó.    |
| 5. Gna.  | 10. Sóm.  |

Sóm le khut, *i. e. ten and one stands for eleven*.

Sóm le ni, *for twelve and so on*.

|               |                     |
|---------------|---------------------|
| 20. Som ni.   | 25. Sóm ni legna.   |
| 30. Som thúm. | 39. Sóm thúm le kó. |
| 50. Som gná.  | 90. Sóm kó.         |
| 100. Za khut. | 1000. Sháng khut.   |

There are no regular ordinals in the Kookie language. The word for first or foremost is Amusa, and the place of ordinals is thus supplied.

*First*, Amusa.

*Second*, Khutbána, *or, after one*.

*Third*, Nibána, *or, after two, &c. &c.*

## PRONOUNS.

The personal pronouns are—

|                    |                      |
|--------------------|----------------------|
| Kei, <i>I.</i>     | Keihó, <i>We.</i>    |
| Nung, <i>Thou.</i> | Nunghó, <i>Ye.</i>   |
| Hipa, <i>He.</i>   | } Hihó, <i>They.</i> |
| Hinoo, <i>She.</i> |                      |
| Hi, } <i>It.</i>   |                      |
| A, }               |                      |

The third personal pronoun has however various forms—as, Hú Hihi, Húhú, Hichú, Húchú, all of which may signify persons or things either in the masculine, feminine or neuter gender; and the use of them depends upon the circumstances on which the person or thing has previously been alluded to, or upon their position while the speaker is speaking.

A curtailed form of pronoun, always accompanies, and precedes the verb (except in the future tense) independently of its nominative, this form is—Ka, *I* or *we*—Na, *thou* or *ye*, and A, *he*, *she*, *it*, or *they*.

Almost all nouns, and every adjective when used by itself, has prefixed to it this simple form of the 3rd personal pronoun, thus—

Apháe, *good*, or *it (is) good.*      Alíne, *large*, or *it (is) large.*

Alhá, *wing* or *its wing.*      Amei, *tail*, or *its tail.*

And in fact every noun having reference to beings, in either of the three persons, cannot stand alone, but must be preceded, either by the individual to whom it belongs, or by one of the personal pronouns. Thus Loo, the word for *head*, would be unintelligible to a Kookie, unless speaking definitely it were either

Shem hou loo, *Shem kou's head.*

Mi loo, *a man's head.*

Ka loo, *my head.*

Naloo, *thy head*, or indefinitely, Aloo, *his*, *her*, or *its head*—and in the same manner Pá, *father*, must stand either as Kapá, Napá, or Apá.

Pronouns are declined in the same manner as nouns, by means of *post-positions*. The Genitive case may be at pleasure in either of the following forms.

Keima, keia, kei or ka, *mine.*





|                      |                          |                         |                       |                           |                          |                           |                          |                        |                       |
|----------------------|--------------------------|-------------------------|-----------------------|---------------------------|--------------------------|---------------------------|--------------------------|------------------------|-----------------------|
| <sup>1</sup><br>What | <sup>2</sup><br>does     | <sup>3</sup><br>he say? |                       | <sup>2</sup><br>Hipán     | <sup>1</sup><br>í        | <sup>3</sup><br>ashoiyem? |                          |                        |                       |
| <sup>1</sup><br>Can  | <sup>2</sup><br>you      | <sup>3</sup><br>speak   | <sup>4</sup><br>the   | <sup>5</sup><br>Manipoori | <sup>2</sup><br>Nung     | <sup>4</sup><br>Meitei    | <sup>5</sup><br>pao      | <sup>3</sup><br>nashoi | <sup>5</sup><br>thei  |
|                      |                          |                         |                       | guage?                    |                          | em?                       |                          |                        |                       |
| <sup>1</sup><br>How  | <sup>2</sup><br>far      | <sup>3</sup><br>is it   |                       |                           | <sup>3</sup><br>Héngchal | <sup>1</sup><br>íchun     | <sup>2</sup><br>ghumlum? |                        |                       |
| <sup>1</sup><br>How  | <sup>2</sup><br>many     | <sup>3</sup><br>days    |                       |                           | <sup>2</sup><br>Ni       | <sup>1</sup><br>íját      | <sup>3</sup><br>lum      |                        |                       |
|                      |                          |                         |                       | journey?                  |                          |                           | hum?                     |                        |                       |
| <sup>1</sup><br>How  | <sup>2</sup><br>many     | <sup>3</sup><br>houses  |                       |                           | <sup>4</sup><br>Nung     | <sup>5</sup><br>khóá      | <sup>2</sup><br>in       | <sup>1</sup><br>íját   | <sup>3</sup><br>úmum? |
|                      |                          |                         |                       | are there in              |                          |                           |                          |                        |                       |
| <sup>4</sup><br>your | <sup>5</sup><br>village? |                         |                       |                           |                          |                           |                          |                        |                       |
| <sup>1</sup><br>What | <sup>2</sup><br>is       | <sup>3</sup><br>your    | <sup>4</sup><br>name? |                           | <sup>3</sup><br>Na       | <sup>4</sup><br>mín       | <sup>1</sup><br>í        | <sup>2</sup><br>hum?   |                       |
| <sup>1</sup><br>When | <sup>2</sup><br>he       | <sup>3</sup><br>abused  | <sup>4</sup><br>you,  | <sup>5</sup><br>why       | <sup>1</sup><br>Ajou     | <sup>3</sup><br>na        | <sup>2</sup><br>tum      | <sup>4</sup><br>pe     | <sup>7</sup><br>din,  |
|                      |                          |                         |                       | (did you                  |                          |                           |                          |                        | íbóla                 |
|                      |                          |                         |                       | not come)                 | <sup>6</sup><br>henga    | <sup>5</sup><br>nahúng    | <sup>8</sup><br>hiem?    | <sup>8</sup><br>chule  |                       |
|                      |                          |                         |                       | to me, and I              |                          |                           |                          |                        |                       |
|                      |                          |                         |                       | (would                    | <sup>9</sup><br>keimán   | <sup>10</sup><br>aghimua  |                          |                        |                       |
|                      |                          |                         |                       | have punished him)        |                          |                           |                          |                        |                       |
|                      |                          |                         |                       | myself?                   |                          |                           |                          |                        |                       |
|                      |                          |                         |                       |                           |                          |                           |                          |                        |                       |

## VERBS.

The expression of time in these can be traced to Past, Present, and Future, and the tenses of the two former even are but little understood, and are frequently used indiscriminately.

The imperative mood is the simplest form of the verb, and is obtained from the root (which is sometimes, but not always, used as a noun) by subjoining "in" or "tan," as—

Húngin or húngtán, *come*.

Punin or puntán, *begin*.

Shélin or shéltán, *hide*.

But when the root ends in a vowel, the first form of imperative is obtained by elongating that vowel and subjoining n alone, as—

Moon or mútan, *get*.

Lán or latán, *take*.

Vén or vetan, *see*.

Pén or petan, *give*.

or by the introduction of a consonant between the final vowel of the root, and the in, as

Thouvin or thoután, *awake*.

Theiyin or theitán, *be able*.

Láijin or laitán, *dig*.

Koiyin or koitán, *place*.

The consonants j, v and y alone are in use for this purpose, but there seems to be no rule as a guide in the adoption of them.

When the root ends in p, an m is introduced before the "in," in the first form of the imperative, as

Shipmin or shiptán, *throw*.      Chepmin or cheptán, *smoke*.

Shútópmín or shútóptán, *dip*.      Kupmin or kuptan, *weep*.

The pronoun na, *thou*, is almost invariably prefixed to the imperative, although it may be used without it. The imperative is only used in the 2nd person.

The present tense is formed from the root, by affixing an e—under the same provisions, as the formation of the first form of imperative, thus—

Kei kahúnge, *I come*.      Kei katunge, *I arrive*.

Kin kalájje, *I dig*.      Kin kathouve, *I awake*.

Kin kashipme, *I throw*.      Kei kakupme, *I weep*.

The past tense, for which however the present is frequently used, is formed from the root by adding ta or tai, as—

Kei katúng tai, *I arrived*.      Kin kapun tai, *I began*.

Kin kalái tai, *I digged*.      Kin kaship tai, *I threw*.

Another form of the past or present tense, for it is used as both, is obtained by subjoining nai to the root, as—

Kin kane nai, *I eat*.      Kei katou nai, *I sit or sat*.

Kei kading nai, *I stand or stood*.      Kei kacho nai, *I sell or sold*.

A more distinct past tense is made by means of the verb Jouvin *accomplish*, used as an auxiliary, thus—

Kin kanejoutai, *I eat*.      Kin kachep joutai, *I smoked*.

the past tense of the auxiliary being subjoined to the root of the verb.

The past and present tenses of whatever form are subject to no modification in person or in number, as—

Kin kané, *I eat*.      Keihon kané, *we eat*.

Nungin nané, *thou eatest*.      Nunghón nané, *ye eat*.

Hipán ané, *He eats*.      Hihón ané, *they eat*.

The future tense is formed from either forms of the imperative, by subjoining ge for the first person of both numbers. The final n of the imperative and the g, being pronounced as the ng in singing, thus—

From Húngin or húngtán, *come*, Hunginge or hungtánga.

From Vén or vetán, *see*, Vénga or vetánga.

From Thouvin or thoutan, *awake*, Thouvinge or thoutange.

The future undergoes the following alterations with respect to the persons. It rejects the double pronoun, thus—

|                                            |                                           |
|--------------------------------------------|-------------------------------------------|
| Kin dénginge, <i>I will strike.</i>        | Keihón dénginge, <i>we will strike.</i>   |
| Nungin dénginate, <i>thou wilt strike.</i> | Nunghón dénginate, <i>ye will strike.</i> |
| Hipán dénginte, <i>he will strike.</i>     | Hihón denginte, <i>they will strike</i>   |

or

|                    |                     |
|--------------------|---------------------|
| Kin déngtange.     | Keihon déngtánga.   |
| Nungin déngtánate. | Nunghón déngtánate. |
| Hipán déngtánte.   | Hihón, déngtánte.   |

and so on with all verbs, as—

|                                                                 |                                                                 |
|-----------------------------------------------------------------|-----------------------------------------------------------------|
| Moonge }<br>Moonate } <i>will get.</i><br>Moonte }              | Mútánga }<br>Mútánate } <i>will get.</i><br>Mútánte }           |
| Vénga }<br>Vénate } <i>will see.</i><br>Vénte }                 | Vetánga }<br>Vetánate } <i>will see.</i><br>Vetánte }           |
| Shipminge }<br>Shipminate } <i>will throw.</i><br>Shipminte }   | Shiptánga }<br>Shiptánate } <i>will throw.</i><br>Shiptánte }   |
| Theiyinge }<br>Theiyinate } <i>will be able.</i><br>Theiyinte } | Theitanga }<br>Theitánate } <i>will be able.</i><br>Theitánte } |

Another future tense, which has no distinctive meaning, is formed by subjoining nánga to the root, for the first person, thus—

|                                         |                                       |
|-----------------------------------------|---------------------------------------|
| Kei chenánga, <i>I will go,</i>         | Kei hónvenange, <i>we will see.</i>   |
| Nung chengnánate, <i>thou shalt go.</i> | Nunghón venanate, <i>ye will see.</i> |
| Hipán chenánte, <i>he will go.</i>      | Hihón venánte, <i>they will see.</i>  |

The potential mood is made available by the use of the verb Theiyin, *be able*, as an auxiliary, thus—

Kei kachétheiye or kei che theiyinge, *I may or can go.*

and in the same manner by means of the other auxiliaries we have

Kei kache nóme, *I would go*, and

Kei chéphanánga, *I ought to go.*

The infinitive is formed from the root by adding na, as—

|                           |                      |
|---------------------------|----------------------|
| Déngna, <i>to strike.</i> | Chéna, <i>to go.</i> |
| Véna, <i>to see.</i>      | Néna, <i>to eat.</i> |



A more significant form of the infinitive has “ding” subjoined to the simpler form, as—

Venading, *to see*.

Nénading, *to eat*.

The present participle is the same as the imperative, and has very frequently the root prefixed to it, as—

Déngin or déngdéngin, *striking*.

The past participle is formed from the present or the imperative, by subjoining lung or ting, as—

Denginting, or denginlung, *Struck*, or *having struck*.

A negative form of the verb obtains throughout all the tenses, by the interpolation of hi, thus—

Déng hi in, *do not strike*.

Hung hi in, *do not come*.

Kin ka denghie, *I strike not*.

Kadentáhie, *I struck not*.

Kin deng hi inge, *I will not strike*.

Also by subjoining poi, to the root, for the present tense—

Kin kadéng poi, *I do not strike*, and

Kin kadéngta poi, *I did not strike*.

For the future, póngé is added to the root to express negation.

Kei ché póngé, *I will not strike*.

Nung che pónate, *thou wilt not strike*.

Hipa che pónte, *he will not strike*.

There is no word in the Thadou language with the simple signification of *no*, or *not*. The negative being only used in conjunction with the verb, as described above.

The only grammatical puzzle in the language is that certain verbs require a final n, in their nominatives. This is obtained by adding “in” to such nouns in the nominative case as end with a consonant, and by adding n, and prolonging the vowel when they do not. For this curious inflection, I have been able to discover no rule or reason, verbs both active and passive, transitive and intransitive appearing arbitrarily to admit of either the one form of nominative or the other. The Kookies themselves never hesitate in marking the distinction, but they have never been able to account for it to me; some sense of euphony, appreciable only to their ears, is the only likely conjecture I can arrive at.

*The Copernican System of Astronomy among the Arabs.—By*  
A. SPRENGER, M. D.

Mons. Sedillot has, I believe, published some passages shewing that the Arabs were acquainted with the Copernican system of Astronomy, yet the following extract from the *Hikmat al'ayn* of Kátiby, (died A. D. 1272) will not be read without interest.

“Some philosophers fancy that the earth moves towards the east and that the rising of the celestial bodies in the east and their setting in the west is owing to this motion and not to the motion of the widest heavenly sphere which, they maintain to be at rest. This idea is wrong. I do not however advance as an argument against it that, if this was the case, a bird flying in the direction of the motion of the earth would not be able to keep up with it, because the motion of the earth would be much faster than that of a bird, inasmuch as it returns to its place in a day and a night. Such an argument is not conclusive, because it may be urged that the atmosphere which is close to the earth partakes of its motion as the ether partakes of the motion of the heavenly sphere. But I reject this theory because all terrestrial motions take place in a straight line and therefore we cannot admit that the earth should move in a circle.” (This is the theory of Aristotle: who says, that only the heavenly bodies have the most perfect of motions, the circular).

ومنهم من زعم انها تتحرك الى المشرق فظهر الكواكب في المشرق وخفاها في المغرب لذلك لا لحركة الفلك الاعظم فانه ساكن فهو باطل لا لانه لو كان كذلك لما كان الطائر الذي حركته الى جهة حركتها يلحقها لكون حركة الارض اسرع من حركته لعودها الى الموضع الاول في اليوم بليته لان الملازمة ممنوعة لجواز ان الهواء المتصل بالارض يشايعها في حركتها كما يشايع الاثير الفلك بل لكونها ذات سيل مستقيم فيمتنع ان تتحرك على الاستدارة \*

*Examination of three specimens of Bengal Mineral Waters. By*  
HENRY PIDDINGTON, Curator Museum Economic Geology.

These waters have all been sent in much too small a quantity to enable me to make any very correct quantitative analysis, and above all we cannot from small quantities pronounce on the presence or absence of Iodine or Bromine to which in minute quantities, so many mineral waters are now known to owe their efficacy. For a perfectly satisfactory analysis we require at least  $2\frac{1}{2}$  or 3 dozen quart bottles, which would give us 5 or 6 gallons of the water. The bottles should be perfectly clean and well rinsed out with the water of the spring before filling, and the corks (new ones) soaked in the water of the spring and well beaten in.

No. I.

*Darjiling Mineral Water from the Minchu Spring,*  
*from B. H. HODGSON, Esq., C. S.*

Two bottles of this water reached me; one (A) was a dark green glass (English) and the other (B) a white French glass bottle. The cork of the first was a very bad one, but that of the second was excellent, and it had been so well corked, that it took the strength of two men to pull, one at the bottle and the other at the corkscrew, to open it. The water of the first bottle had evidently decomposed. That of the second though quite limpid when opened and re-corked (to take a small quantity of the water for testing) began in two or three days to grow turbid, and gradually threw down its iron, some of it cohering in fine flaky webs of a pale yellow colour (carbonate of the protoxide); and it took eight or ten days before it again became tolerably clear, in which time some of the deposit reddened considerably. When the whole was filtered it left a chocolate brown deposit on the filter.

1. The water of both bottles had a very slight smoky taste.
2. A yellowish tinge was perceptible in (A), which was also a little turbid.
3. The cork of (A) was blackened and there was a faint smell of sulphuretted hydrogen but perfectly distinct. In (B) the smell of

the sulphuretted hydrogen was very strong and marked. With so small a quantity, however, our analysis, as to quantity, is necessarily imperfect, neither can we pronounce on the presence or absence of Iodine and Bromine as above remarked. Mr. Hodgson will, I have no doubt, favour us with a larger supply, when these questions will be settled.

#### TESTS—for *Acids*.

|                                                         |                           |
|---------------------------------------------------------|---------------------------|
| Silver foil was discoloured, . . . . .                  | Sulphuretted Hydrogen.    |
| Litmus and Turmeric papers were not affected, . . . . . | } No free Acid or Alkali. |
| Acetate of Lead, . . . . .                              |                           |
| Mur. Barytes, . . . . .                                 | Carbonic Acid.            |
| Nit Silver, . . . . .                                   | Sulphuric Acid.           |
| Gold Leaf, . . . . .                                    | Trace of Muriatic Acid.   |
|                                                         | No Nitrates.              |

#### *Bases*.

|                                                                |               |
|----------------------------------------------------------------|---------------|
| Mur. Platina, . . . . .                                        | No Potass.    |
| Carbte. of Amm <sup>a</sup> . and Phosp <sup>h</sup> te. Soda, | No Magnesia.  |
| Oxalate Ammonia and Sulphate of Soda,                          | No Lime.      |
| Tincture Galls, alone nothing, but with                        | } Oxide Iron. |
| Lime water it shewed, . . . . .                                |               |

As the water in both bottles had decomposed, it was useless to examine it for the quantity of the gaseous contents.

Twenty-two ounces of the water, (of B) carefully evaporated and the residue examined, gave as follows

|                                                              | In 22 oz. | In an imperial<br>gallon |
|--------------------------------------------------------------|-----------|--------------------------|
|                                                              | gr.       |                          |
| Peroxide Iron, . . . . .                                     | 1.15      | 6.74                     |
| Sulphur, . . . . .                                           | 0.10      | 0.58                     |
| Saline matter, mostly Muriate and Carbonate, Soda, . . . . . | 0.35      | 2.04                     |

The water is thus a carbonated and sulphuretted chalybeate spring, containing its iron in the peculiar state in which it is found in the Bath waters.

It also greatly resembles one of the Harrowgate springs.

By the kindness of Mr. Grapel who brought down the water, I have been able to ascertain that the bottles must have been filled



about the end of October, and as the bottle (B) was opened in the beginning of February, this shews that in the cold weather the water may be preserved good, even in a white glass bottle\* for three months, so that it may thus be sent at intervals to Calcutta for patients who cannot leave their employments; though in such cases of course, the great adjuvant, change of air, would be wanting. Mr. Hodgson requests me to add from the *Hurkaru* of the 2nd February, a notice of the virtues of these waters of which he is the author, and I insert it below.

“In a November number of the *Friend of India*, there appeared a brief note of the mineral springs of Darjiling. The short intervening period has sufficed, even at this, the empty season of the Sanatorium, to furnish two more cases strikingly confirmatory of the eminent remedial qualities of the Sikim medicinal waters. One of these cases was of hereditary gout of the worst type, and aggravated by chronic rheumatism, the other was a case of extreme debility and inertness of the vital functions, particularly the action of the liver, consequent on malarious fever. In the former case, there has been experienced wonderful relief from pain, such as had not been known by the patient for years, with as good a prospect of entire recovery as in such cases is possible.

“In the latter case the recovery has been as complete as it was rapid,—strength, appetite and energy returning with the quickest pace without the least aid from medicine, which indeed before the resort to the waters had been found to be of no further service.

“It seems important that the public should be made aware what a blessing is within the reach of all persons suffering from general debility and inertness of functional action, from gout, from rheumatism, even the most severe and long dated, from secondary syphilis, from glandular and cutaneous affections generally, and lastly from sores of a bad type and long standing, that have resisted the employment of internal and external pharmacopeial remedies. As already stated by the writer in the *Friend of India*, there are many of these springs in various parts of Sikim, the virtues of which

\* The light would aid the decomposition, and green glass bottles would be always best.

have been long known to the natives, though only so recently tried by Europeans. But this one, so tried, has been preferred for its proximity and accessibility and sheltered site, the last being a material point with reference to the chief element of the curative process, or frequent bathing in the waters, at as high a temperature as the patient can endure.

“Minchu” is a compound word meaning in the language of the country “medicine-water,” and as the term is both euphonic and appropriate, it should be at once adopted as the designation of the Darjeeling baths.

“A gentleman here has made purchase of the ground and is erecting a temporary house of three apartments within a few yards of the spot where the mineral water issues from beneath a huge block of gneiss. A philanthropic gentleman of the station had previously erected a similar building for the accommodation of bathers; this building being now devoted entirely to the bath, consists of three rooms.

“The distance from Darjiling is about five miles by the very good road already constructed. The elevation as yet untested by barometer or boiling water may nevertheless be safely said, by reason of the vegetation proper to the spot and the temperature, to be about 3,500 to 4,000 feet above the sea, due allowance being made for the extra heat generated by the rocky soil, sheltered position and eastern aspect.

“The water, still unanalysed, is void of all sapid or sensible properties. It has no heat, no taste, no smell. But the deep dye of rusty red with which it speedily incrusts stone and wood, proves it to be full of iron. It is to be hoped that Dr. W. O’Shaughnessy on his way through Calcutta will find time for an analysis, which it is to be hoped we shall soon obtain. This wonderfully efficacious remedy for so many of the ills that flesh is heir to, is as mild as patent in its action. In the slighter cases of debility, deranged liver and what not, it suffices to drink the water at Darjeeling without the necessity of resort to the Minchu. But in more serious cases such resort is indispensable for the purpose of bathing. The waters may be drank cold or tepid, but for bathing it must be used heated, and as hot as the patient can bear, and as often, if he desire a very speedy cure. But such overhaste

is not good speed, unless the patient be naturally robust and not much weakened by his ailment.

“Thirty to forty baths usually suffice even in severe cases, and should more be deemed needful, it is thought better to suspend the use of them, after having taken so many, and to recur to the bathing after an interval of some weeks. The method of using the bath is borrowed entirely from the people of the country. A duct brings the water from its source to the bathing place, which is both bathroom and dwelling; and this arrangement is adopted to guard against cold, nor should it be much deviated from in any future arrangement, the precaution being of cardinal importance.

“Besides heating the water with red hot stones tossed into the bathing tub, the Lepchas use an infusion of the bark of a tree, the genus and species of which are yet to be determined. But the necessity of this addition to the inherent virtue of the element has already been in good measure disproved, so we will here close our notice of the medicinal waters or baths of Darjeeling, referring our reader also to the article in the *Friend of India* above adverted to.”

## II.

*Mineral Water, from a spring walled in, at Kudjorah in Jessore,  
from A. GROTE, Esq., C. S.*

This water is tasteless, or but very slightly saline.

It has no smell.

There was a little flaky yellowish brown deposit in the bottle, which was carbonate of iron.

### TESTS—for Acids.

|                                       |                           |
|---------------------------------------|---------------------------|
| Silver Foil, . . . . .                | No Sulphuretted Hydrogen. |
| Litmus and Turmeric, . . . . .        | No free Acids.            |
| Acet. Lead sol precepte., . . . . .   | Carbonic Acid.            |
| Mur. Barytes, . . . . .               | No Sulphuric Acid.        |
| Nitrate Silver (plentiful,) . . . . . | Muriatic Acid.            |
| Gold Leaf test, . . . . .             | No Nitrate.               |

### For Bases.

|                                                 |            |
|-------------------------------------------------|------------|
| Mur. Platina, . . . . .                         | No Potass. |
| Carbonate Ammonia and Phosphate Soda, . . . . . | Magnesia.  |
| Oxalate Ammonia and Sulphate Soda, . . . . .    | Lime.      |

Tinct Galls, alone, slightly turbid . . . . . }  
 with Lime Water, . . . . . } Iron.

Forty-eight ounces of this water being evaporated gave a slightly coloured residuum and a considerable white crystalline sediment weighing in the whole 11 grains.

|                                                         | In the 48<br>oz.  | In one gal-<br>lon. |
|---------------------------------------------------------|-------------------|---------------------|
| Carbonate of Lime, . . . . .                            | 6.25              | 16.64               |
| Protoxide of Iron, . . . . .                            | 0.64              | 1.70                |
| Muriate and Carbonate Magnesia, . . . . .               | 1.70              | 4.62                |
| Saline matters Muriate and Carbonate of Soda, . . . . . | 2.00              | 5.33                |
| Water and Loss, . . . . .                               | 0.41              |                     |
|                                                         | <hr/> 11.00 <hr/> | <hr/> 28.29 <hr/>   |

The spring is thus a carbonated, calcareous and magnesian water, with a slight, though probably efficacious proportion of iron; which is of course in the state of carbonate, and held in solution in the water.

### III.

*Mineral Water from Sosoneah, North of Hazareebagh, from W. H.*

ELLIOTT, Esq., C. S., through Mr. GROTE.

I had three small pint bottles of this water, but the whole were very badly corked.

Examined by the same tests as the foregoing, the carbonic and muriatic acids only were found, and of the bases lime, iron and soda were present; but the whole are in very small quantity, the total of the saline matter and sediment obtained by the evaporation of 24 oz. being 1.70 gr.; so that we can only at present say, generally, of this water that it is a carbonated and slightly chalybeate spring, with a little muriate and carbonate of soda also in solution. Nevertheless when a larger quantity in proper preservation can be obtained, it should be re-examined for Iodine and Bromine as above remarked. I add to this paper, a circular from the Medical Board with which I have been favoured by Dr. Macpherson, which give excellent directions for collecting mineral waters for analysis, and a list of many springs of which we know nothing and now that com-



munication in India is a little less tardy than a sea voyage of old, it is to be hoped that some of them like the Minchu spring may prove of service to the cause of humanity.

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## APPENDIX.

### *Circular from the Medical Board.*

SIR,—The Supreme Government having resolved on a systematic examination of all the mineral springs in India, you are directed to call the attention of the medical officers in your circle to the subject, and to request them to ascertain whether there are any springs of real or supposed medicinal virtues in their districts, and to send specimens of them to the Presidency for analysis. The Supreme Government will request the Civil authorities to co-operate.

2. Annexed are a few simple directions for the collection and transmission of waters, and a list of some of the springs which have been noticed in various parts of India, including those which are believed to exist in your circle.

I have the honor to be,

Sir,

Your most obedient servant,

\* \* \* \*

*Surgeon,*

*Secretary, Medical Board.*

*Fort William,*  
*Medical Board Office, 185. }*

---

### *Directions for the collection and transmission of Mineral Waters.*

1. The mineral waters should be bottled in fine dry weather, and for gaseous waters the morning is best.

2. Particulars should be sent of the quantity of water furnished by the spring, whether it is constant or remits, of its temperature, whether varying at different times, the nature of the soil or of the rocks, from which it issues, the supposed elevation above the level of the sea, whether the spring contains bubbles of any gas, whether any particular *confervæ* are found growing near it, and whether the spring deposits any sediment.

3. Four quart bottles of each water will be the quantity usually required, the bottles to be of common black glass, perfectly clean; the corks if possible new, and it is well to steep them for a few days in the water of the spring; the corks to fit accurately, and to be secured with dammer and string, in the usual way in which beer is bottled in this country, placed in a box with four divisions; and packed with tow.

4. With sulphurous waters it is particularly necessary, that the bottle be quite full; acidulous, alkaline and gaseous waters may be exposed to the air for an instant, before being corked, and it is especially necessary to be careful in tying down the corks of such.

5. Specimens of any *confervæ* about the well or of any deposits from it, as well as of the rocks in the neighbourhood, should also be sent.

6. A notice should accompany, stating whether the natives of the country believe in its medicinal power, and in what diseases they count it useful.

7. There should be no delay in transmitting the waters, which should be sent by *dâk bangy* to the address of the Secretary, Medical Board.

8. When Medical or other officers on the spot are able to afford any chemical information respecting the waters, or are for instance able to observe whether the mineral ingredients are constant in quantity, they are requested to communicate it.—Especially in cases of gaseous waters, such as those containing Carbonic Acid or Sulphuretted Hydrogen, it is very desirable that they should endeavour to determine the quantity of gas present.

9. Information is wanted as to the accessibility of the spring, and healthiness or otherwise of the neighbourhood.

|                                              |                       |
|----------------------------------------------|-----------------------|
| Hot springs in Martaban and Tenasserim, Pe-  | } Suptg. Surgn. Pegu. |
| troleum springs in Pegu, .....               |                       |
| Petroleum springs, Arracan and Assam, Seeta- | } Dacca.              |
| coond near Chittagong, .....                 |                       |
| Uteer 30 miles from Pooree, .....            | } Barrackpoor.        |
| Hot springs near Chauneh in Bancoorah, ...   |                       |
| Ditto ditto Sooree, .....                    |                       |
| Ditto ditto Rajmehal Hills, ...              |                       |

|                                                               |   |           |
|---------------------------------------------------------------|---|-----------|
| Hot springs near Chauneh at Singoorjah, .....                 | } |           |
| Ditto at Pinarkoon, .....                                     |   |           |
| Ditto at Kutkumsandee, .....                                  |   |           |
| At Mujoolee 30 miles S. E. of Rhotas, ....                    |   |           |
| 2 Springs in Hills N. E. of Gya, .....                        | } | Dinapore. |
| 4 Sulphuretted springs within 27 miles of Hazareebaugh, ..... |   |           |
| Burkutta G. T. road, .....                                    |   |           |
| Seetacoond Moonghyr, .....                                    |   |           |
| Many hot springs in same range, .....                         | } |           |
| 2 Springs on Runjeet river Darjeeling, .....                  |   |           |
| Springs at Landour, .....                                     |   |           |
| Any ditto in Kemaon? .....                                    |   |           |
| Well of Sonah near Delhie, .....                              | } | Meerut.   |
| Sulphurous spring at Gwalior, .....                           |   |           |
| Many mineral springs at Macheny in Jeypore, .....             | } | Agra.     |
| Hot springs in Alwar, .....                                   |   |           |
| Hot and cold springs at Seetabaree in Harrowtee, .....        |   |           |
| Soda springs in Rajpootana, .....                             |   |           |
| Hot springs at Jumnootrie, Gungotrie, .....                   | } | Umballa.  |
| Kedarnath and Budinath in Ghurwal valley of the Sutlej, ..... |   |           |
| Chalybeate at Nageonda, .....                                 |   |           |
| Muneeakarn, .....                                             |   |           |
| Bishihst, .....                                               | } | Lahore.   |
| Saline spring at Dreva near Shapore, .....                    |   |           |
| Sulphur ditto at Lonsah near Noorpore, .....                  |   |           |
| Chalybeate at Dalhousie Chumba, .....                         |   |           |
| Iodine and Brine near Juwalli Mukki, .....                    | } |           |
| At Mukhdoor Rusheed 14 miles from Mooltan, ...                |   |           |
| Saline springs in Salt Range, .....                           |   | Peshawur. |

*Bombay.*

Hot fountain in Kattywar.

Also Saline and Sulphur springs within high water mark.

Sulphurous well near Somnath.

Saline springs in the Concan.

|                                                   |   |         |
|---------------------------------------------------|---|---------|
| Saline and Sulphurous springs in Lukeepass, ..... | } | Scinde. |
| Many hot springs on Western boundary, .....       |   |         |

*Madras.*

Ramandroog hills near Bellary.

Chalybeate at Bungalore.

Sulphuretted hot springs at Bradachellum on the Godavery.

Hot springs at Rair and Urjunah and at Byorah in the Deccan.

*Notes on Alfred von Kremer's edition of Wáqidy's Campaigns.—By*  
*Dr. A. SPRENGER.*

(SECOND NOTICE.)

I possess an Arabic MS. which has the title of *Jamharat al-'Arab* and contains seven times seven ancient poems (the first seven being the *Mo'-allaqát*) and also episodes from the early history of the Arabs in a poetical garb.

The first episode is the story of Barráq (Persian authors call him *Majnún*) and Laylà. She was the youngest and handsomest daughter of an Arab chief and had two sisters. The eldest of them *So'dà* was married to *Tha'labah*, the *Lame*, king of *Petra*, and the second to *Shabyb*, a chief of the *Tay* Arabs. Barráq, the hero of the story, fell in love with the youngest.

When Barráq was young he used to go out to the pasture grounds, milk the camels and carry the milk to a Christian hermit, who instructed him in reading the gospel, for our hero was a Christian.

He had hardly attained the age of twenty-five when the celebrated war broke out between the Arab tribes of *Mesopotamia* and the *Syrian desert*, and afforded Barráq an opportunity of giving proofs of his bravery. Without following the original in the historical details of this war, I content myself with saying, that he surpassed all other warriors in courage and obtained the title of *Father of Victory*.

*Ibn Náfi'* who tells us the story next introduces specimens of the liberality and generosity of his hero. Some *'Adwán* families were in debt and they sent to Barráq to solicit his assistance. He gave them all his own camels, and as they were not sufficient to extricate them from their difficulties, he gave them also those of his father and of his brother. The former reproved him for his prodigality, but the strain in which he extolled the merits of liberality not only moved his father to similar feelings, but it induced the *Tay* tribe to give to the needy *'Adwánities* more than double as much as they required.

*Lokayz*, the father of Laylà was a friend of *'Amr b. Morrah*, the *Laird of Çahbán*, and used now and then to spend a few days in his



castle. The beauty and soft feminine character of Laylà had become known all over the desert, and were the theme of conversation among the Arabian chiefs. One day as Lokayz was staying with the Laird, he demanded his daughter in marriage. Lokayz had not the courage to refuse him, but he did not give him a promise.

The rivalry of these two lovers is the plot of the story which throughout is with great art connected with the political history of the time to heighten its interest. It is not my intention to give the outline of it, but I wish to call the attention of the reader to the method of treating the subject, which is peculiar to the Arabs and constitutes their epos. The narrative is in prose, whose only charm is its great simplicity, and it forms only a small proportion of the work. The greater part of the story consists of speeches, disputations, and monologues, which are all in verse and not without poetical beauty. They are always dignified and contain noble passions, and much wisdom.

Compositions of this description seem at all times to have been popular among the Arabs. The earliest and most beautiful specimen is the book of Job. It consists almost entirely of speeches, which are highly poetical. One of the productions, which up to this day are popular at Damascus is the *Dywán Bany Hilál*, which consists chiefly of poetical monologues and disputations.

The first century after the conquests of the Arabs was the most poetical age recorded in oriental history. Savages, with great natural talents, were the masters of the fairest countries in the world. The luxuries of civilized life have a great charm which they could not resist. They lived in great ease in the cities of Syria, Egypt and Persia, their only occupation being the exercise of arms and the defence of the country. The wealthy ryots were the slaves of the Musalmán community and had to support them. As these barbarians advanced in civilization they looked back with pride and veneration on the simple manners and exalted heroism of their fathers. Refinement and luxury deprived them of the energy to imitate their example but they filled them with a taste for what is beautiful and great. The traditions regarding the original condition and exploits of their ancestors assumed therefore more and more an ideal character; and a poetical light was poured over the history

of Arabia and of the origin of the Islám, and like the heroes of olden times, the actors were endowed with every quality which they considered noble. It was during this age that the genealogies of the Arabic tribes were invented or constructed out of ethnographical materials and that most of the poems ascribed to the time of paganism were made. Poetry was in those days the vehicle of public opinion, and exercised the same influence on politics which in our days is exercised by newspapers.

One of the most favorite themes of the poets of those days seems to have been the history, not only of Arabia but also the sacred history and all history which had reached them. It does not appear that they made many alterations, the shape in which it reached them being fabulous enough for all purposes, but they filled it with poetical effusions. The early Arabic historians quote seriously elegies which Adam recited on the death of Abel, hymns which Noah chanted in descending from the ark, and songs which Kayumorth recited on ascending the throne.

Up to this day we have two sets of works on the life of Moham-mad. The one professes to be historical, and it would be profanation to read a work like Ibn Hishám in a coffee-house. The other set of works is legendary, and intended to be read before meetings in the month of Raby' I. and such books are frequently related for edification and amusement in coffee-houses by paid story-tellers. These legendary biographies of Moham-mad are usually called Moled مولد, because they contain more particularly the birth of the prophet. The most celebrated Moled is that of Bakry, who wrote in 763.

It is but natural that the history of the prophet should have occupied the historical poets or poetical historians of the first century more than any other episode of the history of our race. And much that was legend in the first century was regarded as history in the second, although the difference between history and legend was even then carefully kept in view.

In referring to Ibn Ishák, d. 151, we find that his biography of the prophet contains a great deal that has the character of what I called above the epos of the Arabs. Thus in page 106, he gives an account of the death of 'Abd al-Mottalib, the grandfather and guardian of the prophet, and he relates that he sent for his six

daughters, and said to them: I am dying, but I should like to hear in my last moments how you express your grief on my death. Each of them repeated improviso an elegy which Ibn Ishák has preserved.

This scene and the manner in which it is treated mark the peculiarity of what I call the Epos of the Arabs. Their poets delight to view an important or touching occurrence from all its sides, and in order to make this kind of moralizing less tedious, they put the expression of their sentiments into the mouths of persons, who were most concerned in it. Thus in the story of Barrák and Laylà, the chiefs of the tribe, successively give their opinion to Lokayz on his intention of *selling* his daughter to a man of another tribe. And in the book of Job the story is subordinate to the speeches which contain the different views which people entertain on the changes of fortune. Similar remnants of the early poetical and legendary biography of the prophet are frequent in Ibn Ishák, and, if we only know what view to take of them, they are of great interest.

It would be a matter of great interest to ascertain the names of these poetical historians. Before attempting to identify them, it appears to be expedient to bring to the notice of the reader, some of the men who in the first century propagated the history of the prophet, true or false.

If we compare the oldest accounts we possess as those of Ibn Ishák, d. 151; of Abú Ishák 'Amr b. 'Abd Allah, d. 127 (quoted by Ibn Hibbán and Bokháry), of Ibn Aby Shaybah, d. 235; of Ibn 'Oqbah, d. 141 (quoted by Ibn Sayyid alnás), we find a very great resemblance in the division of the subject and even in the expression. If we follow up the authorities which these writers quote we find the further we go back the closer the various accounts approach, so that they appear to be different texts of the same original with trifling, but sometimes important and evidently intentional alterations, and also with some additions and omissions, I might quote numerous examples to prove this assertion, but they would take up several pages, and I therefore content myself with referring for an instance to my notes in this Journal, Vol. 21 p. 576 on Bahyrah's journey to Makkah.

The natural inference from these premises, seems to be that in



the first century the biography of the prophet had assumed a stereotype form, and that the earliest works which we have on it are copies of this stereotype biography. To suppose that a *written* record (beyond memoranda), has reached the authors whom we have just mentioned would be an assertion which cannot be proved. The similarity of the earliest accounts can be sufficiently accounted for by assuming that they all come from the same place, and from the same school, and that some eminent persons took the lead in that school.

During the first century of the Hijrah, the principal seat of learning was Madynah. Even during the second century, it was superior to any other city, though many learned men emigrated to Babylonia, which rose rapidly to importance.

About the year 100 of the Hijrah, there flourished a man at Madynah of the name of Shoraʿbyl b. Saʿd, who attained to great celebrity for his knowledge of the campaigns and life of the prophet in which, it was thought he surpassed all his contemporaries. He was a client of the Hotamah, an Anṣār family, and like other learned men, he was daily to be found in the great mosque of Madynah, ready to relate traditions of the prophet to any one who liked to listen to them. At the same time he was himself anxious to obtain new ones from his elders. Among those from whom he collected his information in his youth were the best informed contemporaries of the prophet, as Zayd b. Thábit who used to write down the revelations for the prophet and d. in 48 or after 50; Jábir b. ʿAbd Allah, d. at Madynah after A. H. 70, aged 94; ʿAbd Allah, a son of the Khalif ʿOmar, d. 73; ʿAbd Allah b. ʿAbbás, d. at Táyif in 68, aged 71 years; Abú Saʿyd Khodry, d. 74, and Abú Horayrah, joined the prophet three years before his death and d. in A. H. 59. Though these men are mentioned among his shaykhs, on comparing dates we find that he was too young when they died, for him to have derived much information from them; the bulk of his historical knowledge he must have obtained from later authorities. He was unfortunately very poor, and tried to turn his celebrity to account. If a man made him a handsome present, he would assure him that his father or grandfather or some other member of his family fought in every campaign of the prophet and held a high place in his favour;



but woe to the ancestors of a man who did not pay! They never had distinguished themselves during the age of the prophet except perhaps in the ranks of his enemies. Owing to this description of industry he got a bad name among his own biographers. Towards the end of his life his faculties failed him, and he died at an advanced age in A. H. 123.

Among those who took traditions from him are, according to the *Kamál*:

1. Músà b. 'Oqbah, d. 141.

2. Ibn Isḥáq, d. 151.

3. Abú Ma'shar, d. 175.

4. Yaḥyà b. Sa'yd Anḡary who was Qádhīy of Madynah and subsequently in the 'Iràq, where he died in 143. He was the most learned man of his age besides Zohry, Bokayr b. Ibn al-Ashajj and Abú-l-Zinnád. He had so faithful a memory that he used to dictate traditions to his pupils from memory, and if he subsequently rehearsed them, they found that he could repeat them literally as he had dictated them.

5. Ibn Aby Dzyb born in 80, died in 158.

6. 'Omárah b. 'Azyyah, d. 140.

7. Malik b. Anas, born in 93, d. 179.

8. Fitr b. Khalyfah, d. 155 or 153.

9. Moḥammad b. Ráshid, d. in 160 odd.

10. Ziyád b. Sa'd.

11. Abd al-Raḥmán b. Solaymán b. Ghasyl, d. 171.

12. 'Aḡim b. al-Aḡwal, d. 142.

The three first named pupils of Shoraḡbyl, have left biographies of the prophet. The work of Ibn Isḥáq we have, that of Músà b. 'Oqbah is frequently quoted by Bokháry, Ibn Sayyid alnás, Sohayly, and Ibn Ḥajar and other writers, and it is very likely that a copy of it will yet be discovered. I made enquiries regarding this book wherever I went, and at Damascus I was assured that there existed a copy, but I was unable to obtain a sight of it. Abú Ma'shar we find also sometimes quoted but much less frequently. It appears to me that Shoraḡbyl had a great hand in giving to the biography of Moḥammad, a stereotype form. Much had been done before him, more particularly by 'Orwah, Sa'yd b. Mosay-

yab and others, but in the first years after the Hijrah as long as eye-witnesses were alive, they would be chiefly consulted and it is not likely that they all would choose the same set phrases in relating what they had seen.

I do not mean to say that these three authors merely wrote down what they heard from Shorahbyl, nor that he was the only man who had a hand in completing the stereotyping of the main parts of the biography of Mohammas. As it has already been stated and will be further shown lower down, much has been done before him. And during his life time it must have been the subject of daily conversation in the mosque of Madynah. Still I am led to suppose that he took a great part in it and my reasons for this supposition are : 1. The testimony of Najjár and Dzohaby, who say that he was better versed in the biography of Mohammas than any of his contemporaries. 2. The circumstance that three of his pupils left works on the subject. 3. The very silence of Ibn Ishák. Though it is distinctly stated in the Kamál that Ibn Ishák obtained information from him, he nowhere quotes his authority by name ; on the contrary there are some sentences preserved from him in which he expresses a very unfavorable opinion of his teacher.

The fact is, many parts of the stereotyped version were evidently not to the taste of Ibn Ishák, and on perusing his book it gives us the idea that one of his objects in writing it, was to improve and critically to illustrate it. He therefore seldom mentions his authorities for those parts of the story which were generally believed to be true. Thus for instance he like Bokháry and others takes the history of the Mi'ráj from Khodry, but he does not say through whom it has reached him. As Khodry is mentioned among the teachers of Shorahbyl, it is not impossible that he was the medium of communication. Ibn Ishák generally gives the authorities only where he has additions to make to the stereotyped and generally received versions, where he has more clearly ascertained a fact or where he suggests corrections. I will mention an instance. In p. 100 he relates that Hassán heard, when he was seven years of age, a Jew publicly proclaiming that a star had risen the preceding night announcing the birth of Akmad (the Messiah). To throw light on this story, Ibn Ishák enquired of the grandson of Hassán how old

he was, when the prophet came to Madynah, and was informed that he was sixty years old. It hence follows that he was just seven years of age when the prophet was born, and that therefore, there is no anachronism in the above statement. Similar instances in which he made enquiries from persons, who, owing to their family connection, must have been accurately acquainted with certain facts are frequent.

In the commencement of some chapters however, he gives an isnád which apparently refers to the main sources of the stereotype version. It runs at the heading of the battle of the ditch, حَدَّثَنِي يَزِيدُ بْنُ رُوْمَانَ مَوْلَى آلِ الزَّيْبُرِ عَنْ عُرْوَةَ بْنِ الزَّيْدِ وَمَنْ لَأَتَمَّ عَنْ عَبْدِ اللَّهِ بْنِ كَعْبِ بْنِ مَالِكٍ وَ مُحَمَّدِ بْنِ كَعْبِ الْقُرْظِيِّ وَالزَّهْرِيِّ وَعَاصِمِ بْنِ عُمَرَ بْنِ قَتَادَةَ وَعَبْدِ اللَّهِ بْنِ أَبِي بَكْرٍ وَغَيْرِهِمْ

"I have been informed by Yazyd b. Rúmán, a client of the Zabayr family on the authority of 'Orwah, the son of Zobayr, also by a person against whom I have no suspicion on the authority of 'Abd Allah b. Ka'b b. Málik and of Mohámmad b. Ka'b Qoratzy, and also by Zohry, by 'Açim b. 'Omar b. Qatádah and by 'Abd Allah b. Aby Bakr and others."

The battle of Badr is headed by the following isnád حَدَّثَنِي مُحَمَّدُ بْنُ مَسْلَمٍ الزَّهْرِيُّ وَعَاصِمُ بْنُ عُمَرَ بْنِ قَتَادَةَ وَعَبْدُ اللَّهِ بْنُ أَبِي بَكْرٍ وَيَزِيدُ بْنُ رُوْمَانَ عَنْ عُرْوَةَ بْنِ الزَّيْبُرِ وَغَيْرِهِمْ مِنْ عُلَمَائِنَا عَنْ ابْنِ عَبَّاسٍ

"I have been informed by Zohry and by 'Açim b. 'Omar and by 'Abd Allah b. Aby Bakr and by Yazyd b. Rúmán on the authority of 'Orwah, and by others of our men of learning on the authority of Ibn 'Abbás."

At the head of the story of the campaign called Sawyq the isnád runs حَدَّثَنِي مُحَمَّدُ بْنُ جَعْفَرِ بْنِ الزَّيْبُرِ وَيَزِيدُ بْنُ رُوْمَانَ وَمَنْ لَا أَتَمُّ عَنْ عَبْدِ اللَّهِ بْنِ كَعْبِ بْنِ مَالِكٍ \*

"I have been informed by Mohámmad, by Ja'far b. Zobayr, and by Yazyd b. Rúmán and by a person against whom I have no suspicion on the authority of 'Abd Allah b. Ka'b b. Málik."

In the commencement of the campaign of the Banú Moçtalíq it runs حَدَّثَنِي عَاصِمُ بْنُ عُمَرَ بْنِ قَتَادَةَ وَعَبْدُ اللَّهِ بْنُ أَبِي بَكْرٍ وَمُحَمَّدُ بْنُ يَحْيَى بْنِ جَبَّارٍ كُلُّهُمْ قَدْ حَدَّثَنِي بَعْضُ حَدِيثِ بَنِي الْمِصْطَلِقِ \*

"I have been informed by 'Açim b. 'Omar b. Qatádah and by 'Abd Allah b. Aby Bakr and by Mohámmad b. Yahyà b. Jabbár.

Every one of these men related to me a portion of the story of the Banú Moçtaliq (and I completed one statement through the other)."

As authorities for his account of the *Okod* campaign, he mentions in addition to Zohry and Moḥammad b. Yaḥyá and 'Aḥim b. 'Omar also al-*Hoçayn* b. A'bd al-Rahmán b. 'Amr b. Sa'd b. Mo'ádz.

These isnáds give us the names of eight Shaykhs of Ibn Isháq and comparing them with other quotations strewed over the book, we find that from some of them he received an almost complete account of the life of the prophet. I will now give a short notice of the latter and with a view of tracing the sources regarding the biography of Moḥammad up to eye-witnesses, also of their authorities.

The first Shaykh mentioned is Yazyd b. Rúmán Abú Rúḥ of Mady-nah. He was a client of the Zobayr family and derived the greater part of his information on the biography of Moḥammad from 'Orwah the son of Zobayr. He was particularly strong in explaining the *Qorán*, having studied it under 'Abd Allah b. 'Abbás b. Raby'ah, who is to be distinguished from the famous Ibn 'Abbás. He died in 129 or 135. Ibn Isháq quotes him particularly often in his accounts of the campaigns but also in the first part, as pp. 221, 415, 417, 454, &c.

The Shaykhs most frequently quoted by Ibn Isháq were relations of 'Orwah b. Zobayr, and like Yazyd b. Rúmán, they derived most of their information from him. I will first name them and then give a short account of 'Orwah himself.

Moḥammad b. Ja'far b. Zobayr a nephew of 'Orwah is quoted in Vol. I. pp. 34, 327, 393, 456, Vol. II. pp. 95, 117, 180, 198 and *passim*.

Hishám a son of 'Orwah was born at Mady-nah. As long as he resided in his native town, he was considered a trustworthy teacher of traditions, but when he came into the 'Irág he related many traditions on the authority of his father which he had received from him only second hand. He died in 145 or 146. Ibn Isháq introduces accounts which Hishám professed to have received from his father 'Orwah in Vol. I. pp. 143, 204, 403 and Vol II. p. 153.

'Omar, a son of the preceding. In Vol. I. p. 403, is an account which he had received from 'Orwah.

Yaḥyà, a son of 'Orwah is quoted in Vol. I. p. 201. He took



traditions from 'Orwah and also from 'Abd Allah b. 'Amr b. al-'Aḡ, Vol. I. p. 181.

Ḡālih b. Kaysán, the friend of the Khalif 'Omar b. 'Abd al-'Azyz and the tutor of his children, is also quoted, but very rarely. He took traditions from Zohry, Vol. I. p. 153, and also from others Vol. II. p. 22. He died about ninety years of age after A. H. 140.

Zohry, whom I shall mention lower down, took most of his traditions from 'Orwah and his relations.

'Orwah b. al-Zobayr was born at Madynah in A. H. 23. His mother Ḡafyyah was an aunt of the prophet. His brother 'Abd Allah gained a large party and was proclaimed Khalif in Arabia, Egypt and Khorásán, but after he had maintained himself nine years in his lofty position, he was defeated by the lieutenant of the Omayyides and crucified at Makkah in A. H. 73. 'Orwah seems not to have meddled with politics, and he even spent the last days of his life at the Omayyide court at Damascus, where it became necessary to amputate one of his legs on account of a malignant ulcer. No man of that age had better opportunities to collect information regarding the history and tenets of the Islám than him, and he made the best use of them. He was one of the seven men who are called the great divines of Madynah, and his distinguished pupil Zohry said, that he found that he was an inexhaustible sea and was able to give an answer to any question that might be proposed to him. He wrote down the result of his enquiries and to judge from the quotations which occur in Ibn Isháq, Bokháry and Ibn Sa'd, the assertion of Hájy Khalyfah, No. 12464, that he has written a biography of Moḥammad, seems to be correct. But unfortunately the prejudice, that it was not proper to have any other book than the Qorán, induced him to efface all his writings.\* He regretted it subsequently and took great pains to teach the numerous traditions with which his memory was stocked to his children and pupils, and they have preserved a great portion of his labours. He died in 94 A. H.

\* *قال عروة كنا نقول لا نتخذ كتابا بعد كتاب الله فمحوت كتبني* *فوالله لو ددت ان كتبني عندي* \* The Khatyb Baghdády thinks that the reason why he repented to have destroyed his writings was, because when he got old, his memory got weak; but in one version he says his books would be very useful for his children.

Another Shaykh of Ibn Isháq whose name occurs in all but one of the above isnáds is 'Abd Allah b. Aby Bakr b. Moḥammad b. *Hazm* Anḡary of Madynah, who died in 130 or 135 at the age of seventy. His teacher was his own father, Abú Bakr whom the Khalif 'Omar b. 'Abd al-'Azyz (came to the throne in 99) appointed judge of Madynah, and to whom he sent orders to collect and write down traditions, more particularly those of his aunt 'Amrah, a daughter of 'Abd al-Raḥmán b. Sa'd b. Zorárah of the Anḡar and those of Qásim. When this order was given, 'Abd Allah was no longer a pupil, but a companion of his father, and no doubt assisted him in his labour. Hence it happens that he mostly quotes the same Shaykhs as his father. Abú Bakr died at the age of eighty-four in 117 or 120. Ibn Isháq takes in many instances the account of 'Abd Allah as the basis of his narrative, as in Vol. II. p. 135. In some instances 'Abd Allah does not state his authority as in Vol. I. pp. 287, 295, 296, 427, 434, 449, 451, 454; Vol. II. pp. 131, 133, 135, 187, 191 and *passim*. He quotes his father in Vol. I. p. 48. He quotes 'Amrah Vol. I. pp. 52, 105, and Vol. II. p. 102. He quotes in several instances 'Othmán b. Aby Solaymán b. Jobayr from his uncle Náfi' b. Jobayr from his father Jobayr. He quotes Yaḥyà b. 'Abd Allah b. 'Abd al-Raḥmán b. A'sad (Sa'd?) b. Zorárah, Vol. I. p. 339. He quotes Ibn Abbás second hand Vol. I. pp. 435, 442. He quotes a man of the Banú Sá'idah from Abú Osayd Málik b. Raby', who was present at the battle of Badr, Vol. I. p. 436. He quotes Omm 'Ysà, a lady of the Khozá'ah from Omm Ja'far, Vol. II. p. 174, and he quotes several other authorities. 'Amrah, whom he and his father quote had collected a great many traditions from 'Ayishah and other wives of the prophet, and died in 106 or according to others as early as 98 at the age of seventy-seven.

'Aḡim b. 'Omar b. Qatádah was equally a native of Madynah, but during the reign of the pious 'Omar b. 'Abd al-'Azyz he came to Damascus and taught traditions in the great mosque. Subsequently he returned to his native town where he died in 120 or 129. Ibn Sa'd *apud* Dzohaby states, that he was particularly strong in the biography of the prophet, and Ibn Isháq quotes him almost in every chapter, as Vol. I. pp. 141, 283, 286, 295, 339, 366, 432; Vol. II. pp. 13, 17, 18, 19, 53, 94, 111 and *passim*. 'Aḡim, it would appear

taught the stereotype version, he therefore seldom quotes his authorities and only in cases where he deviates from it. Among the Shaykhs whom he quotes is Maḥmúd b. Labyd who died in 96 aged ninety-nine years. In his days, it was so common to preserve traditions in writing, that there is little doubt that he kept note books.

The anonymous Shaykh against whom Ibn Isháq had no suspicion, and who derived his information from Moḥammad b. Ka'b Qoratzy and from 'Abd Allah b. Ka'b b. Málik (d. 97 or 98) seems to me to be Shorakhbyl, of whom I have spoken above. Ibn Isháq had apparently several informants, whom he does not think proper to mention. One of them took traditions from Miqsam, and Sohayly supposes that he is identical with Hasan b. 'Omárah. He is evidently a different man from the one alluded to in the above isnáds.

Moḥammad b. Ka'b Qoratzy of Madynah was the son of a converted Jew. He resided for some time at Kúfah, but returned to his native town, where he died in 108, or 117 or 120 by the fall of the roof of the mosque, whilst he was engaged in literary discussions with his learned friends. He was particularly strong in the explanation of the Qorân. His authority for traditions on the life of Moḥammad is not only quoted by the anonymous Shaykh but also by Yazyd b. Ziyád *apud* Ibn Isháq, Vol. I. pp. 184, 320, 276; Vol. II. p. 85 and *passim*. He is also quoted by Boraydah, (*apud* Ibn Ishaq Vol. II. p. 25) who had received his traditions through Sofyán Aslamy. The name of Moḥammad b. Ka'b also frequently occurs in Ibn Sa'd's isnáds.

At length I come to Moḥammad b. Moslim Zohry, who is also called Ibn Shibáb. He is one of the most remarkable men in the literary history of the Islám, and with him closes the first period of the Moḥammadan church history. He was a native of Madynah and a soldier by profession. He spent part of his life at the court of the Khalif 'Abd al-Málik, at Damascus, and was the tutor of Hishám's children, who at one time owed him seven thousand dynars on that account. He was very rich and liberal, nay extravagant. On one occasion a friend reminded him of his debts, which amounted to twenty thousand dynars, and he answered, I possess five springs, every one of which is worth double that sum.

Zohry had so retentive a memory that he learned the Qorân by-heart in eighty days. Being passionately fond of honey he



ascribed to it the property of improving the memory. He was anxious to obtain the best information and spent several years in the company of Ibn Mosayyab (died shortly after A. H. 90) who was then one of the most celebrated traditionists and theologians. He was particularly anxious to obtain information on the origin of the Islám from the descendants of the Refugees and A'ncar, but did not neglect to consult their freed slaves and other hangers-on (موالي). Zohry like some other men of his age thought it objectionable to write down traditions, but gradually this practice became universal and he gave up this prejudice.\* Abú Zinnád (d. in 131, aged sixty-six years) relates that he used sometimes to accompany him in his walks, and wherever he went he took tablets and a note-book with him, and wrote down whatever he heard. Ǧálil b. Kaysán (died about 140) was a fellow-student of his, and as they were consulting with each other on the best method of study, they agreed to take down traditions and they both wrote all the sayings of the prophet which they could gather, subsequently Zohry proposed to take down also the sayings of his companions bearing on dogmas, but on this point they differed. Ǧálil did not consider them as decisive in law, but Zohry did, and wrote them down. 'Obayd Allah b. 'Omar relates of him that they saw him giving a book of traditions to his pupils, telling them, that they might propagate the contents thereof on his authority. On one occasion he mentioned to Málik a very long tradition, and as he could not remember it he requested him to repeat it, but instead of repeating it, he wrote it down for him. The amount of traditions, poems and other information which Zohry taught was very great, and when al-Walyd moved he found that the books (دفاتر, now this term is used for account or office-books) containing what Zohry had taught made several loads for beasts of burden.

To illustrate the light in which writing was viewed even in the commencement of the second century, I may mention that Sofyán Thawry, died 161, received some traditions from Zohry in writing,

\* Ma'mar apud Ibn Sa'd folio 178 and Dzohaby. The tradition does not run alike in both authors, one reads amr, where the other reads omará, and they alter the other words accordingly, but the sense which I give in the text, results from both readings. I shall give the version, which we find in Ibn Sa'd and the Khatyb Baghdády in another article in the original.



and because they were not at the same time communicated to him verbally, he did not avail himself of them. But Sofyán Thawry was altogether a very eccentric man. Al-A'raj (d. in 117) who used to copy the Qorân was induced by Zohry also to write down traditions, but as soon as he had learned them by-heart he tore them up (مزق الرقعة). The great boast in those days was, to know as many traditions by-heart as possible. From the earliest time however, they assisted memory by keeping notes. This we are told was done by Zayd and Ziyád. In 'Abd al-Haqq Dehlawy's *Madárij*, Vol. II. p. 284, occurs a very important passage bearing on this subject, which is taken from the Mawáhib, Vol. I. p. 304, "Wáqidy states, giving his isnád up to 'Ikrimah (a client and a pupil of Ibn 'Abbás, d. in 107), that he ('Ikrimah) said, I found the following letter among the books (كتب) of Ibn Abbás (was born three years before the Hijrah and died in 68) after his death, and I copied it."

But these notes were only intended to be used privately on the sly, for they were almost ashamed to be obliged to have recourse to them, and they were seldom arranged and not intended to be propagated by the process of transcription only. But genealogies and lists of names, it seems, were made use of without reserve even by the most prejudiced and conceited. It is related of Zohry that he used a genealogical table of his tribe and family.

Ibn Ishâq sometimes says in quoting Zohry حدثني الزهري and sometimes ذكر الزهري (in Vol. I. pp. 149, 404 and *passim*. In page 130, he uses this expression also in reference to information received from 'Orwah, saying, ذكر عروة). They were rather strict in those days in distinguishing between the terms which they used to indicate the manner, in which they received a tradition, and writers on the canons of historical criticism hold that ذكر without the addition of لي or لنا does not imply that a man has *heard* the tradition from the shaykh quoted, or that he received it in any manner from himself; and I suspect, that wherever Ibn Ishâq uses this term, he found a tradition in books or writings only, and perhaps second-hand. Even where he says حدثني it does not imply that he obtained it orally. He may have received it orally and in writing or in writing only, but from the informant himself.

Hájy Khalyfah, Halaby and others say that Zohry left a work on the biography of Mohámmad, and Sohayly several times quotes

it. There is no doubt that he collected an immense number of notes on the subject, and Ibn Ishák refers to them in almost every chapter, but I doubt, whether he left them arranged and in the shape of a book on his death, and think that like the commentary on the Qorân ascribed to Ibn 'Abbás, they were collected and arranged by a later hand, perhaps by his nephew, Moḥammad b. 'Abd Allah b. Moslim, who is quoted by Wáqidy in the first page as one of his Shaykhs.

Having said so much on the origin of writing down traditions, though it is my intention to enter into the subject at some length in a separate article, I may advert to a statement of Ibn Hanbal, recorded by Ghazzály, Shahráshúb, Nawawy and others. He says, the first man who composed books was Ibn Jorayj (d. in 150, it is said, at the age of one hundred years). If this is correct at all, he refers to systematic works on traditions or law. There is evidence to show that there existed Arabic works on profane subjects before his time. Mas'údy speaks of a public library at the time of 'Omar b. 'Abd al-'azyz, and I possess the history of Ibn Monajjim, who wrote in 131, and he quotes in pp. 68, 184 and 103, an older author whose name was Aḥmad b. 'Abd Allah Injly. In page 103 he says, *و زعم الانجيلي في كتاب خشين عيلم ان رجلا الخ*. "Injly expresses an opinion in his work, which has the title of Khashyn 'Aylam that, &c." I do not know when Injly died, but from Ibn Monajjim, p. 184, it appears that he was a nephew and pupil of 'Abd Allah b. Sallám, of whom we find the following notice in the Kamál of 'Abd al-Ghanyy, "'Abd Allah b. Sallám b. al-Háarith Khazrajy was called Abú Yúsof, and was a confederate of the Qawáqilah, a family of the Banú 'Awf b. Khazraj. He was an Israelite of the tribe of Joseph, and embraced the Islám when Moḥammad came to Madynah. The prophet changed his name which had been Hoḥayn into 'Abd Allah, and promised him the paradise. To him alludes the verse of Qorán, 46, 9 (in which Moḥammad refers to his testimony) and also verse 13, 43. But as to the bearing of the latter verse, the opinions of the commentators of the Qorán are divided. He was present with the Khalyf 'Omar at the conquest of Jerusalem, and died according to Ibn Sa'd at Madynah in 43."

Mas'údy mentions the work of Injly as well as that of Ibn

Monajjim among his authorities in the preface to the Golden Meadows.

Regarding the authorities on which Zohry's biography of Moḥammad was founded, there occurs an interesting passage in Ibn Ishāq, in the commencement of the account of the war against the Qoraytzah. He takes Zohry as his guide and copies the list of the authorities, from whose information Zohry had put together his story. They are, 'Alqamah b. Waqqāḥ Laythy of Madynah (who died during the reign of 'Abd al-Mālik b. Merwān), Say'd b. Jobayr (was put to death by Hajjāj in 95 before he had completed his 50th year of age), 'Orwah (mentioned above), 'Obayd Allah b. 'Abd Allah b. 'Otbah b. Saby'ah (d. in 94 or 84). From Bokhāry, p. 573, we learn that Zohry related the adventure of 'Āyishāh on the authority of 'Orwah, Sa'yd b. Mosayyab, 'Alqamah b. Waqqāḥ and 'Obayd Allah b. 'Abd Allah. Numerous other passages might be adduced, from which it appears that Zohry derived his knowledge of the main facts in the life of Moḥammad from these five men. Among them he quotes most frequently 'Orwah (as *apud* Ibn Ishāq, Vol. I. pp. 130, 415; Vol. II. pp. 130, 144 and *passim*, also *apud* Bokhāry, pp. 2, 572, 573, 574 and times innumerable) and it seems that in his biography of the prophet, he restored the work of 'Orwah as far as he could recollect it from his lectures, and gather it from his other pupils, and that he enriched it, with additional information from a very great variety of authorities.

Ibn Ishāq takes from Zohry the story of the adventure of 'Āyishah. The young lady accompanied her decrepid husband in one of the campaigns, and lost her way, but had the good luck to meet a young man who brought her back to the arms of her spouse. This story affords the best specimen of Zohry's manner of treating the subject, which is far from candid. The story being too long for being inserted here, I give 'Orwah's and Zohry's version of the expedition of Ibn Jaḥsh, which I related according to other authorities in a preceding number, p. 65, we see from it that these men were far too skilful theologists for being good historians.

"The prophet sent 'Abd Allah Ibn Jaḥsh b. Rayāb Asady on an expedition in Rajab immediately after the first Badr campaign, and he gave him eight men. They were refugees, and there was no



Anṣár among them. He wrote a letter for him and told him not to look into it before he had proceeded two days journey. Then he should read it and go to the place indicated in it, but that he was not to compel any of his men to accompany him. The men of *Jaksh* were: (see list *suprà*, p. 65 note). When Ibn *Jaksh* had advanced two days he opened the letter and read it, and he found in it what follows: 'When you have read this letter proceed as far as *Nakhlah* between *Makkah* and *al-Táyif*. Watch the movements of the *Qorayshites* and give me information.' When he had done reading it he said, I hear and obey, and then addressing his followers, he spoke: The prophet orders me to proceed to *Nakhlah* to watch the movements of the *Qorayshites* and to bring him the intelligence thereof, and he ordered me not to force any of you to accompany me. Let those of you who wish to earn the glory of martyrdom, accompany me, but those who have no inclination may return. As to myself I carry out the orders of the prophet. Having said so he proceeded, and they all went with him, not one of them remained behind. They went along the *Hijáz* road until they came to a *Ma'dan* above *al-For'*, which is called *Bahrán* or *Bohrán*. There a camel, which *Sa'd* and *'Otbah* were riding in turn, went astray. They went in search of him and were left behind. Ibn *Jaksh* and his other followers proceeded until they reached *Nakhlah*. There a *Qorayshite* caravan passed them laden with raisins, leather and other articles, in which the *Qorayshites* used to trade. The persons in charge of the caravan were *'Amr b. al-Hadhramy*, *'Othmán b. 'Abd Allah*, his brother *Nawfal* and *Hakam b. Kaysán*. When these men saw the party they were afraid; because they had encamped quite close to them. *'Okkashah*, after he had his head shaved, showed himself to them, and they were put on their ease and said to each other, They are pilgrims, they will do us no harm. As this was the last of *Rajab*; the *Moslims* consulted among each other what to do, some said, If you do not attack them to-day they will slip into the sacred territory, where you cannot attack them, and if you do kill them, you kill them in the sacred month. They were doubtful what to do, and afraid to attack them. At last they took courage and agreed to kill as many of them as they could, and carry away the booty. *Wáqid* shot *'Amr* with an arrow and killed him.



'Othman and Hakam gave themselves up as prisoners and Nawfal escaped. Ibn Jaksh and his followers went back with the two prisoners and the booty until they reached Madynah. Some one of the Jaksh family states, that Ibn Jaksh said, the prophet has a claim to one-fifth of the booty, and having set one-fifth aside he divided the rest among his followers. This was before the order regarding "the fifth" was revealed. Ibn Ishâq observes, when they came to the prophet he said to them, I did not order you to fight in the sacred month, and he gave no orders regarding the prisoners and the booty, and did not accept any thing of it. When the prophet had thus spoken to them they were very much grieved, and afraid that their souls were lost, and their brethren severely reproached them. The Qorayshites said, Mohammad has abolished the sacred month [of Rajab] and his party sheds blood in it, makes prisoners and kills. The Moslims, who were at Makkah, answered them and maintained that the attack had taken place in Sha'bân. The Jews drew an evil omen for the prophet from the names (see p. 71 note) and said, God has turned this matter to his detriment and not to his advantage. As there was so much talk about the matter, God revealed the verses (see p. 68 *suprà*). This revelation cheered up the Moslims, and the prophet took now the booty and prisoners in hand. The Qorayshites sent men to ransom the two prisoners, but the prophet refused to give them up before his own two men, Sa'd and 'Otbah, who were missing had returned, saying, If you have killed them, I put your men to death. When Sa'd and 'Otbah had come back he took the ransom for them. Hakam embraced the Islâm, and turned a sincere Moslim and remained with the prophet until he fell a martyr at Byr Ma'unah. 'Othmán returned to Makkah, and died there as a Káfir. When the first verse was revealed, which absolves Ibn Jaksh and his party from guilt, they came to the prophet and said, that they would now expect some reward from God for their exploit, and upon this the second verse was revealed, which they conceived, contains a promise of a reward. The account of this affair is taken from Zohry and from Yazyd b. Rúmân, who quotes 'Orwah as his authority."

In the original, the account is not without poetical merit, but it is far from genuine. I might quote a number of similar instances,

in which both 'Orwah and Zohry must have been in possession of more genuine information than the one which they communicate to their readers. Both 'Orwah and Zohry were great admirers of poetry. The former repeated after every tradition some national verses to mix the *utile* with the *dulce*, and perhaps also in explanation of the tradition, and the latter used to say, when he sat down to deliver his lectures, Now let us hear your traditions and the poetry, which you know. This leads us to suppose that not only many edifying legends but also a great part of the poetical history adverted to in the introduction to this article, owes its currency to these two men. For a long time I subscribed to the high opinion, which Bokháry, Moslims, and other authors entertain of these two men, but a deeper study of the sources caused me to alter it. I must bring here another Father of the Moslim church to the notice of the reader, who belongs to the same class. This is Sa'y'd b. Mo-sayyab, who died shortly after A. H. 90. His son Moḥammad, who repeats only what he heard from his father, gave currency to the elegies of the daughters of Abú Tálib adverted to above. It is very likely, that these men are not the inventors of stories or poetry, but only preferred legends to true history. But to Anas b. Málik, who was ten years the servant of the prophet, and died in 92, upwards of one hundred years of age; Abú Horayrah, Ibn 'Abbás, and some other companions of the prophet, we must apply the very hardest epithets. There are stories of miracles attributed to them, which have been handed down by several independent isnáds, whereby the invention is brought home to them. And it cannot be said that they have been deceived, because Anas and also the others profess in many instances to have been eye-witnesses. As it is of great importance to know the character of the witnesses, I intend to embrace the first opportunity which I may have to publish the notes which I have collected on the inventors of miracles and of legends regarding Moḥammad. The literary history of those days deserves to be carefully investigated for its interest both as regards the biography of Moḥammad, and in regard to the development of his doctrines. Mr. W. Muir has lately published a very valuable pamphlet: "The testimony borne by the Qorân to the Jewish and Christian scriptures." From the passages which he collected, it appears that Mo-

hammad considered the scriptures as divine revelation. Whilst on the other hand from a number of incidents in his life, it is clear that neither he nor any of his early converts considered him unfallible unless he pretended to speak from inspiration. It was to be expected that the Musalmans would refer to the scripture for information on law and religion not contained in the Qorân. They followed quite the contrary course: they relied entirely on the accidental sayings of the prophet and even of his companions, and if the Bible were lost, and we had no other information regarding it than that contained in the theological writings of the Musalmans, we should hardly know that it ever existed. This tendency of the Moḥammadans, to separate themselves from Christianity and to supersede it is the leading fact of the Moḥammadan church history of the first two centuries during which the Islâm received its present form.

There remains that I should say a few words on Músà b. 'Oqbah and Abú Ma'shar, who, as I have stated above, were pupils of Shorabyl and left works on the biography of Moḥammad.

Músà b. 'Oqbah Asady was a client of the family of Zobayr or rather of Omm Khálid, who was either the mother or step-mother of 'Orwah. He was one of the learned men of Madynah. His two brothers, Moḥammad and Ibráhyim were also men of great erudition, and they all three when they sat in the mosque of Madynah, were surrounded by large circles of pupils. Sibṭ Ibn 'Ajamy puts him in his "Black-Book," which has the title of *Tabyyn biasmâ al-modallisyn*, accusing him of Tadlys,\* but it appears to me that he does not substantiate his charges. Ibn 'Oqbah's campaigns are

\* Tadlys is of two kinds; first the Tadlys al-isnád: a man relates from a contemporary what he has not heard from him, but believes to have heard from him omitting the name of his real informant. Sometimes he does not omit the name of his Shaykh but of another witness, who is of weak authority or close to his own time, with a view to enhance the value of the tradition. Second, Tadlys al-shoyúkh: a man gives a name or *cognomen* to his Shaykh by which he is not known. Persons are frequently induced to commit the latter kind of Tadlys by a desire to make the reader believe that they have consulted a great number of authorities. Thus a man might say: "Zohry informed me" then "Ibn Shibáb informed me" then "Moḥammad b. Moslim informed me," meaning one and the same person, yet the reader would probably think three distinct authorities are quoted. Sometimes the intention is to disguise the name of a weak witness.



very highly spoken of. Soyúty says in his *درر المنتثرة* as follows :  
 اما المغازي فكتب الواقدي قال الشافعي كذب وكتب ابن اسحق اكثرها عن  
 اول الكتاب وليس فيها اصح من مغازي موسى بن عقبة “As to the  
 works on the campaigns [and life of Mohámmad] it has been ob-  
 served by Sháfíy that the works of Wáqidy are a tissue of lies. The  
 beginning of the work of Ibn Isháq is equally for the greater part  
 a lie. There exists no more correct book on the subject than that  
 of Músà b. 'Oqbah.” Málik's opinion of Ibn 'Oqbah's work is  
 equally favorable. His words are “He was a trustworthy, good man  
 and his work on the campaigns is good.” Ibn Mo'yn says : كتاب  
 موسى بن عقبة عن الزهري من اصح هذه الكتب “The work of Músà  
 b. 'Oqbah, who follows the authority of Zohry, is one of the most  
 trustworthy books on this subject.” It would appear from this  
 that it was but a new edition of Zohry, which as I have said was  
 but a new edition of 'Orwah. But some authors deny that he  
 heard Zohry. This however, is contrary to Bokháry, p. 573. Ibn  
 'Oqbah was also instructed by 'Orwah himself, by 'Ikrimah, the  
 client of Ibn 'Abbás, and generally speaking by the same class of  
 men as Ibn Isháq. He died at Madynah in 141, ten years before  
 Ibn Isháq.

Abú Ma'shar Najyh b. 'Abd al-Rahmán was a native of Sind, and  
 a freed slave of a woman of the Makhzúm family. Some authors  
 maintain that he was not a Sindian but a Himyarite. How he fell  
 into slavery and gained his liberty is not mentioned. He lived at  
 Madynah, but in 160 the Khalif Mahdiy visited that city and took  
 him to the 'Iráq, allowing him an annual stipend of one thousand  
 dynars. He attained a high age, but lost the use of his faculties be-  
 fore his death, which overtook him in 175. Imám Ahmad put a high  
 value on his work. Among his informants were Hishám, a son of  
 'Orwah, Mohámmad Ibn al-Monkadir, d. 131, and Sa'yd b. Mosayyab,  
 and he enjoyed the advantage of being instructed by Mohámmad b.  
 Ka'b Qoraytzy himself, whereas Ibn Isháq received traditions from  
 him second-hand only.

There were several other men, who during the first 150 years  
 after the flight collected materials for the history of the prophet.  
 Two of them, Abú Mijlaz and Abú Isháq are of peculiar interest,  
 because they are not quoted by Ibn Isháq nor it would appear have



they been consulted by Ibn 'Oqbah and Abú Ma'shar, but nearly the whole of Ibn Hibbán's biography of Moḥammad is taken from Abú Isháq, and he as well as Abú Mijlaz are constantly quoted by Bokháry, Ibn Sa'd and Ibn Aby Shaybah (d. 235).

Abú Isháq 'Amr b. 'Abd Allah Hamdány, was a soldier by profession and took part in several campaigns. His pay amounted to 300 dirhams a month, and according to another account, referring perhaps to a different time, to one thousand. He saw a great many companions of the prophet and among them 'Alyy, and recorded traditions from thirty-eight of them. His principal informant is Bará b. 'Ázib, who offered his services for the Badr campaign, but was rejected on account of his youth, and died in 72. We have details on every chapter of the biography of Moḥammad from Abú Isháq, but in many instances though palpably fictitious they agree literally with those contained in Ibn Isháq, though they rest on different authorities. Abú Isháq attained the high age of ninety-nine years, and died in 127 or 128.

All the men whom I have hitherto mentioned were of Madynah, or at least belonged to the Madynah school, but Abú Mijlaz Láhiq b. Homayd Sodúsy was of Baḡrah, and spent the greater part of his life in Persia. He came with Qotaybāh b. Moslim to Marw and settled there, and it would appear that he was placed in charge of the public treasury and mint of Khorásán. He died between 100 and 109. Among his informants were Jondob b. 'Abd Allah, d. after A. H. 60, Hasan, the son of 'Alyy, Ibn Nohayk and others. His traditions are of greater importance for the life of Moḥammad than those of any other authority. They are numerous, and there is every reason to suppose that they have been taken down during his lifetime.

It was my intention to bring the history of the biography of Moḥammad down to the time of Wáqidy and his secretary, and to examine their authorities as well as those of the historical traditions contained in Ibn Aby Shaybah, d. 235, but this article already extends to such a length, that I must conclude my history with the year 140, after the death of Moḥammad. There is another subject which might have been of some interest, and that is the manner in which traditions were propagated in those days, and the canons of criticism which were in vogue.

*Table of heights and distances along the proposed line of Railway from Surat to Agra.—Communicated by Sir R. HAMILTON, Bart. Agent to the Governor General for Central India.*

*Bombay, Baroda and Central India Railway.*

| Distance from<br>Bombay in<br>miles. | Name of place.                                        | Height in feet above<br>low water at<br>Broach. |
|--------------------------------------|-------------------------------------------------------|-------------------------------------------------|
|                                      | Surat, .....                                          | 80                                              |
| 219.                                 | Broach, .....                                         | 143                                             |
| 263.                                 | Dubai, .....                                          | 145                                             |
| 334.                                 | Rajpore Ali, .....                                    | 994                                             |
| 352.                                 | Joneami Ghaut, .....                                  | 1,385                                           |
| 369.                                 | Para, .....                                           | 1,325                                           |
| 387.                                 | Tirla Ghaut, .....                                    | 1,850                                           |
| 419.                                 | Dhar, .....                                           | 1,850                                           |
| 459.                                 | Indore, .....                                         | 1,853                                           |
| 480.                                 | Ragoogurh, .....                                      | 1,960                                           |
| 495.                                 | Gola, .....                                           | 1,650                                           |
| 503.                                 | Tuppa bari Ghaut, .....                               | 1,788                                           |
| 507.                                 | Tuppa Ghaut, .....                                    | 1,865                                           |
| 524.                                 | Ashta, .....                                          | 1,620                                           |
| 548.                                 | Camp of Sehor, .....                                  | 1,620                                           |
| 567.                                 | Bhopal, .....                                         | 1,690                                           |
| 578.                                 | Balrampoor Ghaut, .....                               | 1,640                                           |
| 604.                                 | Bhilsa, .....                                         | 1,406                                           |
| 636.                                 | Oodeypoor, .....                                      | 1,336                                           |
| 698.                                 | Budwur (on road from Lullutpoor to Chandeyree,) ..... | 1,250                                           |
| 715.                                 | Betwa river (near Series Ghaut), .....                | 1,008                                           |
| 757.                                 | Jhansi, .....                                         | 745                                             |
| 785.                                 | South bank of Sind River, .....                       | 640                                             |
| 806.                                 | Antree pass, .....                                    | 960                                             |
| 817.                                 | Gwalior, .....                                        | 670                                             |
| 849.                                 | Chumbul river, flood level of, .....                  | 458                                             |
| 884.                                 | Agra, .....                                           | 565                                             |

*April 4th, 1856.*

*A visit to the Rock-cut temples of Khandgiri.*—By E. A. SAMUELLS, Esq. B. C. S., Commissioner of Cuttack.—Communicated by the Government of Bengal.

*Cuttack, the 25th February, 1856.*

*To the Secretary to the Government of Bengal.*

SIR,—I have just returned from a visit to the Rock-cut temples of Khandgiri in the Khas estate of Khoordah, and wish to draw the attention of the Lieutenant-Governor to the present state of these very interesting monuments of antiquity. A full account of them will be found in the text book which accompanies the illustrations of Fergusson's *Rock-cut temples of India*, (p. 10) in Sterling's *History of Orissa* (p. 149), and in the 6th and 7th Vols. of the *Journal of the Asiatic Society*. I need only mention here, that they are supposed by Fergusson to be, with one exception, the most ancient works of this class in India, and are deservedly objects of great interest to Indian Archæologists, and to all, indeed, for whom the combination of gigantic works of art with picturesque scenery has any charms.

2. I found the temples in very much the same state as that described by Fergusson, although, from the circumstance of there being only one or two byragees in the place at the time of my visit, I was more fortunate than he was in being able to penetrate every portion of the different caves, and to note accurately the extent to which injury to the sculptures had proceeded.

3. The friezes in the verandahs of the caves I found generally in very good preservation, though so begrimed with soot from the fires which the byragees have been in the habit of burning beneath them, that it requires a good light to make out all the details. The figures stand well out from the wall, and the judicious use of a brush with soap and water, would in the course of a few days restore them to their original beauty.

4. The life-size figures at the angles of the caves, have suffered more. The features of the very interesting figure in the cave called the "Thakoor Gumphā," which represents a man clothed in a kilt and socks or buskins, are completely destroyed, and the upper part

of the figure much injured. Most of the other large statues have suffered mutilation to a greater or less extent, and one very fine statue of a woman has been rendered indecent and otherwise disfigured.

5. The byragees and other religious mendicants, who from time to time take up their abodes in the caves, have built up many of the spaces between the pillars of the verandahs with wattle-and-dab walls, and have done their best to destroy the appearance of the place.

6. I have directed the magistrate of Pooree to take advantage of the absence of the byragees to have the whole of these walls removed, and all the rubbish and dirt collected about the caves swept out. The Bhubanessur Police have orders to take care that these nuisances are not renewed; and the Surburakar of Khandgiri, who seemed to feel ashamed of the state of the caves, promised that he would do his utmost to prevent the byragees from cooking in the verandahs in future, or doing any thing else which might tend to disfigure the sculptures.

7. It will probably be necessary, however, to station a burkundaz permanently at Khandgiri to protect the caves from injury, and I would suggest that one burkundaz should, for this purpose, be added to the establishment of the Bhubanessur Force. If the Lieutenant-Governor approves of this suggestion, a proposition statement in the usual form will be submitted.

8. Some small expenditure will also be necessary to cleanse the friezes and other sculptures, and to improve the steps leading from one cave to another, which at present are rather perilous. I think it probable that one hundred Rupees will cover the whole expense, and I would recommend that the magistrate of Pooree and the executive officer of the division should be authorized to expend that sum in cleansing the sculptures and repairing the steps and paths on the Udayagiri,\* and if possible also on the Khundgiri hill.

I have, &c.

(Signed) E. A. SAMUELLS,  
*Commr. of Circuit.*

\* All the most interesting caves are on the Udayagiri hill.



PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR MARCH, 1856.

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The Society met on the 5th inst. at half-past 8 P. M.

C. ALLEN, Esq. Sr. Member of the Council present, in the chair.

The minutes of the preceding month were read and confirmed.

Read a letter from W. Muir, Esq. Secretary to the Government, N. W. Provinces, announcing the despatch of four silver coins found near the foundation of an old house in Pergunnah Surgree.

The following gentlemen, duly proposed and seconded at the last meeting, were balloted for and elected ordinary members.

Bábu Rájendralál Mittra.

J. F. Curtis, Esq.

Major R. R. W. Ellis, 23rd Regt. B. N. I.

The Council submitted reports—

1st. Announcing that they have appointed Bábu Gour Doss Bysáck Assistant Secretary and Librarian to the Society in the room of Bábu Rájendralál Mittra resigned.

2nd. Submitting a list of books required for the Library and requesting permission to devote a sum, not exceeding Rs. 600, to the purchase of them.

The reports were approved and the proposed expenditure sanctioned. Communications were received—

1. From Bábu Rádhánáth Sikdár, enclosing a register kept by Dr. Withecombe of the mean temperature and fall of rain at Darjiling, Sikkim, Himalaya, from 1848 to 1855.

2. From Mr. Assistant Secretary Carmichael, forwarding a Meteorological Register kept at the office of the Secretary to the Government of the N. W. Provinces at Agra, for the month of Dec. last.

3. From Dr. Watson, Jessore, submitting the following memorandum on two hot springs in the village of Kujooráh.

"The accompanying bottles are filled with water taken from two springs situated in the village of Kujoorah, nine miles from the station of Jessore, in the direction of Magoorah. The springs are about forty yards apart, and so near the river Chutra, that the waters of that river undoubtedly flow over them during the rainy season.

"One of the springs is covered in with mats and surrounded with a low brick enclosure built by the former proprietor of the sugar-factory in that village; the factory is now out of repair and will soon become a ruin. The other spring is unprotected and open to the air. The temperature of both springs when I visited them at 7 A. M. on the 2nd February was 82° degrees Fahrenheit.

"The water of these springs has a disagreeable taste, as if slightly impregnated with ink, and on its course to the river, leaves a rust-coloured deposit upon the clay. The quantity of water furnished by the spring surrounded by a brick enclosure is 6 quarts in 12 seconds, or 450 gallons per hour; the volume of water supplied by the other spring, I was unable to determine.

"The natives make no use of the spring-water either for medicinal or domestic purposes. There are no wells in the neighbourhood, and the villages rely solely on the river for their supply.

"I have no doubt that the springs are, to a certain extent, chalybeate, and this circumstance occurring in the Delta of the Ganges is curious, and shews that the depth of alluvial deposit in Jessore is not so thick, as is generally supposed. I would therefore request the favour of the water being submitted to analytical examination. Dr. Palmer, the Civil Surgeon of Jessore, reported on these Kujoorah springs in December, 1854, to the magistrate of the district, but I have not heard that anything has resulted from his report."

4. From Col. Birch, Secretary to the Government of India in the Military Department forwarding a report by Mr. H. Schlagintweit on the progress of the Magnetic Survey in Sikkim and the Khosia hills.

The Librarian submitted his usual monthly report.

After the conclusion of the ordinary business of the evening Mr. H. Schlagintweit at the request of the chairman gave a short account of his operations during the last year in Sikkim and Assam and exhibited some fine panoramic views and other sketches made

by himself in different parts of the country through which he had lately travelled. He also presented to the Society a copy of a work by himself and his brother Adolphe on the physical geography and geology of the Alps.

On the motion of Mr. Allen, the best thanks of the Society were voted to Mons. H. Schlagintweit for the interesting details he had given.

#### LIBRARY.

The library has received the following accessions during the month of February last.

#### *Presented.*

The A'aras-i-Bozorgan, being an obituary of pious and learned Moslems from the beginning of Islam to the middle of the 12th century of the Hijrah, Edited by W. Nassau Lees, 8vo.—BY THE EDITOR.

Selections from the Records of Government, N. W. P. part XXIII.—BY GOVERNMENT OF THE N. W. P.

Selections from the Records of the Bengal Government, No. XXIII.—BY THE GOVERNMENT OF BENGAL.

Proceedings and Correspondence connected with the late Public Works Commission for the Madras Presidency, Madras, 1855, 8vo. pamphlet.—BY THE SAME.

Selections from the Records of the Madras Government, 1855, No. V. Report of the Annamullay Forests.—BY THE GOVERNMENT OF MADRAS.

Papers and Proceedings of the Royal Society of Van Diemen's Land, Vol. II. p. III.—BY THE SOCIETY.

Journal of the Statistical Society of London, Vol. XVIII. p. IV.—BY THE SOCIETY.

The Oriental Christian Spectator for January, 1856.—BY THE EDITOR.

The Calcutta Christian Observer, for February, 1856.—BY THE EDITORS.

The Oriental Baptist, No. 110.—BY THE EDITOR.

La Science pour Tous, No. 2.

The Upadeshak, No. 110.—BY THE EDITOR.

Report of the Calcutta Public Library, for 1855, 8vo. pamphlet.—BY THE CURATORS OF THE LIBRARY.

#### *Exchanged.*

The Athenæum, for November, 1855.

London, Edinburgh and Dublin Philosophical Magazine, No. 68.

*Purchased.*

L'Athenæum Français, Nos. 44 and 47.

The Literary Gazette, Nos. 2026 to 2030.

Revue des Deux Mondes, 15th November and 1st December.

Comptes Rendus, Nos. 18 to 23.

Journal des Savants, November, 1855.

The Edinburgh Review, No. 209 for January 1856.

The Quarterly Review, No. 194.

Annales des Sciences Naturelles, vol. III. No. 6.

Williams' Sanskrit Grammar, 8vo.

Bohlen's Ritusanhâra, 8vo.

Williams's Vikramorvasî, 8vo.

Johnson's Selections from the Mahâbhârata, 8vo.

RA'JENDRALA'L MITTRA.

1st March, 1856.

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FOR APRIL, 1856.

At a monthly general meeting of the Society held on the 2nd inst. at the usual hour.

Sir JAMES COLVILLE, Kt. President in the chair.

The proceedings of the last meeting were read and confirmed.

Presentations were received,

1. From the Rev. S. Hislop of Nagpore, through the Rev. Dr. Duff, a collection of fossil shells from Central India.

2. From D. W. Mitchell, Esq. Secretary to the Zoological Society of London, the Transactions and proceedings of the Society.

3. From the Imperial Academy of Sciences, Vienna, the latest publications of the Academy.

4. From the Government of the N. W. Provinces through Capt. Maclagan, officiating Principal of the Thomason Civil Engineering College, a copy of the Report on prisons in the N. W. Provinces for the year of 1854.

The Council submitted reports,—

1st. Announcing that Capt. James having resigned his place in the Council, they have elected Dr. Sprenger subject to the confirmation of the next meeting a member of their body and Joint Secretary to the Society, and have added the name of Bábu Rájendralál Mittra to the Sub-Committees of Philology and Library.



2nd. Suggesting that the Society request the Right Hon'ble Viscount Canning to become the patron of the Society.

Resolved that a deputation, consisting of the President, Vice-Presidents and Secretary, wait upon his Lordship for the purpose.

3rd. Stating that in their opinion the present state of the Society's finances does not warrant the reduction of subscription proposed by Capt. Thuillier at the December meeting, and that such reduction would materially impair the efficiency of the Society, and submitting the following report drawn up by a special Sub-Committee appointed to take the subject into consideration.

#### REPORT.

"The Committee are of opinion that it is very desirable to reduce the amount of subscription, if it can be effected without bringing the Society into financial difficulties.

"There can be no doubt, however, that the immediate effect of a reduction would be a diminution of the annual income, since the accession of new members could only take place gradually. Unless therefore, the Society is prepared to diminish its annual expenditure or to make up the deficit in income from the small existing surplus, the reduction cannot be effected.

"A reduction of annual expenditure is, under present circumstances evidently impossible; and, in the face of the many calls for increased outlay, the Committee are of opinion that the other alternative is equally impracticable.

"In coming to this conclusion, the Committee have been mainly influenced by the state of the Museum, the constantly increasing claims of which demand the most serious consideration. There is a call, on the one hand for an increase of the Curator's salary and for providing more assistants, and on the other hand for additional space.

"In whatever way the Society may ultimately determine to dispose of some of these questions, the Committee presume that the necessity of maintaining in good order the specimens now in the Museum will be generally admitted. This, the Society is bound to do as trustee for the donors of many valuable collections, and they are equally bound as far as practicable to make these collections accessible to the public. But all the available space in the Society's apart-

ments being already most inconveniently overcrowded with specimens it will soon be absolutely necessary to deal with the question of extending the accommodation of the Museum.

“Your Committee are however of opinion that the support of a Museum on a scale commensurate with the requirements of science in the metropolis of British India is beyond the means of the Asiatic Society, or of any private association, and the Committee recommend to the Council’s consideration the propriety of drawing the attention of Government to the importance of establishing a public museum on a more extended scale, than it is possible for any private body to maintain.

“Such an institution has been established for a year past by the Madras Government, and a small additional grant has recently been provided for the support of a Zoological Garden in connection with it. On the establishment of a great public museum in Calcutta it would probably not be difficult to make arrangements for the transfer to it of the collection belonging to the Society on conditions consistent with the trust character of the property.

“The ordinary yearly charges of the Museum as shewn in last year’s report are as follow :

|                                                                                           |     |       |   |   |
|-------------------------------------------------------------------------------------------|-----|-------|---|---|
| House rent to Curator,.....                                                               | Rs. | 480   | 0 | 0 |
| Establishment, .....                                                                      |     | 290   | 0 | 0 |
| Petty charges including freight, purchase of stoppered<br>bottles and printing, . . . . . |     | 503   | 0 | 0 |
|                                                                                           |     | <hr/> |   |   |
| Total,..                                                                                  |     | 1,273 | 0 | 0 |
|                                                                                           |     | <hr/> |   |   |

“Supposing that the Society, after consulting its absent members, should agree to adopt this suggestion, and that, on the negotiations with Government which would follow, an arrangement could be made to relieve ourselves of this charge, a reduction of subscription from Rs. 16 to Rs. 8 per quarter could be carried into effect without difficulty.”

(Signed) T. THOMSON.  
T. BOYCOTT.  
A. GROTE.  
W. S. ATKINSON.

The subject of transferring the Museum of Natural History to Government gave rise to considerable discussion; it was ultimately proposed by Sir J. Colville and seconded by Dr. Thomson, that the consideration of the report be postponed to the next general meeting.

Dr. Walker moved as an amendment that the report of the special Committee be referred back to the Council for further information on the financial state of the Society.

The amendment was seconded by the Rev. K. M. BANNERJEE and carried.

Communications were received—

1. From Babú Radhánath Sikdár, forwarding Abstracts of the Meteorological Observations taken at the Surveyor General's office in the months of November and December 1855, and January 1856.

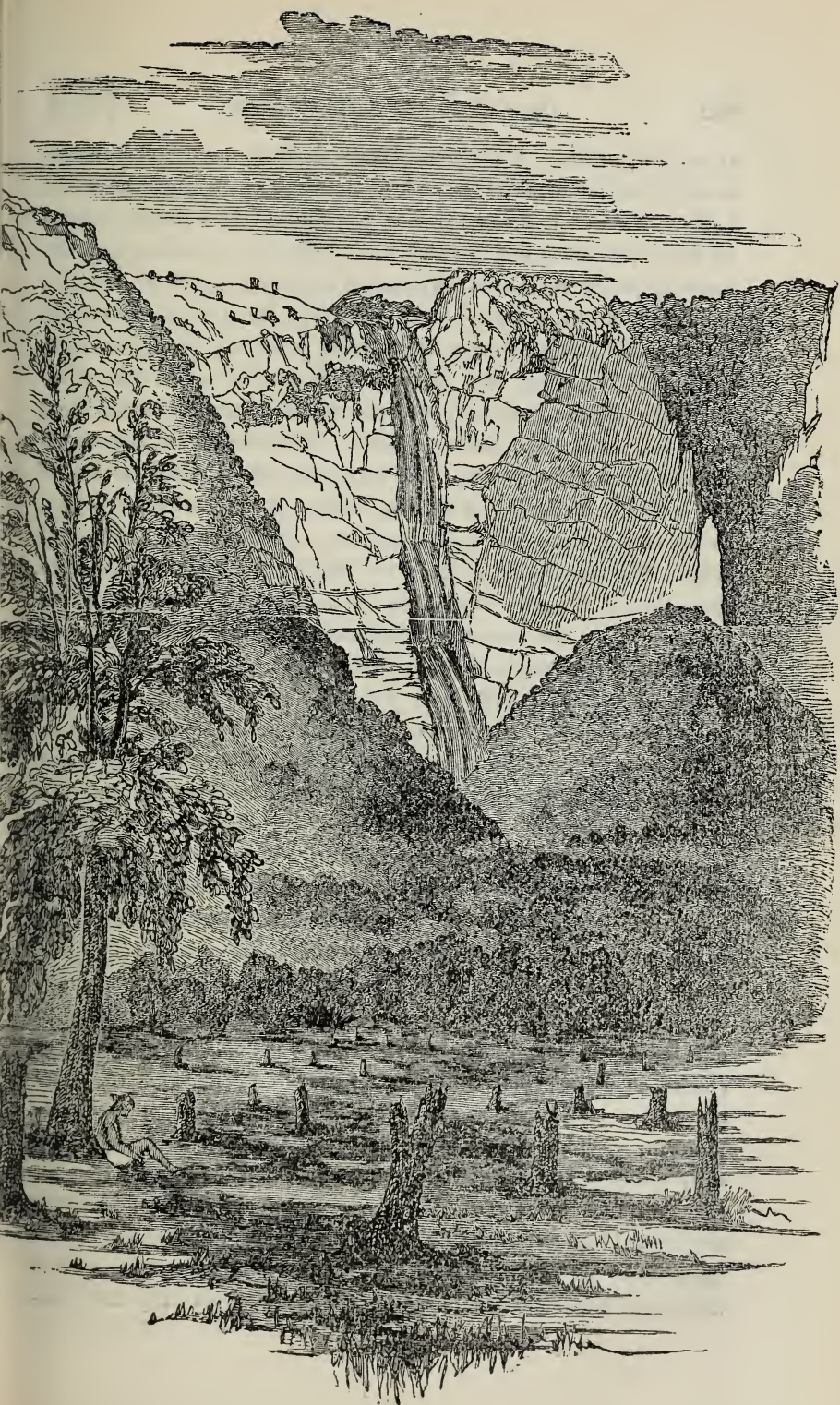
2. From Lieut. R. Stewart, submitting a Meteorological Register kept at Apaloo, North Cachar, during October last.

3. From Capt. G. H. Saxton, Assistant Surveyor General, Cuttack, enclosing an account of a visit to a water-fall in the Bonai province of the South-west Frontier Agency with a drawing.

The account is as follows :—

“ Whilst on Survey duty in the neighbourhood I received information of the existence of a water-fall from the hills on the South-east side of Bonai, a district, through the centre of which, the Brahmini river flows. My trigonometrical operations required that I should ascend the hills and fix a station thereon, somewhere beyond the falls, which were visible from my camp at the village of Kutigoan. Having made arrangements for my camp proceeding towards the East, Dr. Short, Lt. Depree, and myself, on the morning of the 17th January, started for the fall. After about an ordinary march, we had to leave our houses, and with a guide from a little hamlet in the dense jungle, we walked for some distance, by a path completely covered by jungle, when we came to a small opening which appeared to have been the site of a village. A number of jack fruit trees, and abundance of chilli plants, of great size (6 or 7 feet high), I suppose to result from former cultivation. From this spot, we had a beautiful view of the fall, and determined to remain for breakfast and observation. The accompanying sketch (or rather one in water colours from which this is made) by Lt. Depree, was taken







from this position. I was able to make a pretty accurate measurement of a base of 343 feet, and by observing the angle at each end (with a Sextant) to a small tree in the fall, I got a rough distance of 3,140 feet from our position to it. With this distance, and the measured angle subtended vertically, I made the depth of the fall, as it appears in the sketch, about 550 feet. Our position was West from the fall, which during the morning is entirely shaded by cliffs jutting out boldly on both North and South sides. In the afternoon, the shadow gradually withdraws, and the sparking and light make the scene much more splendid. Early in the afternoon we started for a nearer view. The pathless jungle and the nature of the ground, made this a tedious labour, but at last after a final ascent of a considerable height, we were rewarded with a beautiful sight. The position from which we enjoyed the view, immediately faced the fall at a very short distance, and about on a level with the bottom, where the stream changes from the nearly vertical smooth rock, to a rugged channel passing round the foot of the height on which we sat. The cliffs over which the stream falls are a mass of red jasper, and their bold formation and beautiful colour add grandeur to the scene. The rock is very nearly perpendicular, but the water at no part falls for any distance in an uninterrupted descent. In the present state of the country, its inaccessibility must exclude almost all, excepting my own party, from the pleasure we enjoyed; should any others have the opportunity, I would strongly recommend their visiting this fall. I have seen those of the Cauvery in Mysore, and though they are on a grander scale having the body of water of a large river instead of a small mountain stream, this may well be admired as equally lovely. We had to think of getting to our tents which were at the village of Jalandapani, on the other side of a small range of hills, so we retraced our steps to where our horses had been left and reached our tents about sunset. The following morning we ascended the hills to a little village, beautifully situated above the valley, through which the stream runs for some distance before reaching the cliffs. These hills (extending for 10 or 12 miles at about 3,500 feet elevation) and the neighbouring country are well worthy of notice, and I purpose writing a short account of them and some peculiar tribes by which they are inha-

bited. There is one tribe, which though the men wear a cloth as customary elsewhere, the women are in full costume, when, attired in two branches of leafy twigs and some necklaces.

“The waterfall is situated in N. Lat.  $21^{\circ} 47'$  and E. Long.  $85^{\circ} 10'$ , with the town of Bonai (where the Rani, who governs the province, resides) about 11 miles off: a little North of West, on the bank of the Brahmini river, into which, about this place, the full stream runs.”

4. From the Government of Bengal through Mr. Under-Secretary Morris, forwarding copy of a letter from E. A. Samuells, Esq. Commissioner of Cuttack, containing an account of a visit to the rock-cut temples of Khundgiri.

The Librarian submitted his usual monthly report.

#### LIBRARY.

The Library has received the following accessions during the month of March last.

#### *Presented.*

Address of Thomas Bell, Esq., read at the Anniversary Meeting of the Linnean Society, May 24th, 1855.—BY THE SOCIETY.

Transactions of the Linnean Society of London, vols. 6, 9, 12, 15, 19, 20 and 21.—BY THE LINNEAN SOCIETY OF LONDON.

Proceedings of the Linnean Society, for 1855.—BY THE SAME.

Du Buddhisme, par M. J. Barthlemy St.-Hilaire, Paris, 1855, 8vo.—BY THE AUTHOR.

Sitzungsberichte, der Kaiserlichen Akademie der Wissenschaften, Philosophisch-Historische classe Band XIV. Heft I. and II. and Band XV. Heft I.—BY THE ACADEMY.

Mathematisch-Naturwissenschaftlich classe Band XIV. Heft. I. and Band XV. Heft I. and II.—BY THE SAME.

Archiv, für Kunde österreichischer geschichts-quellen, Band XIV. p. 1.—BY THE SAME.

Denkschriften, der kaiserlichen Akademie der Wissenschaften, Mathematisch-Naturwissenschaftlich classe Band XIV. Heft I. and Band XV. Heft I. and II.—BY THE SAME.

Almanack, des Kais: ak-des Wixpenschaften (1855).—BY THE SAME.

Literaturgeschichte der árabes. By von Hammer Purgstall, sechoter Band Zwiete abtheilung.—BY THE AUTHOR.

Die Tertiärflora auf der Insel Java, Nach den entdeckungen des Herrn fr. Junghuhn beschrieben und érortert in ihrem verhältnisse Zur gesammtflora der Tertiarperiode. von H. R. Göpperts' Gravenhage, 1854, Royal 4to.—BY THE AUTHOR.

Integration der linearen differential Gleichungen mit constanten und veränderlichen co-efficienten, von Dr. J. Petzval, 3rd part.—BY THE AUTHOR.

The White Yajur Veda, edited by Dr. A. Weber, part II. No. 67, Berlin, 1855.—BY THE EDITOR.

The Transactions of the Royal Irish Academy, vol. XXII. part V. 1855.—BY THE ACADEMY.

Proceedings of ditto for 1853-54, part I.—BY DITTO.

Journal of the Indian Archipelago, for September, 1854, 2 copies.—BY THE GOVERNMENT OF BENGAL.

Report of the Inspector General of Prisons, North-Western Provinces, for the year 1854.—BY THE GOVERNMENT OF THE N. W. PROVINCES.

Selections from the Records of the Government N. W. P. part XXIV.—BY THE SAME.

Ditto from the Ditto of the Government of India, No. X.—BY THE GOVERNMENT OF INDIA.

Notice des Biographies originales des arriteurs qui ont ecrit en Langue Indienne on Hindustanie, par M. Garcin de Tassy pamphlet.—BY THE AUTHOR.

The Quarterly Journal of the Geological Society, No. 44.—BY THE SOCIETY.

Bhôdjaprabandha Histoire de Bhôdjaroï de Malwa, en des Pandites de son temps Par Ballal, edited by T. Pavie, 4to.—BY THE EDITOR.

Transactions of the Zoological Society of London, vol. III. part II. vol. IV. p. I. II. III.—BY THE SOCIETY.

Proceedings of the Zoological Society, for 1848 to 1855.—BY THE SAME.

The Report of the British Association for the advancement of Science, for 1854.—BY THE ASSOCIATION.

Rig Veda Sanhita, a collection of Ancient Hindu Hymns constituting the second Ashtaka or Book of the Rig Veda, translated from the original Sanskrit, by H. H. Wilson, vol. II. London, 1854.—BY THE COURT OF DIRECTORS.

Archæologia; or Miscellaneous Tracts relating to antiquity, vol. xxxvi.—BY THE SOCIETY OF ANTIQUARIES, LONDON.

Proceedings of the Society of Antiquaries of London, No. 42.—BY THE SAME.

Journal of the Royal Asiatic Society of Great Britain and Ireland, vol. xv. p. 2 —BY THE SOCIETY.

La Vie et les aventures de Feriac relation di ses Voyages avec ses Observations Critiques sur les Arabes et sur les Antres peupler, Par F. E. Chidiat, Paris, 1855, 8vo.—BY THE EDITOR.

Proceedings of the Royal Society of London, No. 16.—BY THE SOCIETY.  
Indische Studien Beiträge für die Kunde des indischen Alterthums,  
Dr. A. Weber, vol. III. parts II. III.—BY THE AUTHOR.

Memoirs of the American Academy of Arts and Sciences, vol. V. pt. I.  
—1853. Philadelphia.—BY THE ACADEMY.

Re-cueil des actes de l'Académie Impériale des Sciences, Belles-lettres  
et Arts De Bordeaux, (1854, 3e. trimestre).—BY THE ACADEMY.

The Oriental Christian Spectator, for February, 1856.—BY THE EDITOR.

The Calcutta Christian Observer, for March, 1856.—BY THE EDITORS.

The Oriental Baptist, for March, 1856.—BY THE EDITOR.

Kurze Sanskrit-Grammatik zum Gebrauch für Anfänger von Theodor  
Benfey, Leipzig, 1855.—BY THE EDITOR.

Proceedings of the Trevandrum Museum Society, pamphlet.—BY THE  
SOCIETY.

The Tuttwabodhini Patrika, No. 152.—BY THE TUTTWABODHINI SABHA.

Papers and Proceedings of the Royal Society of Van Diemen's Land,  
vol. II. p. III.—BY THE SOCIETY.

*Exchanged.*

The Philosophical Magazine, No. 65.

The Athenæum, for December, 1836.

*Purchased.*

The American Journal of Science and Arts, No. 60.

Wright's Analectes sur l'Histoire et sur Littérature des Arabes d'  
Espagne par A. Makhari, vol. I. p. I.

Comptes Rendus, Nos. 24—28.

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Early Christianity in Arabia; an Historical Essay by T. Wright, London  
1855, 8vo.

Specilegium Syriacum: containing remains of Bardeson Meleter Am-  
brose and Morabar Serapion, edited by the Rev. W. Cureton, London,  
1855, 8vo.

Journal des Savants, for December, 1855.

A Glossary of Judicial and Revenue Terms and of Useful Words, accru-  
ing in official documents, relating to the Administration of the Government  
of British India, by H. H. Wilson, London, 1855, 4to.

Vikramorvasī: A Drama by Kālidāsa, edited by M. Williams, Hertford,  
1849, 8vo.

Biblical Researches in Palestine, Mount Sinai and Arabia Petraea, a  
Journal of Travels in the year 1838, by E. Robinson and E. Smith, 3 vols.

Rig Veda ou Livre des Hymnes, traduit du Sanskrit par, M. Langlois,  
Paris, 1851, 4 vols. 4to.



An Elementary Grammar of the Sanskrit Language, by M. Williams, London, 1846, 8vo.

A Dictionary of the Bengali Language with Bengali Synonymes and an English Interpretation,—By the Rev. W. Morton, Calcutta, 1828, 8vo.

Astley's Collection of Voyages and Travels, 4to. 4 vols.

Les Pourânas etudes surles derniers monuments de la Litterature Sanskrita, par F. Nève, Paris 8vo. 1852, pamphlet.

The National Atlas of Historical, Commercial and Political Geography, London, folio, 1855.

GOUR DOSS BYSA'CK,

*Librarian and Asst. Secy.*

1st April, 1856.

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FOR MAY, 1856.

At a monthly general meeting of the Society held on the 7th instant at the usual hour.

The Hon'ble Sir James Colville, Kt., President in the Chair.

The proceedings of the last meeting were read and confirmed.

*Read Letters.*

1st.—From Dr. Walker announcing that Capt. Dalton, of Deb-rooghur, Assam, has dispatched the head of a Takeen for the Society's Museum.

2nd.—From the Rev. J. W. Hislop at Bagdad, advising the dispatch of an Assyrian Slab.

The following gentlemen were named for ballot at the next meeting.

Lieut. De Bourbel, Engineers, proposed by Mr. H. V. Bayley, and seconded by Mr. Grote.

Dr. Mouat proposed (for re-election) by Dr. Thomson, and seconded by Capt. Young.

Lieut. Chancey, Madras Army, proposed by Mr. D. Money, and seconded by Mr. Beaufort.

*The Council submitted Reports.*

1st.—Announcing that in accordance with the resolution to that effect at the last General Meeting, a deputation consisting of Sir J. Colville, Dr. Spilsbury, Mr. Grote, Babu Rámopál Ghose, and Mr. Atkinson, waited upon the Right Hon'ble the Governor General, pursuant to appointment to request him to become the patron

of the Society, and that he was pleased to intimate his acceptance of the office.

2nd.—Stating that Lieut. Lees having gone to Europe, his place in the Council had been filled up by the election of Bábu Rájendralál Mittra, subject to the confirmation of the Society at the next meeting.

3rd.—Submitting a memorial from Mr. Blyth to the Hon'ble the Court of Directors, together with a recommendation "that the memorial of Mr. Blyth be forwarded to the Government of Bengal, with the expression of the high sense entertained by the Society of the value of Mr. Blyth's labours in the department of Natural History, and of its hope that the memorial may be favourably considered by the Hon'ble Court."

The memorial is as follows :—

TO THE HON'BLE THE COURT OF DIRECTORS OF THE EAST  
INDIA COMPANY.

The Memorial of Edward Blyth, Curator of the Asiatic Society's Museum, Calcutta.

RESPECTFULLY SHEWETH,—1. That in September, 1855, your Memorialist completed fourteen years of service with the Asiatic Society in Calcutta, as Curator of its Museum, during which long period, he has found that the expenses of living have increased considerably, whilst his salary still continues at its original humble sum of Company's Rupees 250 monthly (granted for the purpose to the Society by your Hon'ble Court); and this, with no kind of promotion nor so much as a retiring pension to look forward to, after any number of years of toilsome service in the climate of Bengal.

2.—That, however desirous the Asiatic Society might be of augmenting your Memorialist's personal allowances, the ever increasing demands upon its income, consequent upon the extension of its collections among other causes, altogether disables it from so doing; and beyond the continuance of a monthly grant of Co.'s Rs. 40, allowed in compensation for some rooms which were formerly occupied by your Memorialist in its Museum, it appears that he cannot hope for a suitable increase of pay from the Asiatic Society, to whatever extent he may exert himself in promotion of its interests.

3.—That the duties of your Memorialist's office are very laborious and of a kind which imperatively demand quietude and the most earnest and undivided attention and constant study; a thorough devotion to them, in fact, which can only be given by a mind undistracted by pecuniary troubles, and freed from the absolute necessity of seeking emolument from other sources, which your Memorialist has been obliged to do, instead of concentrating his whole attention (as he would much rather have done) upon his proper official duties.

4.—It is not for your Memorialist to expatiate upon what he may nevertheless have effected, towards elucidating some branches of the Zoology of India; but he may be permitted to appeal to those naturalists in England who are best qualified to judge of his labours in this line, which have been almost wholly unassisted, and were mostly prosecuted under the great disadvantage of an insufficiency of the necessary books of reference. Under more favourable conditions, and above all, with a personal allowance suitable to the requirements of a decent existence in this very highly and increasingly expensive metropolis, your Memorialist would have been enabled to accomplish more, and in every respect to have proved himself far more efficient in his office; but he has endeavoured to do his best under circumstances of difficulty, and for many years habitually devoted about double the number of hours to the Museum that were required by the terms of his agreement with the Asiatic Society.

5.—That your Memorialist has now passed an important portion of his life in India, and has obtained a familiar practical knowledge of its Zoology in various branches, which materially facilitates the prosecution of further researches; and he is still anxious to bestow the extra time required for such labours and investigations, but finds it impracticable upon present allowances.

6.—He therefore most respectfully memorializes your Hon'ble Court to take his peculiar case into favorable consideration, trusting that some arrangement may be made for granting him a pension after a certain number of years of service, and, in the meanwhile, that a suitable increase of salary may be accorded, that may enable him to devote his entire energies to the multifarious duties of his

Curatorship, unharassed by conflicting pursuits, and by the cares and anxieties inseparable from straitened means.

The recommendation of the Council having been put to the vote was agreed to.

4th.—Submitting with reference to a resolution of the Society at its last meeting the following memo. explanatory of the report of the special Committee which was then read.

MEMORANDA.

“It was the opinion of the Committee that a very considerable outlay is necessary on account of the Museum, no less to secure a proper arrangement and maintenance of its existing collections, than to make due provision for the ever increasing accumulations ; and that, independently of the requirement of the Library, the Museum alone, if justice is done to the valuable collections it contains, and adequate provision made for its extension, will absorb a far larger sum than the present surplus income of Rs. 2152 estimated on its ordinary income and expenditure for the year 1855.

|                                                      |          |
|------------------------------------------------------|----------|
| At present the ordinary annual cost of the Museum is |          |
| about, . . . . .                                     | Rs. 4190 |
| Out of which Government pays, . . . . .              | 3600     |

Leaving a charge on the Society’s finances of, . . . . . 590

This insignificant sum is all that the Society has hitherto felt itself in a condition to devote, as an *ordinary* yearly charge, to the purposes of the Museum.

The Committee after careful consideration came to the conclusion that there was no prospect that the Society’s finances would ever be adequate to the pressing and increasing demands on this head, and, feeling strongly the vast importance to science of a really efficient Museum for reference in the Metropolis of India, they were led to suggest that a proposal should be made to Government to take the matter in hand, as the only probable means of accomplishing this object effectually. On the question of reducing the subscriptions therefore they were clearly of opinion that, so long as the Museum has to be supported, no change can be effected, since there appear to be no grounds for believing that a lower scale of subscription will



ever produce a larger annual income, whilst for a time at least the loss must be considerable.

They next considered, the practicability of lowering the rates, provided the Society were freed from all charges in respect of the Museum. In this case they were of opinion that some change might be effected.

They considered, however, that any small diminution would be impolitic, as not holding out sufficient inducement to attract any considerable number of new members. So that the immediate loss of annual income would probably be a permanent one.

They therefore, though with some doubts as to the result, agreed to recommend a reduction of the subscriptions to one half the present rate, depending on the cash balance of Rs. 5,800 in the Bank to meet present loss, and looking to a large influx of new members to restore the finances ultimately to something like their present amount.

|                                                                      |      |       |
|----------------------------------------------------------------------|------|-------|
| The income in 1855 from 125 members at 16 Rs. per quarter was, ..... | Rs.  | 8000  |
| The income from the same No. at 8 Rs. would be, ....                 |      | 4000  |
|                                                                      |      | <hr/> |
| Producing a loss of, .....                                           |      | 4000  |
| Against this we have a surplus in 1855 of Rs...                      | 2152 |       |
| To which may be added the cost of the Museum,                        | 590  |       |
|                                                                      |      | <hr/> |
| Making a total of, .....                                             |      | 2742  |
|                                                                      |      | <hr/> |
| Leaving to be made up by new members, .....                          |      | 1258  |

The income however derived from each additional member at 8 rupees a quarter will be diminished by Rs. 3-8 a year on account of the extra copies of the Journal required, each No. of which must be estimated to cost in printing and paper at least 8 annas.

Thus each additional member will only produce a net income of Rs. 28-8.

Forty-five new members therefore at Rs. 8 a quarter, producing Rs. 1282-8 would be required to make up the deficiency, and this number the committee hoped might be eventually gained, and even exceeded; unless exceeded, however, there would be no annual surplus, and the Library would still be left in its present unsatisfactory state.

Supposing however that the Society with its present liabilities is desirous of a reduction of subscription without making any further provision than now exists for the proper custody and extension of the Museum, the results, estimated as above, will be as follows:—

A reduction to eight rupees per quarter will require sixty-five new members, with no surplus.

A reduction to ten rupees per quarter will require twenty-four new members, with no surplus.

A reduction to ten rupees per quarter will require no new members, with Rs. 152 surplus.

In these calculations, however, the income has been estimated on the supposition that the full amount of subscriptions due from members is realized, which is never the case; whilst, at the same time, the *ordinary* annual expenditure only has been taken into account, although the actual expenditure on account of *extraordinary* demands is always very much in excess of this.

Both these causes vitiate the above results in the same direction.

Thus in 1855 instead of a surplus of 2152 rupees, there was an actual deficit of about 630 rupees on the year's transactions.

Taking this year, therefore, as a standard, with the minimum of reduction, it would be necessary to obtain as many as 57 additional members at 12 Rs. a quarter to meet the current expenses.

The *extraordinary* expenditure for 1855, incurred chiefly on account of the Museum, was no doubt somewhat in excess of the average outlay under this head, but it serves to show the extent of the demands which the Museum makes on the resources of the Society, and the necessity of a surplus income to meet them."

After some discussion Capt. Thuillier gave notice that he would move at the next General Meeting "that a proposition be submitted to the Society at large, that the subscription of members of this Society be reduced from 16 rupees to 10 rupees a quarter."

5th.—Submitting a letter from Dr. H. H. Wilson, Boden Professor of Sanskrit, in the University of Oxford, relating to the management of the Bibliotheca Indica with their proposed reply.

Professor Wilson's letter is as follows:

SIR,—The interest which I must ever take in the proceedings of the Asiatic Society of Bengal, will I hope, be admitted as some

excuse for my volunteering the communication of my opinions on a measure which I conceive injuriously to effect the usefulness and credit of the Society in this quarter of the world.

The Bibliotheca Indica has established a European reputation, and with a few possible exceptions, has hitherto admirably accomplished the purpose for which it was set on foot, in conformity with the intentions and encouragement of the Court of Directors—the circulation of works relating to the literature, sciences, institutions and religion of the Hindus—which existed only in the perishable and rarely accessible condition of manuscripts in India itself, and which were therefore unavailable to European students. Many valuable works have been printed in the series. Many most acceptable in Europe, among which may be specified the Upanishads, the system of logic, and rhetoric, the Surya Siddhanta, the Black Yajush, &c. These may be regarded as especially fulfilling the objects of the Court, supplying the wants and gratifying the expectations of European Indian scholars, whose only remaining desires are that those works which have been commenced and are yet unfinished should be completed with as little delay as may be avoidable, and that *when they are finished*, publications of a similar character especially those illustrative of the Vedas, and the literature connected with them, as the Bráhmaṇas and Sūtras, should be undertaken.

It is therefore with much concern that the cultivators of Indian literature have observed the disposition lately evinced by the Society, to divert the numbers of the Bibliotheca Indica to a branch of literature which however valuable it may be in some respects, is neither of Indian origin nor relations, throwing no light whatever on the social system of the bulk of the population, and wholly valueless as a clue to the ancient history of the country. The publication is becoming more of a Bibliotheca Arabica, than a Bibliotheca Indica, a character which it was not originally intended to bear and which in India itself can be of interest only to a very few learned Mohammadans, professors and teachers of Islam.

Now it may be questioned if any extensive multiplication of Arabic works is needed for the supply of Arabic scholars in Europe. There is already a copious collection of the most important works in Arabic in print, and Manuscripts are far from rare or difficult of



access. In this country they are numerous, at the British Museum, in the Libraries of Oxford and Cambridge, and there is scarcely a university on the continent without them, whilst Sanskrit MSS. are to be found only in London, Oxford, Paris and Berlin. There is by no means therefore the same reason for perpetuating Arabic MSS. by the Indian Press, and there is no urgent necessity for the intervention of the Asiatic Society of Bengal.

It may also be doubted if, in respect of the Arabic works hitherto committed to the press by the Society, due attention has been paid either to the interests of general literature or the tastes and wants of European Arabic scholars. The *Itqan Sayuty* extending through ten fascicules, the exegesis of the Koran, is no doubt important to Mohammadan Theologians, but few Europeans, it is to be expected, would be inclined to look upon the exegetic sciences of the Koran as a very improving or attractive study. With regard also to the biography of those who knew Mohammed, many of the individuals are of extreme insignificance, and none of them could have exercised any influence on events in India, where the name of Mohammed himself was scarcely known before the tenth or eleventh century. Although also the history of his campaigns and that of the conquest of Syria come within the scope of general literature and may have an interest to the students of Mohammadan history, yet they are open to the same objection that applies to the other works; they have no relation near or remote to India, and do not serve in any way to illustrate its past or present condition. Again, reasonable exception may be taken to such publications as the *Dictionary of the Technical Terms used in the sciences of the Mohammadaus*, on the grounds of incompatibility and expence. The *Bibliotheca Indica* has been hitherto confined to works of moderate size and cost, and has been wisely so restricted, being thus brought within the reach of European purchasers. Dictionaries must always be of greater or less extent and cannot be printed except at a proportionate charge, which will bear heavily upon the funds at the Society's disposal. When printed also they can be sold only at a price which few students in Europe can afford, for the Society must not think that charges which appear moderate in India, will be thought so by oriental scholars in Europe. The sale will therefore be restricted



whilst the outlay is enhanced. Besides which the publication of such a work is quite inconsistent with the intention of the Bibliotheca Indica, which was to furnish scholars with books to read, not to provide students with the means of learning to read them.

The objection to the printing of Dictionaries on the score of expense, applies generally to this extension of the scheme of the Bibliotheca. If it is to comprehend all Mohammadan as well as all Hindu literature, where are the funds to be found? Each is sufficiently copious to absorb all the means placed by the liberality of the Court at the command of the Society for the publication of Indian literature especially; and to attempt to combine with this Arabic literature also, must end in starving both. Exceptions in favour of the latter where bearing upon Indian Mohammadanism or Indian history under the Mohammadans may be admitted, but the usefulness and success of the Bibliotheca will be grievously impaired if the present disproportionate extension of a literature alien to India be persevered in. I have no wish to undervalue the importance of Arabic literature or the merits of those gentlemen by whom it is so zealously and successfully cultivated, but Persia, Arabia, Egypt, Africa, Turkey, are the fields in which it is the most natural and productive crop, whilst in India it is, like the Mohammadans themselves, a stranger and intruder.

Trusting that the Society will receive this, as it is intended, as a proof of my sincere interest in its continued prosperity, believe me,

Yours very truly,

Sd. H. H. WILSON.

To this letter the Council proposed the following reply:—

SIR,—In replying to your letter dated 17th August, 1855, addressed to the Secretary of the Asiatic Society of Bengal, I am directed by the Society to intimate to you the gratification it feels in being assured of your continued interest in its welfare and reputation, whilst it gladly acknowledges that your opinions and advice are entitled to the most attentive consideration, as well from your distinguished position in Oriental Literature, as from the many important services rendered by you to the Society both in India and at home.

The important nature of your communication, affecting alike the

Literary reputation of the Society and its faithfulness in the discharge of a trust committed to it, has given rise to a lengthened discussion amongst the members of the Philological Committee and the Council generally, and has thus occasioned a somewhat protracted delay in framing a reply.

In considering your strictures and suggestions upon the choice of works selected for the *Bibliotheca Indica* it is necessary to recall the origin and intended scope of this series of oriental publications.

It had its origin in the following circumstances :

In the year 1835 the Government of India peremptorily prohibited the publication of any Oriental works at the expense of the fund which had been set apart under the charter act of 1813 to be applied in part to the revival and improvement of Literature and the encouragement of the learned natives of India. It was further directed that the printing of the whole of the Oriental works then in progress with two exceptions should be immediately discontinued.\*

This measure was regarded with extreme regret by the Asiatic Society, and an appeal was made by it to the Governor General in Council begging that the obnoxious order might be rescinded.

The Government declined to accede to the Society's request, but offered to make over, with one or two exceptions, all the unfinished Oriental works to "the Asiatic Society or any other Society or individuals willing to complete them at their own expense."

This offer was accepted by the Society, and they proceeded to complete the unfinished works, proposing at the same time to undertake the publication of a fresh series as soon as this part of their task was accomplished.

To enable them to carry out their views a memorial was drawn up and forwarded to the Court of Directors, in which the Society expressed their assurance that if the Court deemed it "inexpedient to alter the appropriation of the Parliamentary fund, which the local Government had determined upon, they would devise some other means of continuing that encouragement to the cause of Asiatic Literature which reflected honor on the hand that dispensed it ;"

\* It is worthy of remark that the two works excepted from the general sentence were the *Fatawa Alumgiree* and a treatise on Spherl. Trig. both Arabic.

and the memorial proceeds to ask for "pecuniary aid in the expense of publishing standard and useful works in Oriental Literature."

At this period the Society was fortunate in enjoying the advantage of your assistance as its agent in Europe, and you warmly supported the memorial in two letters, dated in 1836 and 1837, in one of which you characterize the grant solicited as "a provision for the encouragement of learned natives and the revival of native Literature, and for publishing the most esteemed writings of the East for the use as much of Europeans as of Asiatics."

The Court replied in a despatch (No. 8 of 1838) addressed to "Our Governor of the Presidency of Fort William in Bengal" from which the following is an extract.

"We are still of opinion that the publication of Oriental works and works on instruction in the Eastern languages, should not be abandoned. We therefore authorize you to devote a sum not exceeding 500 Rupees a month to the preparation and publication of such works either through the medium of the Asiatic Society or any equally appropriate channel."

It was in these general terms that the Court was asked for and accorded the grant out of which the expenses of the Society's Oriental publications have since been defrayed.

The unfinished editions made over to the Society by Government comprized Sanskrit, Arabic, and Persian works, and these having been completed, a new series, under the name of *Bibliotheca Indica*, was commenced in 1847.

This was at first entrusted to the Editorship of a Sanskrit scholar, and all the earlier works which appeared in it were Sanskrit. Dr. Sprenger's work on Arabic Bibliography in 1849 was the first intrusion into the series of another Oriental language and the commencement of Nejamy's *Khiddnamah* in 1852, in Persian was the next.

Subsequently (in 1852) the series was placed on a new footing. The Society dispensed with the single paid Editor and invited Editors of texts from the general body of Oriental scholars.

All offers to edit works were first carefully sifted by the Philological Committee, and if the Council adopted their recommendation, the Society's sanction to the publication was obtained at an ordinary general meeting.



Under this system all the most distinguished scholars, which India now possess, Sanskrit, Arabic and Persian, have been applied to to edit texts. Amongst the proposals consequent on these applications every Sanskrit work, with the exception of those noted in the

\* Charaka, Vaisheshika Sutra,  
Vaisheshika Sutropascāra, Vṛiddha  
Sāla bhanjika, Gotama Smṛiti,  
Golā dhyaya, Mimāṃsā Sutra,  
Yoga Sutra, Kautuka Saraswa.

margin\* which were declined on their merits, has been adopted, and if a greater number of Arabic fasciculi, as compared with Sanskrit, have appeared in any one year, this must be

attributed to the comparative inactivity of the editors of some of the Sanskrit works, and not to any partiality that has been shewn for Arabic literature, as may be seen by a reference to the Society's list of works, published and in progress.†

With regard to the principles of selection, the Society has not considered itself restricted in any way by the terms of the grant to the publication exclusively of works illustrative of Indian civilization.

The general interest of Literature in the historical and social phenomena of Asia with its systems of religion and philosophy have been the considerations which have guided its choice.

Of the estimation in which the Arabic works selected for publication are held in this country an immediate test is afforded by the ready sale they meet with, which, even in the case of the large unfinished works, such as Dr. Sprenger's two dictionaries, has been nearly equal to that of the Sanskrit editions, and will be presumably greater when they are completed.

That they should not meet with the like approval in Europe would be a source of regret to the Society.

Whilst, however, the Society cannot admit, in view of the circum-

† In addition to these the Philological Committee have agreed to recommend the following works for publication when the state of the funds permits.

|                  |                   |
|------------------|-------------------|
| Veṇisañhāra.     | Aniruddha-champu. |
| Anargharāghava.  | Kāvya-dars'a.     |
| Prasannarāghava. | Setubandha.       |
| Nāgānanda.       | Nyaya Sutra.      |
| Lalitamādhava.   | Vīshṇu Purāṇa     |
| Vidagdhamādhava. | Daśarūpaka.       |



stances attending the Government grant, that they have violated any obligation, expressed or implied, to expend it exclusively in "the circulation of works relating to the Literature, Sciences, Institutions and Religion of the Hindus," they are at the same time quite ready to consider the expediency of introducing further changes into the management of the Bibliotheca Indica.

But absolutely and by positive rule to restrict the Bibliotheca Indica to Sanskrit works, or to works relating exclusively to India, would, they think, be unwise as regards the interests of Oriental Scholars in Europe, and mischievous in the discouragement it would afford to the cultivation of Arabic and Persian literature in this country, where it possesses such ardent and able votaries.

But it is the desire of the Society, no less than their interest, to satisfy the tastes and meet the wants of the learned in Europe, and recognizing you as an authoritative exponent of those tastes and wants, they have every disposition to be guided in a great measure by the views which you have so ably advanced for their consideration and whilst giving you this assurance they desire to express their sincere obligations for the friendly interest you have now and at all times manifested in the prosperity of a Society with which you have been so long and so intimately connected.

I have, &c.

The reply was approved and adopted.

The election of Dr. A. Sprenger as a member of the Council and Joint Secretary to the Society reported at the last meeting, was confirmed under bye-law 60.

Communications were received

From Babu Rádhánáth Sikdár, forwarding copy of a Meteorological Register kept at the Surveyor General's Office, Calcutta, for the month of February last.

From Mr. Assistant Secretary Oldfield, enclosing copy of a Meteorological Register kept at the Office of the Secretary to the Government of N. W. P., Agra, for the months of February and March, 1856.

From Sir R. Hamilton, Bart., Agent to the Governor-General,

Central India, sending a table of heights and distances along the Railway line from Surat to Agra.

From Col. Hannay through Mr. Grote, announcing the discovery of a rich vein of iron ore at Dhubri.

The Secretary read extracts from the letter.

From Mr. Piddington, submitting a paper entitled, "A second series of experiments to ascertain the mean quantity of silt held in suspension by the water of Hooghly in various months of the year, and also the quantity carried out to sea," as also "Notes of an examination of three specimens of Bengal mineral waters."

The Librarian submitted his usual monthly report.

Mr. Oldham, at the request of the President, proceeded to give some account of the results he had arrived at from the investigations conducted by himself and his assistants in the Geological Survey in Central India during the past season.

Briefly referring to the many valuable papers which had been contributed by previous observers illustrative of the Geology of Central India, and to the fact that few parts of the immense empire of India had excited more interest and attention than the districts adjoining the Nerbudda river, Mr. Oldham pointed out that the great thickness of sandstones and associated beds, which formed the mass of the Vindhya range, was the most striking and remarkable feature in that country. This had been spoken of as "*the sandstone*," "*the great sandstone, &c.*" Capt. Franklin had referred it to the age of the middle portion of the new red sandstone of European geologists. Jacquemont, for the greater part at least of the area, assented to this view. Other observers had given it a different position. Captain Sherwill for instance had mapped it as Old Red sandstone, although giving it the somewhat anomalous position of resting upon "mountain limestone." In 1854, Dr. Carter of Bombay had published a carefully compiled summary of the Geology of India, in which the whole of this sandstone and associated beds was referred to the same age as the coal bearing rocks of Bengal, all which he classed with the Oolitic or Jurassic epoch of European geologists, and he took his typical groups, and the names for his subdivisions from localities in this district. He divided the whole into three sub-groups, which he called—Tara, Kuttra and Punnah groups, in

ascending order; the coal being supposed to belong to the central or the Kuttra group. And this classification he applied to other districts. Again on the geological map of India, recently published under the sanction of the Court of Directors, by Mr. Greenough, all this immense area, stretching from the Soane to near Mundlairsir in the Nerbudda, was placed under the general head of Oolitic and Diamond sandstone and limestone.

The researches of the Geological Survey of India, had extended over a considerable portion of this district during the past season, and although much remained to be done in working out the details, as might be anticipated in so large an area, sufficient had been learned to enable a few great conclusions to be drawn. It was at present impossible to give all the detailed illustrations of these, and they would therefore be only stated as briefly as possible. The importance of them would at once be recognised by those who had given any attention to these enquiries, tending as they did to modify existing opinions, and to alter the colouring of all our geological maps in the most marked and extended way.

Their late investigations had shewn—that there was good evidence of a great faulting, accompanied by much disturbance mechanically, and by much alteration chemically, in the rocks, (more especially to the south of this fault), which passed along the main line of the Nerbudda valley, along the continuation eastward of this line down the valley of the Soane; and thence across Behar, where the continuation of the same rocks formed the Kurruckpoor hills.

That there was a high probability that this line of dislocation was continued to the east by north, up or towards the valley of Assam; its main direction being E.  $15^{\circ}$  to  $18^{\circ}$  N., corresponding with the main direction of the Vindhya range and the Khasi hill range.

That south of this dislocation the great group of sandstones, shales, &c., forming the Vindhya hills, was almost entirely absent, (unless it were admitted, see below, that the highly metamorphosed rocks there seen were the continuation downwards of the same series greatly altered).

That this great group was altogether of a different character and of a more ancient epoch than the beds associated with the coals of

Bengal and of Central India. (The latter resting quite unconformably on the former).

That from the absence of organic remains, there was as yet no evidence on which to base a reference of this group to any established epoch of European geology. (It *might be* Cambrian).

That the names hitherto assigned to this group and its subdivisions being based on erroneous views of position, and therefore tending to erroneous conclusions, must be abandoned.

For the whole formation Mr. Oldham proposed the name *Vindhyan*, stating that it appeared most desirable that the general *physical* relations of the rocks should be determined, and the several groups established on such evidence derived from the actual arrangement and sequence of the rocks rather than from some fancied or imperfectly established analogies derived from partially collected or partially examined organic remains. When the actual sequence of the various groups had been established, wherever this was possible, the organic evidence would be valuable. Applying the name *Vindhyan* then to this great group as being best seen in the well exposed scarps of the *Vindhyan* range, he would propose as distinctive of the subdivisions in ascending order, the names *Kymore*, *Rewah* and *Bundair*. These minor groups were only given provisionally, as it was possible that more detailed examination would shew that there was only a twofold division, and that the *Rewah* limestone and *Bundair* sandstone were only repetitions of the *Soane* valley limestone and sandstone produced by faulting.

Resting unconformably upon the *Vindhya* formation, there was a considerable thickness of sandstones, shales and coals, (in Central India much disturbed, and traversed by trap dykes). The total thickness of this group in this district exceeded some thousand feet. In these beds occurred numerous fossil plants, which thoroughly identified these rocks with the coal-groups of *Burdwan*, of *Hazareebaugh* and of *Cuttack*. No *additional* evidence tending to settle the doubtful question of their true geological epoch had been obtained, nor on the other hand anything to shake the probability of their *Jurassic* date.\*

\* Taking it as proved that the strata at *Kotah*, from which the fish and *Saurian* remains had been obtained, were the same with those of *Kampti* near *Nagpore*, the



Resting again quite unconformably upon these rocks was found another series of sandstones, often ferruginous, generally speaking irregularly though strongly bedded, and of great thickness. These formed the lofty and boldly scarped range of the Puchmurry or Mahadewa hills. And to this group Mr. Oldham proposed to give the name of Mahadewas. No organic evidence had been found in these. In one or two places they seemed to pass upwards conformably into sandstones holding remains of large mammalia (and probably of Sewalik date.)

This group was markedly separated from the coal-bearing group below, and as compared with it was also characterized by the comparative absence of trap dykes or other exhibitions of igneous rocks.

Upon these, in parts of the district, rested the great spreading sheets of trap rocks forming the continuation of the immense basaltic field of the Deccan. Four and five distinct flows could readily be traced in places. And adverting to the occurrence of the beds containing shells (*Physa*, *Paludina*, *Unio*, &c.) which were found between these flows (Intertrappean lacustrine formation, of Carter) *so far as the evidence derived from the Nerbudda district was concerned*, it appeared that there was no reason to suppose that they were confined to any one layer or flow, and still less reason to suppose that their present aspect and condition was due to the intrusion of the igneous rocks from below (as advocated by some), but that on the other hand there was much ground for thinking that this alteration was entirely due to the subsequent overflowing of the heated mass of the trap above, and to the disturbances consequent on the exhibition of such powerful forces as must have accompanied the production of these immense flows of lava. These shelly beds seemed to have been formed by tranquil deposition during the intervals between the successive flows of igneous rock, and to have been broken up indurated and baked by the succeeding outbreak. Mr. Oldham stated, that in making this remark, he wished to say that he had not had the opportunity of seeing the localities referred to by Messrs. Hislop and Hunter, near Nagpore, from which those careful observers had drawn their conclusions, but that his view had strong *Permian* analogies of the Saurians (*Brachyops*) ought not to be overlooked. But the identity of the strata was, he thought, still to be established.

been derived solely from the facts presented to him in other places.

The detailed examination of the greater part of the Nerbudda district was due to the exertions of Mr. J. G. Medlicott.

The following would therefore give a summary view of the groups here proposed in descending order, neglecting for the present all the more recent divisions.

|          | Groups.                                                          | Mineral character.                                                                                                                                            | Age, &c.                                                                                                                                                                      |
|----------|------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          | Mahadewa,.....                                                   | Sandstones, with a few shaly beds, for the most part pebbly, often striped with ferruginous bands.                                                            | Geological age unknown, a few vegetable fossil stems, &c.                                                                                                                     |
|          | Damoodah,.....                                                   | Shales, sandstones, coal, for the most part thinly bedded and regular, often greatly cut up by trap dykes. <i>In Cuttack however there are no trap rocks.</i> | Age not thoroughly decided, probably Jurassic, fossils chiefly vegetable—name taken from the locality where series is most fully developed.                                   |
| Vindhya. | Bundair, ....                                                    | Sandstones, and shales.                                                                                                                                       | Age unknown, probably very ancient, seen all along Vindhya range, into Behar and to the Ganges at Monghyr. Probably also in the Khasia Hills. Possibly only two subdivisions. |
|          | Rewah, .....                                                     | Limestones, shales and sandstones.                                                                                                                            |                                                                                                                                                                               |
|          | Kymore, ....                                                     | Sandstones and limestones and shales.                                                                                                                         |                                                                                                                                                                               |
|          | Sub-Kymore,....<br>(name proposed by H. B. Medlicott, Esq.),.... | Crystalline limestone pseudo-gneiss, micaceous schists, and quartzites, red and green, and white, ....                                                        | Highly probable, though not yet thoroughly proved, that these are only the continuation downwards of the Vindhya groups subsequently altered.                                 |

Granite, gneiss, hornblende-rock, greenstone, &c.

Another district of considerable interest had also been examined during the past season, by Messrs. Blandford and Theobald, and the results arrived at under their careful scrutiny had been strongly confirmatory of the results given above. The Cuttack, or Talchere coalfield gave the following section, descending:—

*Alluvium, laterite, &c.*

1.—Upper grit series,—unfossiliferous—quartzose grits and coarse sandstones, with occasional red shales; pebbly throughout, and near base conglomeritic—above 2000 feet.

2.—Carbonaceous shale series, fossiliferous, consisting of—

(a)—Blue and lilac shales, micaceous; white speckled sandstones and ironstones, about 1500 feet thick.

(b)—Carbonaceous shales containing thin seams of coal (3 inches) irregularly dispersed through them, about 200 feet.

(c)—Shales and coarse white sandstones, the latter predominate in lower portion, 100 to 200 feet.

3.—Lower shale and sandstone series, annelide tracks, consisting of—

(a)—Blue nodular shales, generally arenaceous.

(b)—Fine sandstones, much jointed and "tesselated."

(c)—"Boulder bed," containing numerous boulders of gneiss and granite frequently 5 to 6 feet across—in a fine argillaceous or arenaceous rock, often rippled, sometimes replaced by a coarse sandstone.

Each of these series rested unconformably on that beneath it.

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He would for the present avoid entering on the consideration of the more recent deposits, which were however, full of interest, and would be referred to on some other occasion.

Mr. Oldham, in putting forward these views, deprecated the idea, that in differing so entirely from any previous observers he should be supposed to wish to throw any censure or discredit on their labours. On the contrary, the more closely those labours were examined the more valuable most of them appeared, and to many were they indebted for most important observations. The results arrived at were rather a proof of the absolute necessity of the geological examination of a large country being under one combined and systematic control. The rocks which this evening he hoped he had been able to reduce into some order, he had first met with some years back in Bengal, but from the peculiar way in which they were then seen, it was impossible to make out their relations. It was constantly thus: the examination of one district would throw light on and remove the difficulties of another, and while independent observers would in all probability have continued to group together things essentially different, or separate others essentially the same,

uniformity of result could only be obtained by an uniform method of examination and a combined system of investigation. It was to this that the Government Survey owed their results, not to any superiority individually over previous investigators of the districts referred to.

On the motion of the President the best thanks of the Society were voted to Mr. Oldham for his highly interesting communication.

W. S. ATKINSON, *Secretary*.

#### LIBRARY.

The Library has received the following accessions during the month of April last.

#### *Presented.*

Journal of the Statistical Society of London, Part. I. Vol. XIX.—BY THE SOCIETY.

Journal Asiatique for January, 1856, Part VII.—BY THE SOCIETY.

Journal of the Agricultural and Horticultural Society of India, Vol. IX. part II.—BY THE ASSOCIATION.

Catalogue of the Vernacular Literature Committee's Library.—BY BABU RA'JENDRA'LA'L MITTRA.

The Eighteenth Report of the Proceedings of the Calcutta School Book Society.—BY THE SAME.

The Thirty-third Annual Report of the Parental Academic Institution and Doveton College.—BY MR. G. SMITH.

The Quarterly Journal of the Geological Society, No. 45.—BY THE SOCIETY.

Proceedings of the Royal Society of London, Nos. 17. and 18.—BY THE SOCIETY.

Upadeshák for April, 1856.—BY THE EDITOR.

The Oriental Christian Spectator for March and April, 1856.—BY THE EDITOR.

The Calcutta Christian Observer for April, 1856.—BY THE EDITORS.

The Oriental Baptist for April, 1856.—BY THE EDITOR.

The Durbin, a Persian Newspaper for April, 1856.—BY THE EDITOR.

The Citizen Newspaper for ditto, 1856.—BY THE EDITOR.

The Tattwabodhini Patrika, No. 153.—BY THE TATTWABODHINI SOBHA.

#### *Exchanged.*

The Atheneum for January and February, 1856.

Philosophical Magazine, Nos. 70 and 71, Vol. II.



*Purchased.*

Comptes Rendus, Nos. 1 to 9, 1856, Vol. 42.

Journal des Savants, for January and February, 1856.

Revue et Magasin De Zoologie, No. 12 of 1855 and No. 1 of 1856.

The American Journal of Science and Arts, No. 61.

L'Atheneum Français, Nos. 49 to 52, December, 1855.

The Quarterly Review for December, 1855.

The Edinburgh Review, No. 209 for January, 1856.

The Westminster Review, No. 18 for ditto.

Collection D' ouvrages Orientaux, Vol. 3rd.

Annales des Sciences Naturelles, Nos. 1 and 2, Tome 4th.

Revue des Deux Mondes, 15th January, for February and 1st March, 1856, Vol. I.

Zietschrift fur die kunde des Morgenlandes, Part I. Vol. I.

The Annals and Magazine of Natural History, No. 99, Vol. 17.

Literary Gazette, Nos. 1 to 3, March, 1856.

GOUR DOSS BYSA'CK, *Librarian & Asst. Secy.*

*The 1st May, 1856.*

# JOURNAL

OF THE

# ASIATIC SOCIETY.

No. IV. 1856.

*A brief Notice of the Subhāshita Ratna Nidhi of Sāskeya Pandita, with extracts and translations by the late M. A. CSOMA DE KÖRÖSI.*

(Continued from page 165, Vol. XXIV.)

- 86      གཤམ་ཅན་ ལྷན་པར་ ལྷ་བ་ནི །  
 འད་ འདྲེད་ ཡིན་ གྱིས་ ཐུས་ གྱིར་ མིན །  
 ལྷན་ ལྷ་ བསྐྱེན་ ལྷས་ མེད་ པ་ནི །  
 ལྷས་ དན་ གཏོད་ ལྷས་ དགའ་ ལྷས་ མིན །
- 87      ལ་ཅད་ གཤམ་ལྷ་ ལྷས་ ཐུགས་ ལ །  
 འི་ ལྷས་ འཕྲུལ་ ཐུད་ ལྷ་མའ་ བཞུག །  
 གཞིག་ ལྷས་ གོན་ པའ་ བེད་ལུད །  
 ལོ་ ལྷས་ རྩོམ་ མཐའ་ གཞན་ གྱིས་ བསལ །
- 88      ལྷས་ ལྷེད་ ལྷ་ལྷའ་ ལྷས་ པ་ དད །  
 ལད་ པའི་ ལྷ་ལྷས་ ལྷ་ལྷ་དད །  
 འི་ ལྷ་ ལྷ་ ལྷ་ ལྷ་ ལྷས་ པ་ ལྷས །  
 ལྷས་ ལྷ་ ལྷས་ ལྷས་ ལྷ་ ལྷ་ ལྷས །

## V. EVIL PRACTICES (དན་ལྷེད་).

86. When a cunning person speaks fair, it is for his own interest not out of respect for others; the laughing voice of the night-bird is an ill omen, it proceeds not from joy.

87. If a man grows too famous, on account of his great advancement, though he endures for a while, yet at last he is destroyed. The ass that was covered with the skin of a leopard, after having eaten up one man's standing corn, was slain by another.

88. They that have chosen a wicked man for their king, they that dwell in a house whose upper roof is ruinous, or under a rock whose summit threatens to fall, are in continual fear.

- 89    གལ་ རེ་ རྒྱ་པ་ ཡོད་ན་ ཡང་ །  
      མྱེ་བའི་ རང་ བཞིན་ དན་པ་ སྤང་ །  
      རྒྱ་ སྐྱུ་ རྟེན་ རྒྱ་ མཐོ་ རྒྱ་ཡང་ །  
      མཁས་ པ་ སྐྱ་ ཞིག་ ཡང་ རྩ་ རེན་ ॥
- 90        རྒྱ་པ་ པས་ ཡོན་ དན་ གམས་ རྒྱུ་ཞིང་ །  
      རྒྱུ་ པས་ དེ་ རྩ་ གམས་ པར་ཐེང་ །  
      གཡོན་ རྒྱུ་ རྩ་ཐུ་ སྐྱ་ རྒྱུ་ན་ །  
      རྩ་ཐུ་ གམས་ པར་ རྒྱུ་ བ་ ཡོན་ ॥
- 91    ཡན་ པར་ སྐྱ་བ་ དཔོན་ པ་ རྩ་ །  
      དེ་དང་ ལས་ རྒྱང་ གན་ པ་ དཔོན་ །  
      སྐྱ་ པ་ མཁས་ པ་ རྩ་ དཔལ་ རྩ་ །  
      དེ་ ཡི་ རྩ་ བཞིན་ ཐེང་ པ་ རྩ་ །
- 92        མ་ བཞིན་ པར་ རྩ་ སྐྱ་ ལ་ ཡང་ །  
      ཡིང་ རྩ་ པ་ དང་ བསྐྱེད་ མི་ཐུ་ །  
      བས་ ཡམ་ པ་ ལ་ རྩ་ རྩ་ དང་ །  
      རྩ་ བཞིན་ པ་ ལ་ དཔལ་ རྩ་ མང་ ॥

89. Though a man is learned, but if he is by nature bad, avoid him. Though a venomous serpent has a gem on his head, what wise man would take him into his bosom?

90. By arrogance, good qualities are diminished; by lust modesty is obfuscated. By a continual railing at his servants, the master loses his authority.

91. It is a rare thing to find one who can give good advice, but it is more rare to find one who would listen (to advice)—difficult it is to find an expert physician, few are they that would act according to his advice.

92. Judge not before you have examined. It often happens that an upright man, if he loses his cause, is thought to be a knave. He that acts with discretion, has many enemies.

93      དཀ་པ་ཁི་ ལྟར་ བཅོས་ ལྟར་ བྱང་ །  
 འད་ བཞིན་ བཟང་ པོ་ འབྱུང་ མི་ སྤོང་ །  
 སོལ་ བ་ འབད་ དེ་ བསྐྱས་ ཀ་ ཡང་ །  
 ཁ་ དོན་ དཀར་ པོར་ མི་ སྤོང་ དོ ॥

94      གཞུང་ དཀ་ ཀྱི་ལ་ གཅེས་ འཛིན་པ་ །  
 མཛོལ་ བཞེས་ ཡིན་ བྱང་ ཡིད་མི་ བཅོན་ །  
 ཆེན་ པོ་ ཀམས་ ལ་གསུམ་ རྩོས་ན་ །  
 གཞོན་ གྱིས་ བཞུག་ པར་ གུས་ པ་ མང་ ॥

95      གནད་ པའི་ མཚན་མ་ ཁར་ འབྲིན་ པའི་ །  
 དམ་ བོ་ དེ་ དག་ གཞོམ་ པ་ སྤྱ །  
 ཡན་ པའི་ རྫོལ་ གཤམ་ ཁར་ འབྲིན་ པའི་ །  
 དམ་ བོ་ དེ་ དག་ ཁི་ ལྟར་ གཞོམ ॥

དཀ་ སྤོང་ བཅོས་པ་ཞེ ॥ 5.

96      བདག་ ཉིད་ དཔོན་ཏུ་ བསྐྱས་ ལྟར་ན་ །  
 དེ་ཡི་ བྱ་བ་ བསལ་ དཔོན་ །

93. In whatever manner you fashion a bad man, it is impossible to make his nature good—you may wash the coal with all the zeal you will, but it is impossible to give it a white colour.

94. An ill-principled man, who is fond of riches, though he be a friend, is not of a firm mind. There are many that have been destroyed by their own relations, in consequence of their having been bribed by the great.

95. It is easy to overcome those enemies that announce their plans of lusting (or injuring). But how are those to be subdued who advise a salutary retreat?

# VI. THE NATURAL WAY OR MANNER (OF MEN'S ACTIONS), (འད་བཞིན་གྱི་རྒྱུ་ལ་).

96. If one should happen to be chosen for a ruler, it is seldom that he could know what was to be done. We may look on others



གཞན་ ལ་ ལྟ་ བའི་ མིས་ ཡོད་ ཅུང་ །

འད་ ཉིད་ ལྟ་ན་ མེ་ལོད་ དགོས་ ॥

97 རྒྱལ་པོ་ འབ་ ཅ་ མད་ མོད་ ཅུང་ །

ཆོས་ བཞིན་ རྒྱུད་པ་ སྒྲིན་ ཅ་ རྒྱུད་ །

མཁའ་ ལ་ ལྟ་ གནས་ མད་ ན་ ཡང་ །

འོད་ གསལ་ ཉི་ རྩ་ ལྟ་བུ་ མེད་ ॥

98 གད་ ཞིས་ གནོད་ པར་ ཐེད་ རྩས་པ་ །

དེ་ཡིས་ ཡན་པའད་ ཐེད་ པར་ རྩས་ །

མགོ་ བོ་ རྩད་པན་ བཅིདས་ པ་ཡི་ །

རྒྱལ་པོས་ རྒྱལ་ སྤྱི་ རྩིན་ པར་ རྩས་ ॥

99 སྒྲོན་ པོ་ སྒོ་ ལྟན་ རད་པོ་ ཡིས་ །

རྩེ་དང་ འབདས་ གྱི་ དོན་ ལྷན་ ལྷལ་ །

མདའ་ ནི་ མཁས་ པས་ འཕདས་ རྒྱུར་ན་

གད་ལ་ གདགས་ པ་ ཡོག་ པ་ ལྟར་ ॥

100 མད་ པོ་ གཅིག་ ཅ་ སྒོ་ མཐུན་ན་ །

ཕྱེས་ རུང་ གིས་ ཅུང་ དོན་ ཆེན་ འབྱུལ་ །

with our own eyes, but we want a looking-glass, when we wish to view ourselves.

97. Though there be very many kings, yet there are very few of them, that govern with righteousness. Though there is many a body of the gods in *the* heaven, yet there are none so brilliant in light as the sun and moon.

98. He that can do mischief, can do also good. A crowned monarch may bestow on one a whole kingdom.

99. By an upright intelligent minister both the Sovereign and the subjects can be rendered, in all respects, happy. An arrow, when shot by a dexterous man, strikes the mark aimed at.

100. If many consent together, great things may be performed

ਬੇਦਾ ਕਰਾਸਾ ਬੇਦਾ ਮੇਂ ਕੈਰਾਸਾ ਓਤਰਾ ਪਾਸਾ ।

ਸੇਦਾ ਬੇਰੇਂ ਪੁਰਾਸਾ ਵਾਸਦਾ ਤੇਰਾ ਬਾਸਾ ॥

101 ਗੁਰਾ ਪੁਰਾ ਸੁਰਾ ਵਾ ਦੇਰਾ ਵਰੇ ਮੀ ।

ਮਰੁ ਬੇਦਾਸਾ ਮੁਕ ਘਰਾ ਸੁਰਾ ਪਰਾ ਓਤੁਰਾ ।

ਬਦਾ ਪੋ ਮੇਰਾ ਬੇਦਾਸਾ ਮੁਕ ਘਰਾ ।

ਬਦਾ ਮੇਰਾ ਕੁਰਾ ਤੁਰਾ ਬਕਾ ਵਾਰੇਕਾ ਓਠੇਰਾ ।

102 ਦਾ ਭੁਰਾ ਕੇਰਾ ਵਾ ਕੇਰਾ ਬੁਰਾ ।

ਕੇਰਾ ਪੋ ਕਰਾਸਾ ਹੁਰਾ ਵਰੇ ਪੁਰੀ ਕਰੇਕਾ ।

ਤੁਰਾ ਵਰਾ ਮੇਰਾ ਬੇਦਾਸਾ ਕੁਰਾ ਘਰਾ ।

ਕੁਰਾ ਬੇਰਾ ਕੇਰਾ ਪੋਰੇ ਕਰੇਕਾ ਮਾ ਘੇਰਾ ॥

103 ਕੇਰਾ ਪੋ ਦਾ ਭੁਰਾ ਪੁਰਾ ਮੀ ਵਰੇਰਾ ।

ਦਰਾ ਪਾਸਾ ਦਾ ਭੁਰਾ ਪੁਰਾ ਤੇਰਾ ।

ਮੇਰਾ ਕੇਰਾ ਕੈਰਾ ਕੀਰਾ ਬੇਦਾਸਾ ਮੇਰਾ ਵਰੇਰਾ ।

ਓਰੇਕਾ ਬੁਰਾ ਬੇਦਾਸਾ ਹੁਰਾ ਬੁਰੇਕਾ ਮੇਰਾ ॥

104 ਬੁਰੇ ਵਰਾ ਕੇਰਾ ਪਰਾ ਮੇਰਾ ਵਰਾ ।

ਮਰੁਕਾ ਪਰੇ ਮੇਰਾ ਪੁਰਾ ਕਰੇਕਾ ਪਾ ਬੁਰਾ ।

even by little forces. It is said: a lion's whelp was killed by an assembled multitude of ants, (or pismires).

101. He that is indolent and deficient in exertion, though he be strong and robust, shall decay. An elephant, though he be very strong, is treated, by his little driver, as a slave.

102. When haughtiness is carried too far, even great men will be overpowered: though the white tortoise (fish) has only a little body, yet is he the destroyer of a large crocodile.

103. The great have no need to be arrogant; the arrogance of the mean is futile. A gem wants no recommendation; none would be a counterfeit jewel, though it be highly extolled (or praised).

104. Men, commonly, are injured by men of the like kind



- 108 དང་པོ་ ཉིད་ ཅམ་ དམ་ བོད་དང་ །  
 མཛོལ་མ་ ཉིད་ཅ་ དེས་ པ་ མེད །  
 ཁ་ རས་ མ་ ལྷ་ ཅམ་ཅ་ འཁྲུང་ །  
 ཅམ་ ཁུང་ ཅམ་ཅ་ མཅ་ཅ་ འཁྲུང་ །
- 109 འད་ དབང་ གམས་ ཅད་ བདེ་ བ་ལྟེ །  
 མཉམ་ དབང་ གམས་ ཅད་ ལྷམ་ བལྲལ་ ཡིན །  
 ལྷམ་ མེད་པ་ནི་ མོད་ མའི་ ལྟེ །  
 དམ་ བཅས་ པ་ནི་ འཛིང་ བའི་ལྟེ །
- 110 ཅང་ན་ ཡོན་ཏན་ ལྷན་ ལུན་ ཡང་ །  
 ཅ་ ལྷས་ དན་ན་ ལྷན་ལྷས་ བནས །  
 ལྷས་ ལྷུ་ མཁས་ ཁུང་ ལྷུ་མེད་པས་ །  
 འདཔ་ ཅམས་ ལྷན་ལྷས་ ལྷངས་ ཞེས་བྲམ །
- 111 ལྷན་པོ་ ལྷ་བ་ ལྷང་ན་ མཛོལ །  
 ལྷལ་ པོ་ ལྷམ་ཅ་ འཕྲམ་ ཅ་ མཛོལ །  
 ལྷུ་མ་ ལྷུ་ལམ་ མཛོལ་ན་ མཛོལ །  
 ཅོང་ ཅེན་ དཔོན་ ཅ་ རིན་དང་ ཅེ །

108. It is doubtful at first, whether a person is our enemy or friend. Meat, if not properly digested, becomes poison ; but poison also, if one knows how to use it, may turn to medicine.

109. To be one's own master, is always counted as happiness ; to be in the power of others, is always held as misery. Common things are the cause of quarrels. We are bound, if we have promised a thing.

110. You may have, inwardly, all good qualities, but, if you have not a proper dress, you are despised by all. Though the bat is a prudent bird, yet since he has no feather, it is said, he is rejected by all winged animals.

111. A foolish man is pleasing, when he speaks but little ; a king is dignified when he keeps secluded ; imposing spectacles are beautiful if viewed at a far distance ; a jewel, if rare, fetches a great price.



112 ཏ་ཅང་བཅས་པ་ཆེ་གསལ་ན།  
 དེ་ནི་ད་འཇོན་པའི་སྤྱི་ཆ་འབྱུང་།  
 འཇིག་རྟེན་སྤྲོད་པ་ཡལ་ཆེར་ནི།  
 འབྲེལ་བ་ནི་ལས་འབྱུང་བ་མང་།

113 ཞིན་ཆ་སྤྲོད་པ་ཆིན་པོ་ཡང་།  
 ལྷག་པར་མཛོལ་བའི་སྤྱི་ཆ་མིན་དེ།  
 སྤྲོད་པ་བྱུང་བའི་མཐུང་ཡལ་ཆར།  
 འབྲུམ་པར་འབྱུང་བ་མང་བར་མཐོང་།

114 སེར་སྤྱ་ཅན་ཁྱིས་ཀྱི་ཆོས་པ་དང་།  
 ལྷག་དྲག་ཅན་ཁྱིས་གྲོགས་པོ་དང་།  
 སྤྱོད་ཅན་ཅན་ཁྱིས་རྒྱུ་པ་ཆོས་པ།  
 ཡོད་ཁྱད་དགའ་བ་སྤྱི་ཆ་ཆེན་མོ་རྒྱས་།

115 བརྟམ་ཆགས་ཅན་ནི་ཀྱི་ཁྱིས་དགའ་།  
 ད་ཁྱེད་ཅན་ནི་བསྐྱོད་པས་མཐུ།  
 སྤྱི་ཆ་པོ་རྒྱུ་དང་མཐུན་པས་དགའ་།  
 དམ་པ་བདེན་པར་སྤྱི་ཆ་པས་མཐུ།

112. Too great affection is often the cause of violent animosity ; for the most part all the quarrels of men arise from a too great familiarity.

113. It may happen sometimes that a long debate becomes the cause of a greater friendship. We see often that commonly such as have disputed with (or against) one another, at last agree.

114. Though an avaricious man possesses wealth, an envious man his associate, an ill-minded man his learning, yet these can produce no pleasure.

115. Covetous men delight in wealth ; the ambitious are pleased when they hear their own praise ; a foolish man is glad when he finds one like himself ; the virtuous man rejoices when he hears the truth.

- 116      མྱེ་ བོ་ ངན་ པའི་ ཡོན་ ཏན་ དང་ །  
          མྱ་ མྱས་ ཞན་ པའི་ ིིམ་པ་དང་ །  
          རྩ་དཔོན་ ངན་ པའི་ བཀའ་ རིན་ རྣམས་ །  
          མཉན་ ལ་ ཡན་ པའི་ གོ་ སྤལས་ དཀའ་ ॥
- 117      མང་ལ་ རྩ་ ཡོད་ མྱ་བ་ མཛེས་ །  
          རྩ་ མེད་ མྱ་བ་ བདེན་ ཡང་ སྤོང་ །  
          མ་ལ་ཡ་ནས་ ལྷང་ ལྷུང་ རྩ་ །  
          སྤྱང་ རྩས་ ཡལ་པའང་ རིན་མང་ རྩེ་ ॥
- 118      མྱ་ མང་ རྣམ་པ་ འཛིན་ པའི་ རྩུ་ །  
          མི་ མྱ་ རྣམ་ པ་ སྤོང་ བའི་ མའི་ །  
          རེ་རྩོ་ མྱ་བ་ བརྟེན་ཏུ་ བརྟེན་ །  
          འདབ་ རྣམས་ སྤྱལས་ པས་ བདེ་བའ་ རྩུ་ ॥
- 119      མི་ མང་ དམ་ ལ་ མཁོ་ མེད་ པས་ །  
          རྣམ་པ་ རྩན་ཏུ་ ཡན་ བདམས་ན་ །  
          དམ་ ཡང་ དེ་ལ་ མཁོ་ མེད་ པའ་ །  
          འཕྱད་ པ་ དངས་ པོའི་ རེ་བ་ ཡོན་ ॥

116. The qualifications of a bad man, the imperfect learning of a mighty speaker, the kindnesses of a bad master, seldom are useful to others.

117. If a man is opulent, his discourse is pleasing, an indigent, though he speaks the truth, is contemned. A piece of wood if brought from the Malaya mountain, though it is only a common one, has a high price.

118. Much talking is the cause of danger, silence is the foundation of avoiding misfortune. The talkative parrot is shut up in a cage, other birds, that are mute, fly at random.

119. When a man endeavours to be useful to an enemy in every respect, without hypocrisy and when the enemy also yields him without artifice, it shows a great character.

- 120      ལྷ་པས་ བྲུ་ལ་ མ་ཡིས་ ཁྱི་ ཅི་ ཡན།  
          ལྷ་པས་ ལྷ་ན་ དེ་ན་ ལ་ ཁྱི་ ཅི་ དཔོན།  
          དེས་ན་ ཐུ་བ་ བསྐྱུ་པས་པ་ ལ།  
          ཁྱི་ བ་ དེ་ན་ མེད་ འང་ ལྷ་ལ་ ཡན།
- 121      ལྷིན་པས་ བསྐྱུ་པས་ན་ དཔ་ ཡང་ འཇུ།  
          ལྷ་ན་ མེད་ ལཱ་ལྷ་ ཡང་ འིང་ཇུ་ ལྷིང་།  
          བ་ཡི་ འོ་མ་ རང་ པ་ན།  
          བེའུ་ བཟང་ ཆད་ འཇོའ་ བའ་ འཇུ། ॥
- 122      རྒྱ་ ཐུ་ ཐུམས་ པས་ ལྷིང་བ་ཡི།  
          རྒྱ་ བའ་ ལྷ་ ལཱ་ལྷ་ ཆད་ པའ་ ལ།  
          པད་མའི་ མཆོ་ལ་ དང་པ་ དལ།  
          མ་ བསྐྱུ་པས་ པའ་ ཡང་ འང་ ལིས་ འཇུ། ॥
- 123      ལོངས་ ལྷིང་ ལྷ་པའི་ ལྷིང་ པ་ དང་།  
          མཁས་ པའ་ ལྷིང་ན་ ཇུ་ལ་བ་དང་།  
          རྒྱ་ པོས་ དམན་ལ་ ལོངས་ ལྷིང་བའི།  
          ལཱ་ལྷ་ པོ་ ལཱ་ལྷ་ བའི་ འང་ ལ་ ཡན། ॥

120. What avails it, if an impotent man is angry? What need is there for a powerful to be angry? Therefore it is unreasonable to be angry for the performance of a thing,—it is but to mortify one's self.

121. With gifts you may gather about you the enemy also; if you give nothing, you are left by your own kindred also. When the cow's milk is deficient the good calf grows meagre, and becomes sorrowful.

122. A master that always treats with kindness his own domestics, may easily find servants and slaves. The geese, without being called, gather together to the lakes where there grow many lotuses.

123. When a man employs his riches, when one is gentle after having become learned, when a great man protects the lower class

- 124      ཆཅན་པོ་ རྣམས་ ལ་ རྟེན་ རྩས་ ར།  
          དམན་ པ་ རྣམས་ དང་ ཆཅན་པོ་ ཐོབ།  
          རྩོན་ ཤིང་ ཆེ་ལ་ རྟེན་ པ་ ཡིས།  
          འབྲིལ་ ཤིང་ མི་མོང་ རྩོན་ ལ་ རྩོས ॥
- 125      ཡོན་ཏན་ རན་ ལ་ རྩོན་ ཡད་ རྩང་།  
          ཡོན་ཏན་ དཔལ་ རྣམས་ རེ་བཟང་ རྩོན།  
          ཆཱ་ རྩས་ མཇལ་ ལ་ བཞོད་ ར་ ཡང་།  
          འཇིག་ རྟན་ པ་ རྣམས་ དཔལ་ བ་ བཟུང་།
- 126      རོང་ རྩན་ རྩུན་ པོའི་ རང་ན་ མང་།  
          དཔལ་ བོ་ བཅན་ བཅན་ རྩད་ན་མང་།  
          རེགས་ བཟད་ མཇལ་ པའི་ རྩད་ འབྲིན་ པ།  
          དམ་པ་ འཇིག་ རྟན་ འདི་ན་ དམོན ॥
- 127      བང་ དང་ བང་ ལ་ དེ་ ཡོད་པ།  
          དེ་ ཡིས་ དེ་ ཡི་ བྲགས་ པ་ ཐོབ།  
          མགས་ པ་ བྲགས་ པ་ མཇལ་པ་ དང་།  
          དཔལ་ བོས་ དཔལ་ བོ་ ཐོབ་ པ་ བཞིན ॥

of people, these three things make happy others, and are useful to one's self.

134. By depending on the great, the mean also may rise high. See how the little plant (or shrub) by embracing a large tree has climbed up to the top.

125. Though a talented man has his defects, yet they that delight in learning, support him. Though the atmosphere be obscured (hurt) by rain, yet the inhabitants of the world are made glad by it.

126. Rich men are numerous among the ignorant people ; valiant ones among the crowds of wild beasts ; elegant sayings proceed from the learned class ; a Saint is a rare thing in this world.

127. Every man is celebrated for that thing in which he excels.  
The learned as a learned person, the hero as a valiant man.



- 128      ཆེན་པོ་ རྒྱལ་ རྒྱུ་ མཆོད་ ལྷ་པ་ །  
          དམན་ པ་ རྒྱལ་ རྒྱུ་ བཞུ་ པར་ རྒྱུ་ །  
          དབང་ ལྷ་ ཆེན་པོའི་ རྒྱུ་པོའི་ རྒྱུ་ །  
          རྒྱ་ པ་ ལྷ་ མེན་ རྒྱ་ ལྷ་ རྒྱ་ །
- 129      རྒྱ་ པ་ རྒྱལ་ བཞུ་ ལྷ་ བཞུ་ དང་ །  
          མ་ བཞུ་པ་ པ་ ལྷ་ བཞུ་ ལྷ་པ་དང་ །  
          བཞུ་ དན་ རྒྱ་ རྒྱུ་ བཞུ་པ་ རྒྱུ་ །  
          དཞུ་ བཞུ་ རྒྱ་པ་ བཞུ་ བ་ བཞུ་ །
- 130      རྒྱ་ ལྷ་ རྒྱལ་ ལྷ་ རྒྱ་ རྒྱ་ དང་ །  
          དཞུ་ རྒྱ་ བ་ ལྷ་ རྒྱ་ རྒྱ་ རྒྱ་ དང་ །  
          མ་ རྒྱ་ བ་ ལྷ་ རྒྱ་ རྒྱ་ དང་ །  
          རྒྱ་ རྒྱ་ རྒྱལ་ ལྷ་ རྒྱ་ རྒྱ་ རྒྱ་ རྒྱ་ །
- 131      རྒྱ་ རྒྱ་ རྒྱ་ དང་ རྒྱ་ རྒྱ་ རྒྱ་ །  
          རྒྱ་ རྒྱ་ རྒྱ་ དང་ རྒྱ་ རྒྱ་ རྒྱ་ །  
          རྒྱ་ པ་ རྒྱ་ རྒྱ་ རྒྱ་ རྒྱ་ རྒྱ་ །  
          རྒྱ་ རྒྱ་ རྒྱ་ པ་ རྒྱ་ རྒྱ་ རྒྱ་ །

128. What is respected by the great, is contemned by the low people. The head ornament of the great Ishwosa is devoured by Chandra the Giant.

129. Science existing only in books ; Mantras not committed to memory ; those things which a forgetful man has learned, in the time of necessity often *deceive us*, are deceitful.

130. Sweet scent to dogs and hogs, a light to the blind, meat to indigestion, instruction to foolish men, are not required.

131. A talented (or well qualified) man, and good gold, a brave soldier, and a fine horse, a skilful physician and a beautiful ornament every where find their price (or all esteemed).

132      སྒྲོ་དང་བརྩོན་འགྲུས་ཡོད་ཀྱི་ཀྱང་།  
          དེ་ཡིས་བསྐྱབ་པར་མི་རྩས་གང་།  
          དཔལ་དན་དཔུང་རྩོགས་བརྒྱ་གཞིས་པོ་།  
          རྒྱ་བསེད་སྤྱ་ཡིས་བཅོམ་ཞེས་ཤོས་॥

133      རི་དང་རྒྱ་བོ་སྤང་པོ་རྩ་།  
          ཞིང་དང་མོར་མུ་ལོད་རྒྱ་རོ་།  
          རྒྱུས་པ་སྤང་མེད་རིགས་གཅིག་ཀྱང་།  
          མཚོག་དང་དམན་པའི་ཁྱད་པར་ཡོད་॥

134      མོར་ཁྱི་མཚོག་ནི་རྒྱུན་པ་ལྟེ་།  
          བདེ་བའི་མཚོག་ནི་སེམས་སྦྱོད་པ་།  
          རྒྱུན་ཁྱི་མཚོག་ནི་ཤོས་པ་ལྟེ་།  
          ཐུགས་ཁྱི་མཚོག་ནི་མི་བསྐྱུ་བའོ་།

135      མོར་ཁྱིས་མ་གཟུངས་སྤྱ་ཡང་མེད་།  
          རིག་ཏུ་བདེ་བར་གདེངས་པ་ལྟེ་།  
          བདེ་དང་སྤྱད་བཞུག་ཤམས་ཅད་ཀྱང་།  
          དཔུང་དཔུན་བཞིན་ཏུ་རྩ་བར་འགྱུར་།

འད་བཞིན་ཁྱི་རྒྱུན་བརྩོན་པ་ལྟེ་། 6

132. If one has a good intellect and diligent application, what is it, that cannot be done by them? The Pandavas, they have I heard, have overcome the twelve troops of the dangerous enemy.

133. Though hills, rivers, elephants, horses, trees, guns, rays of light, storms, men and women, be all of the same kind (in their respective orders or classes) yet there is a difference of our being great (or high) and the other small (or mean).

134. The chief wealth consists in charity, and the greatest happiness in the tranquillity of mind. Hearing (or experience) is the most beautiful ornament; the best companion is he that desires not.

135. There is none that had never been afflicted with a disease for wealth—who enjoys always happiness? Pleasure and sorrow are always changing like summer and winter.

- 136      བླ་མ་གཤམ་དང་ཐུག་ཆ་པ་དང་།  
             དགའ་ལྷན་ལྷན་པའི་ཆོས་བརྟེན་དང་།  
             ཐུག་པའི་ཆོས་བཞིན་མི་སྤྱོད་པ།  
             གཞུག་པའི་རྒྱུ་མིན་ལྷན་པ་ཡིན། ॥
- 137      མི་སྤྱོད་པ་ལྷན་པ་དང་།  
             མང་དང་འཁོར་འདྲི་སྤྱོད་པ་ལྷན་པ་  
             སྤྱད་མེད་ཡིད་འདྲི་དང་དང་འཁོར་  
             ལྷན་པའི་རྒྱུ་མིན་པ་ཡིན།
- 138      མི་སྤྱོད་པ་ལྷན་པ་དང་།  
             གཞན་ལ་སྤྱོད་པའི་དང་ཐུག་ཆ།  
             བཟུང་བའི་མི་མེས་ལྷན་པ་འདྲི་  
             གཞུག་པའི་འགྲོ་བའི་བཞད་པ་ཡིན།
- 139      ཆེན་པོ་ཆེས་ལ་དམ་པ་ལྷན་པ་  
             འདྲི་བའི་འཁོར་འདྲི་ལྷན་པ་མང་།  
             སྤྱོད་པའི་ལྷན་པའི་འཁོར་འདྲི་  
             སྤྱོད་པའི་ལྷན་པའི་ལྷན་པ་ཡིན།

VII.—THE UNBECOMING (OR INDECENT) MANNER—

མི་སྤྱོད་པའི་རྒྱུ།

136. If a slave behaves with great pride, if the actions of an ascetic are fruitless, if a prince does not act according to moral law, all the three have taken an irregular course.

137. To act indiscreetly, to have rancour against many, to quarrel (dispute) with the powerful, to be passionate for the female sex, to cleave to what is bad; these five things are the causes of a quick destruction.

138. When one is poor, and yet would have fine garments, when one, living on the charity of others, behaves haughtily, when he that is ignorant of literary works, wishes to dispute, these three are a laughing-stock to men.

139. Great men (Sovereigns) suffer more injury from their own

143. Men wish to live long, and, when grown old, they are afraid of old age. To be afraid of old age, and to wish to live long, is the wrong principle (theory) of a foolish man.



- 144      ਭਾਦ੍ਰਿਸ਼ਾ ਮਾਤ੍ਰਿਸ਼ਾ ਪ੍ਰਾਪ੍ਤਿੰ ਪ੍ਰਾਪ੍ਤਿੰਤੁ ।  
           ਦੇ ਰਾਜਾ ਪ੍ਰਾਪ੍ਤਿੰ ਭਾਦ੍ਰਿਸ਼ਾ ਮਿੰ ਸ਼੍ਰੇਯਾ ਕ ।  
           ਮਿੰ ਦੇ ਭਾਦ੍ਰਿਸ਼ਾ ਹ੍ਰਿਸ਼ਾ ਪਦਪ੍ਰਾਪ੍ਤਿੰਤੁ ।  
           ਘਟਾ ਕਾ ਰਾਜਾ ਹ੍ਰਿਸ਼ਾ ਮਾਤ੍ਰਿਸ਼ਾ ਪ੍ਰਾਪ੍ਤਿੰਤੁ ॥
- 145      ਭਾਦ੍ਰਿਸ਼ਾ ਪ੍ਰਾਪ੍ਤਿੰ ਪ੍ਰਾਪ੍ਤਿੰ ਪ੍ਰਾਪ੍ਤਿੰਤੁ ।  
           ਸ਼੍ਰੇਯਾ ਮਿੰ ਸ਼੍ਰੇਯਾ ਪ੍ਰਾਪ੍ਤਿੰ ਮਿੰ ਭਾਦ੍ਰਿਸ਼ਾ ਕਾ  
           ਮਿੰ ਦੇ ਭਾਦ੍ਰਿਸ਼ਾ ਹ੍ਰਿਸ਼ਾ ਪਦਪ੍ਰਾਪ੍ਤਿੰਤੁ ।  
           ਘਟਾ ਕਾ ਪ੍ਰਾਪ੍ਤਿੰ ਪ੍ਰਾਪ੍ਤਿੰ ਮਾਤ੍ਰਿਸ਼ਾ ਪ੍ਰਾਪ੍ਤਿੰਤੁ ॥
- 146      ਕੋਧਾ ਪ੍ਰਾਪ੍ਤਿੰ ਪ੍ਰਾਪ੍ਤਿੰ ਪ੍ਰਾਪ੍ਤਿੰ ਮਿੰ ਸ਼੍ਰੇਯਾ ਕ ।  
           ਦੇ ਪ੍ਰਾਪ੍ਤਿੰ ਕੋਧਾ ਹ੍ਰਿਸ਼ਾ ਮਿੰ ਪ੍ਰਾਪ੍ਤਿੰਤੁ ।  
           ਪ੍ਰਾਪ੍ਤਿੰ ਮਿੰ ਪ੍ਰਾਪ੍ਤਿੰ ਮਾਤ੍ਰਿਸ਼ਾ ਕਾ ਘਟਾ ।  
           ਘਟਾ ਕਾ ਪ੍ਰਾਪ੍ਤਿੰ ਪ੍ਰਾਪ੍ਤਿੰ ਮਾਤ੍ਰਿਸ਼ਾ ਪ੍ਰਾਪ੍ਤਿੰਤੁ ॥
- 147      ਰਾਜਾ ਹ੍ਰਿਸ਼ਾ ਮਾਤ੍ਰਿਸ਼ਾ ਪ੍ਰਾਪ੍ਤਿੰ ਪ੍ਰਾਪ੍ਤਿੰਤੁ ।  
           ਪ੍ਰਾਪ੍ਤਿੰ ਪ੍ਰਾਪ੍ਤਿੰ ਪ੍ਰਾਪ੍ਤਿੰ ਪ੍ਰਾਪ੍ਤਿੰ ਮਿੰ ਪ੍ਰਾਪ੍ਤਿੰਤੁ ।  
           ਪ੍ਰਾਪ੍ਤਿੰ ਮਿੰ ਪ੍ਰਾਪ੍ਤਿੰ ਪ੍ਰਾਪ੍ਤਿੰ ਪ੍ਰਾਪ੍ਤਿੰ ਮਿੰ ਪ੍ਰਾਪ੍ਤਿੰਤੁ ।  
           ਪ੍ਰਾਪ੍ਤਿੰ ਪ੍ਰਾਪ੍ਤਿੰ ਪ੍ਰਾਪ੍ਤਿੰ ਪ੍ਰਾਪ੍ਤਿੰ ਮਿੰ ਪ੍ਰਾਪ੍ਤਿੰਤੁ ॥

144. When there is a wise instructor, and one will not learn from him, to improve in good qualities, such man is either occupied by the devil, or suffers the ill consequences of his former works (actions).

145. He that is possessed of wealth, and does not enjoy it himself, neither bestows it charitably on others, either has fever, or is an accomplished miser.

146. Who knows what virtue is and does not practice it, to what use is his religion? Though there be a fine crop, the wild beasts, do they rejoice in it?

147. He that is afflicted with the ill consequences of his moral actions, though he has riches, cannot enjoy them. Though the crow be hungry, yet, since there is a snare laid, how can he fully be satisfied?

- 148      ལྷོང་ དམ་ སྤྱིན་ པར་ མི་ རྩས་ པའི་ །  
             རྟོང་ དེ་ རྩལ་ པོར་ བསྐྱེམ་ ཀ་ ཀེ་ །  
             རི་ བོ་ གསེར་ རྩ་ བསྐྱེམ་ པ་ཡི་ །  
             རྩལ་ པོ་ བསྐྱེལ་ པ་ སྤྱིན་ རྩ་ སྤྱི་ །
- 149      རྟོང་ སྤྱིན་ རྟོང་ མིན་ སྤྱི་བ་ལ་ །  
             མཁས་པ་ སྤྱིན་ མང་ན་ ཡང་ །  
             དེ་ལྟར་ སྤྱིན་ གམས་ ལེན་པ་ །  
             འཇིག་ རྟོང་ རྟོང་ སྤྱིན་ རྩ་ དཀོན་ །
- 150      རིས་ གཞུགས་ ལང་རྩ་ ལྷན་ན་ ཡང་ །  
             ཡོན་ ཏན་ མང་ན་ མཆིས་ པ་ མནི་ །  
             མ་ཕ་ སྤྱི་སྤྱི་ ཡིད་ རྟོང་ ཡང་ །  
             རྟོང་ པོའི་ རྩ་ རྩ་ རྟོང་ སྤྱི་སྤྱི་ རྩ་ །
- 151      མི་ དན་ རྟོང་པས་ བསྐྱེན་ རྩ་ རྩ་ །  
             རྩ་ སྤྱི་ མི་ རྩ་ རྟོང་པ་ མེད་ །  
             རྩ་ མི་ རྩ་ རྟོང་ བསྐྱེལ་ རྩ་ རྩ་ །  
             མི་ རྩ་ རྟོང་པ་ མི་ རྩ་ རྩ་ །

148. If you think a man to be rich that neither can enjoy, nor bestow charitably his substance on others, it is very easy for you to make a rich man, by fancying that a whole mountain consists of pure gold.

149. Though there be many learned men, who know and tell what not a virtuous action is; there are very few in this world who would practise it, after having it thus understood.

150. Though a man has his birth, form, juvenile age, yet, without good qualities, he is not handsome; though peacock's feathers be beautiful, yet will they be convenient for the ornament of a great man?

151. By no endeavour can it be done that a naturally bad man be turned into an honest man. How long soever you boil water, it is impossible to make it burn like fire.



- 156 ཀ་ ཅད་ ལོངས་ རྩོད་ བསམས་ གསལ་ ཀ །  
 རོང་ རི་ རྩ་ གི་ གཞེད་ མ་ ཡིན །  
 རྩད་ རོལ་ ཡལ་ རྩེ་ རྩལ་ རོ་ ལ །  
 རྩུང་ གིས་ རྩད་ རོ་ བདེ་ བར་ རྩ །
- 157 ཀ་ ཅད་ མཐུ་ རྩལ་ རྩེ་ གསལ་ ཀ །  
 རྩལ་ རའི་ རྩ་ རོན་ རྩེད་ ར་ ཡིན །  
 གཡལ་ ར་ བསད་ ར་ ཡལ་ ར་ རྩེ །  
 མཐུ་ རྩལ་ རན་ ར་ རྩུང་ ར་ མད་ །
- 158 རྩེའ་ རད་ རེས་ རལ་ རྩེལ་ ར་ རོགས །  
 ར་ རོད་ རམས་ རྩན་ ར་ རོགས་ རྩ་ རྩུའ །  
 ར་ རོད་ རམས་ རེད་ ར་ རེ་ རལ་ རྩན །  
 རལལ་ རེད་ རལལ་ རའི་ རྩུ་ རྩུ་ རྩུའ །
- 159 མཁས་ རས་ ར་ ར་ རའི་ རྩེད་ རྩད་ །  
 རད་ རི་ ར་ རོད་ རམས་ རའི་ རལ་ རྩེ །  
 རོད་ རས་ ར་ རོད་ རམས་ རྩན་ རོགས་ ར །  
 རྩེ་ རོ་ ར་ རྩུ་ རི་ རད་ ར་ རའོན །

156. When a man becomes too famous for his riches, he is destroyed by his wealth. It is commonly rich men that are assaulted, beggars pass through without any molestation.

157. It is but to propose his own destruction, when a man becomes too renowned for his strength and skill. In battle mostly are slain such as have been strong and skilful.

158. Wealth, wit, strength, and the like, all will associate with you, if you have moral merits (if you are virtuous) but, if you have none, they become the cause of your ruin.

159. A wise man, whatever he does, must act with due consideration of his moral merits. At the time of contest, among a hundred persons, it is rare to find one of accomplished moral merits.



- 160 རྩོད་ངན་ ལྷ་ ཡིས་ ཁེངས་པ་ན།  
 རྩོགས་ གཅིག་ ཅི་ནས་ འཇིག་པ་ ལྟུང་།  
 གང་ ལ་ རྟོན་ ངང་ ལྷན་ ལྟུང་ པ།  
 དེ་ ལ་ རྩོགས་ བལྟུང་ རྟོན་ ངའོན་ ॥
- 161 ལྷ་ངང་ ལྷན་ ར་ རྟུང་ རན་ ངའོན་།  
 དེ་ ངང་ ལྷན་ ར་ ངལ་ བོས་ འཇོམས་ ོ།  
 གམས་ རང་ ལྷན་ ལྷམ་ རྟོགས་ ལྟུང་ན།  
 མི་ དེ་ ལྟུང་ ར་ འཆི་ བ་ མང་ ॥
- 162 དེས་ རས་ མཁས་ པས་ བསྟེད་ རམས་ བསག་།  
 བསྟེད་ རམས་ ཁོ་ ར་ ལྷན་ རྟོགས་ ལྟུང་།  
 ལྷ་ རིག་ གང་ ར་ ལྷན་ རྟོགས་ ལོ།  
 དེ་ རི་ བསྟེད་ རམས་ བསགས་པའི་ རིགས་ ॥
- 163 ལྷན་ ལྷས་ ས་ རྟེན་ བསྟུང་ རིགས་།  
 ལྷམ་ ར་ རང་ རིད་ བསྟུང་ པ་ ཡིན་།  
 ལན་ རིག་ ལྷན་ ར་ ལྷས་ པ་ དེ།  
 བདེན་པ་ ལྷས་ ལྟང་ རིགས་ པ་ ལྟུང་ ॥

160. When a bad tank is full of water, certainly it will break out on any side. They that grow rich, seldom leave a posterity.

161. Seldom is found a rich man, that has children also ; but if he has both, he is often destroyed by an enemy. When one is happy in every respect, it happens frequently that such a man is carried off by an early death.

162. Therefore a wise man must acquire moral merits ; it is only virtue that is the cause of every happiness (or prosperity), when a man is prosperous in every respect, it is the sign of his having acquired moral merits.

163. He that thinks thus : I will deceive him, he deceives himself. If one has told one falsehood, afterwards, though he speak the truth, he will be doubted.

- 164 ལོགས་ རེས་ རྣམ་པར་མི་དཔྱད་པ།  
 རྣམ་ རིང་ ས་འོག་ གནོད་ འབེབས་པ།  
 རུང་ མ་ བསད་ པའི་ གི་བ་ ལྟར།  
 ལོགས་ དང་ བུ་བའི་ ལྟ་དཀ་ འོག །
- 165 རྩོག་བ་ དོར་ རས་ འཇུག་པ་ལ།  
 འདི་ ལྷི་ གནོས་ ཀ་ འབྱུག་མི་ འཇུར།  
 འབད་ པ་ མེད་ ཀ་ རིང་ བཟང་ ཡང་ །  
 ལོ་ རོག་ འོག་ པར་ མི་ འཇུར་ འོ །  
 མི་ རིགས་ པའི་ རྣམ་ བཅོག་པལྟེ།
- 166 ལྷོ་ལྷན་ ལ་ བ་ རུང་ བད་ ལུང་ །  
 རྣམ་ ར་ ལོས་ ལུས་ བལྱུག་པར་ ལ།  
 ལུག་ པར་ ལྟར་ ཀ་ ལྷ་ རི་ལོས།  
 མ་ ལུག་ ཀ་ ཡང་ མཛོས་ པའི་ ལྟེ །
- 167 རེམས་ རན་ མོས་ པ་ ལྷ་ རོགས་པ།  
 རམས་ རད་ མཐུ་ བ་ ལུས་ལུང་དཀའ།  
 རང་ རིང་ ཡོན་ རན་ ལྷན་ ལུས་ ཀ།  
 རམས་ རད་ མཐུ་ བ་ དེ་ ལ་ རེ །

164. He that does not examine what good and evil is, and, in his angry fit, injures his neighbour, he shall grieve, like the swallow bird, for his being deprived of his associate.

165. Both here and in the next world, if you are deficient in earnest application, you cannot be prosperous. Though the land be good, you cannot have a (plenteous) crop, without cultivating it diligently.

#### VIII.—THE ACTIONS (OR DOINGS) OF MEN (ལ་བ).

166. An intelligent (pundit) man must always do a small thing also with due consideration, should he succeed (in his offices) what is there more desirable: but should he fail, it is yet handsome to have acted prudently.

167. The minds (sentiments) of men are very different—who-

- 168      શ્રેષ્ઠં દુઃશ્ચ પાતં ભુતં કૈં વદં ।  
             દૈવં પાતં મદં કુઃ સ્વભાવં પાતં વૃ ।  
             શ્રી મતં દૈવં પાતં સ્વભાવં પાતં ॥  
             શ્રીયં પાતં યશ્ચ ભદ્રં ભાગ્યં ચ ॥
- 169      યજ્ઞં ધર્મં શુભં ક્ષેત્રં સુખં પાતં ॥  
             અદ્યં ધર્મં ભાગ્યં ભદ્રં પાતં ॥  
             સુખં પાતં કુશલં ભદ્રં પાતં ॥  
             અદ્યં ધર્મં પાતં ભદ્રં પાતં ॥
- 170      યજ્ઞં ધર્મં કુશલં ભદ્રં પાતં મિ ।  
             શુભં ભાગ્યં ભદ્રં કૈં ભદ્રં પાતં ॥  
             કુશલં ભદ્રં ભદ્રં પાતં ॥  
             મિ ભદ્રં ભદ્રં પાતં ॥
- 171      મિ ભદ્રં કુશલં પાતં ॥  
             ધર્મં પાતં ભદ્રં પાતં ॥  
             દેવં પાતં પાતં ॥  
             સુખં ભદ્રં કૈં ભદ્રં ॥

soever he be, it is difficult for him, to please all (to satisfy the wishes of all)—he is near to do so, who makes himself accomplished in all good qualities.

168. Increase your wisdom (experience) in your very declined age also. In the next life it will be useful to you, what will then avail your alms ?

169. Either keep to him that is accomplished in science, or converse with ordinary men. You may carry easily with you a bottle, when it is either full or entirely empty.

170. Who can bear a man who is but little conversant with science ? who can carry a water-pot on his head, when it is but half filled ?

171. He that understands well the difference between an excellent and a low man, knows how to do his business (or how to act). This is the great foundation of prosperity.

172 སློ་ ཐོས་ བདེན་ པས་ ལེགས་ མྱུངས་ ཀ །  
 སློ་ བོ་ ཐུས་ པའང་ མཚོག་ ཏུ་ འབྱུང་ །  
 ཐོས་ ཞེས་ དག་ གིས་ ཀེ་ རྩོ་ ལ།  
 བསྐྱབས་ ཀ་ འདོད་ པ་ ཞེས་ པར་ འབྱུང་ ॥

173 ཉམས་ ཐུབས་ རྒྱུད་ བའི་ སློ་ པོ་ ཡང་ །  
 རེན་ པོ་ གཞན་ ལ་ བ་ རྩན་ ཀ་ འབྱུབ་ །  
 རྒྱ་ ཡི་ གིགས་ པ་ ཉམས་ རྒྱུད་ ཡང་ །  
 མཚོ་ དང་ འདེས་ ཀ་ ག་ ལ་ བསྐྱམ་ ॥

174 རང་ ཉིད་ སློ་ ཐོས་ མ་ ལྷན་ ཡང་ །  
 སློ་ རེན་ གཞན་ ལ་ ལེགས་ བར་ འདི་ །  
 ལུག་ པས་ དཔ་ བོ་ མི་ གསེད་ ཀ །  
 མཚོན་ ར་ ལེན་ པར་ མེ་ ཐུད་ དམ ॥

175 གནོད་ པར་ ཐུད་ པའི་ དཔ་ བོ་ ཡང་ །  
 གཤམས་ དང་ ལྷན་ ཀ་ ཐོགས་ སྤུ་ འབྱུང་ །  
 རྩམ་ རེན་ ལུས་ ལ་ གནོད་ མོད་ གྲིས་ །  
 སློའ་ བ་ ཞེས་ ཀ་ ལྷན་ ར་ འབྱུང་ ॥

172. With a firm resolution for perfection, a low man also may yet become a principal, if a parrot is well instructed by those who understand teaching, he will know one's worth.

173. Men of little abilities also, if they depend on the great, may succeed (or prosper). A drop of water, is a small thing, but, when united with a lake when will it dry away?

174. Though a man is not intelligent by himself, yet he consults prudently another wise man. The hand does not kill an enemy, but if it takes a weapon, may it not do so?

175. Of a dangerous enemy also, if you know the means, you may make a confederate. Large quantity of poison hurts the body, but if you know how to make the mixture, it turns into medicine.



- 176 འིག་པས་བཞེད་པའི་རས་ནོར་སྤང་།  
 མི་ཤོས་མཉམ་ལ་སྒྲུ་སེམས་སྤང་།  
 ཞིང་ཤོག་ཞིང་སྤེལ་སྤང་གིས།  
 དེ་ལས་ཤིག་ན་ལྷུང་བར་འགྱུར། ॥
- 177 རི་མོད་རང་སྤྱོད་མ་སྤྱོད་པ།  
 དེ་ཡི་བར་ཏུ་དག་ཅམས་བསྟུར།  
 ཏམ་པ་སྤྱོད་ནས་གང་འིགས་བ།  
 རུ་ཞེས་བཞུག་བཅོས་མཉམ་དག་སྤྱ། ॥
- 178 མཚོད་ལོས་པ་དང་འཁོར་ཅམས་ལྷང་།  
 ཅིག་ཏུ་སྤྱིན་པས་བསྟུ་བར་ལྷ།  
 མཚོད་གང་ལ་ལོ་སྤྱོད་ཅམས་དང་།  
 ཡི་དྲགས་བར་ཏུ་མཐུ་བར་གསུངས། ॥
- 179 རི་བོས་འབདས་ལ་མི་གཞོང་པར།  
 འིགས་པའི་ལམ་ཁྱིས་དཔྱ་ཅམས་བསྟུ།  
 སྤྱོད་ལོ་ཞིང་ལ་སྤྱོད་ཁྱི་བཞུད།  
 མཉམ་པ་མང་ན་སྤྱོད་པར་འགྱུར། ॥

176. Aught of the food and money which is offered to you for your learning; listen to others and leave off pride. You may take the fruit from the top of a tree, but, if you reach farther, you fall down.

177. As long as you have not sufficient strength, bear (have patience with) your enemy; when you are strong enough, do as it seems best to you. Thus it is said in other shastras.

178. Treat with due respect, and reward always liberally those round about you. It is said, that with sacrifices and offerings we will have all from the gods down to the spirits (or ghosts).

179. In a becoming manner a prince may tax his subjects without oppressing them. A Sābtru becomes dry, if too much fragrant juice issues from it.

- 180 འད་སྤྱོད་ འཕད་པར་ ཐ་བར་ཕྱེ །  
 ཡལ་ ཆེར་ གསལ་བར་ བརྟན་པས་ ཉམས །  
 ཐྱེའུ་ རྩོལ་ གར་ མི་ ཐུད་ ཀ །  
 མཐུལ་དུ་ གས་ པ་ ཅི་ཉྑེ་ འདྲེགས ॥
- 181 གཞན་ གིས་ བརྟན་ པར་ ཐུང་པ་ཡི །  
 རས་ ངང་ རྟེན་ ཐེས་ ཅི་ ཞིག་ ཕྱེ །  
 རྩི་ ཡག་ མི་ གཅིང་ ར་པ་ལ །  
 མཁས་ པ་ ལྷ་ ཞིག་ ཡིང་ རྟོན་ཕྱང ॥
- 182 ཡ་འོལ་ འཛིང་ ལ་ འཕྲོ་བའི་ རྩིག །  
 ངལ་ བོ་ ལ་ ཡང་ ཐ་ མི་ཕྱེ །  
 ཐག་ ཅ་ བཞིན་ཅུ་ འད་ རིང་ལ །  
 དེ་མ་ གས་དུ་ ལེ་ ལན་ འཕྱང་ ॥
- 183 གལ་ ཏེ་ ངལ་ ལ་ གནང་ འདྲོང་ན །  
 འད་ རིད་ ཡོན་ ཏན་ རྟན་པར་ ཕྱེ །  
 དེ་ཡིས་ ངལ་ཡང་ རེམས་ ཐེག་ཅིང་ །  
 འད་ཡང་ བསོད་ ཀམས་ འཕྲེལ་བར་ འཕྱུང་ ॥

180. Be studious to conceal the manner of your actions. Commonly, it is weakness to show it plainly. Had the eye not been found devising they would not have tied a rope on his neck.

181. To what use are such food and goods as are contemned by others? What wise man would have such dirty things as are eaten by dogs and swine?

182. We should never use such expressions as might hurt one, not even against an enemy; they immediately will return on us, like an echo from a rock.

183. If you wish to injure an enemy, make yourself perfect in all good qualities. By doing so, the enemy himself will be mortified, and you yourself also shall improve in virtue.

- 184      མི་ སྤྱན་ དག་ ལ་ བཅས་ ལྷམས་ སྤྱད་ །  
          རྩོལ་ ཆོས་ ཁ་ ཅས་ གཟུལ་བའ་ བྱ་ །  
          འད་ གི་ ལུས་ ལ་ ཡན་ འདྲོང་ ཅམས་ །  
          གཤའ་ བཞེས་ སྤྱད་ གིས་ ཅད་ ཅམས་ འདྲོན་ ॥
- 185      འད་ རྩེགས་ སྤང་ ཡང་ སྤང་ མི་ བྱ་ །  
          དག་ རྩེགས་ བཅས་ སྤང་ འཕྱ་ མི་ བྱ་ །  
          བྱ་ འོག་ བྱ་ འོག་ གིས་ འཕྱ་ ཡང་ །  
          རྩེག་ པ་ ཅམས་ དང་ མཐུན་པ་ མན་ ॥
- 186      བྱ་ བ་ ཆེ་ རྒྱང་ གང་ བྱེད་ སྤང་ །  
          མཁས་ པས་ རིག་ རྩ་ བསྐྱིམས་ རེ་ བྱ་ །  
          ལེད་ གས་ རི་ བོད་ སྤང་ ཆེན་ གཞིས་ །  
          གསོད་ པའི་ ཆེ་ ཅ་ སྐྱིམས་ རྩོད་ མེད་ ॥
- 187      བདག་ པས་ མཐོ་ བའི་ དམ་ པ་ ལ་ །  
          བརྟེན་ པས་ བདག་ ལ་ ཡན་ པ་ འཕྱལ་ །  
          སྤྱན་ པའི་ དོས་ ལ་ གནས་ པ་ ཡི་ །  
          བྱ་ ཅམས་ གསེར་ རྩ་ སྤང་ བའ་ འཕྱུང་ ॥

184. The foolish man is tender-hearted to an enemy: this must be subdued in a rough manner. They that wish well to their own body, take out the disease of it, by bleeding and caustic operations.

185. Though our own party is angry with us, we should not desert it. Though an enemy treats us with kindness, we should not embrace his cause. Though a crow hurts another crow, yet they do not agree with the owl.

186. A wise man, whatever he does, whether great and small things, must do them with due consideration. When the lion kills both the hare and the elephant, he has no time for consideration.

187. If we keep to such as are more excellent than we, we profit thereby. Those birds that abide on the side of Sumeru (Kirab) seem to shine like gold.

- 188      ཆེན་ པོ་ སྤྲུལ་ འོག་ ལྷན་ པ་ ལ།  
          བདེན་ ན་ ཆེན་ པོ་ འོག་ མི་ འཕྱུར།  
          ཉི་ མའ་ འོད་ ལ་ ཉི་ པ་ ཡིས།  
          སྒྲི་ བ་ མའ་ འོད་ ལྷུར་ ལ་ ལྷོས ॥
- 189      མི་ གང་ མཛེན་ བ་ མི་ བསྟེན་ པ།  
          དེ་ དང་ འཕྲོགས་ པ་ ལྷ་ འིག་ རུས།  
          ནམ་ མཁའི་ འཇམ་ ཆེན་ མདོག་ མཛེས་ རྒྱང་ །  
          གྲིན་ རྩ་ རེ་ ན་ ལྷན་ པོ་ འཕྱུལ ॥
- 190      བདག་ ཉིད་ གང་ ལ་ མི་ དགའ་ བ།  
          གཞན་ ལ་ ལྷན་ རྩ་ དེ་ མི་ རུ།  
          གཞན་ གྲིས་ རྒྱང་ བད་ གཅིས་ པའི་ ཆེ།  
          བདག་ ལ་ བསམ་པ་ ཅི་ ཡོད་ བསམ ॥
- 191      བདག་ ཉིད་ གང་ ཞག་ གང་ དགའ་ བ།  
          དེ་ ཉིད་ གཞན་ ལ་ ལྷུར་ རུས་ ན།  
          གཞན་ གྲིས་ བདག་ ལ་ གང་ དགའ་ བ།  
          དེ་ ཡི་ རྒྱལ་ གྲིས་ མཆོད་ པར་ འཕྱུར ॥

188. If you depend on an envious great man, you never shall obtain renown. See how the moon does decline after having approached to the sun.

189. Who can associate with such a man, as keeps no friendship? Though a rainbow is beautiful, it is a foolish man's error if he takes it for a real ornament.

190. What we like not for ourselves, we never should do to others. When we are injured by others, we should reflect on, what think we then in ourselves?

191. If we do to others what is agreeable to us, others also, in the same manner, will honour us with a pleasing return.



- 192      དམ་ པ་ ངག་ ལ་ བདེན་ པ་ ངང་ །  
          མཁས་ པ་ ངག་ ལ་ འཛི་ བ་ ངང་ །  
          གཞུང་ བཟང་ པ་ ངང་ འཕྲུགས་ པ་ ཀྱི །  
          སྤ་ ལ་ ཡོང་ པ་ རྒྱུན་ ཅ་ བདེ ॥
- 193      ཉམས་ རྒྱང་ རྣམས་ གྱིས་ འང་ ཉིད་ གྱི །  
          སྤ་ བ་ ཉམས་ ཅད་ འབྲུག་ པར་ བསམ །  
          དེ་ རྒྱུ་ གེ་ ཀྱི་ མེ་ སྤ་ བའི་ །  
          མི་ ལ་ གཞན་ གྱིས་ བསྐྱུར་ བ་ ཉེ །
- 194      ཡུལ་ ངང་ ཅུས་ ལ་ བཏ་ པའི་ རྒྱུ །  
          འཕ་ རྩ་ བསྐྱེམས་ དེ་ ལན་ འགའ་ སྤ །  
          ལེགས་ བཤད་ ཡིན་ གུང་ མང་ རྒྱུར་ ཀྱི །  
          རྒྱུང་ རྩ་ རྒྱུ་ བཞིན་ རིན་ མི་ འབྲུ །
- 195      འང་ རྒྱུན་ མཁས་ པ་ རྣམས་ གྱིས་ གུང་ །  
          རྒྱུན་ ཅ་ ག་ བ་ སྤན་ རྩ་ ངམའ །  
          མང་ པོས་ བདག་ ལ་ དེ་ སྤྲུགས་ ཀྱི །  
          རྒྱུན་ ཅན་ ཡིན་ པར་ སྤན་ རྩ་ ངམམ །

192. He is always happy, who has the opportunity of depending on the excellent, of asking (consulting) the learned, and of conversing with good-natured men.

193. Weak-minded men fancy (think) that every thing that they speak, is erroneous. The man who thinks thus, if he do not speak, is very much to be suspected by others.

194. At its proper place and time, after having well considered, speak some time. Though you utter only (or all) elegant sayings, yet if too much, like overplus merchandises, they have no price.

195. It is very difficult (or seldom) in learned men also, to take for a defect the imperfection, that they have. Take care, whoever (studiously) confesses of himself to have such defects, he is a faulty man.

- 196      རྟོ་ དང་ གཤམ་ འཁོར་ མེད་ ཀ་ ཡད་ །  
          མཛེལ་ བོ་ གློ་ ལྷན་ འབྲེགས་ ཡོད་ ཀ །  
          ཅུད་ འབྲེགས་ གུང་ ཀི་ དེན་ ལྷལ་ ཀ །  
          མི་ ཡི་ འབྲེ་ བ་ གློས་ ཅི་ དགོས་ ॥
- 197      ལྷན་ འིངས་ འཁོར་ པའི་ དབ་ བ་ དང་ །  
          མཛེལ་ བ་ བྱེད་ གུང་ བཤེ་ མི་ བ །  
          ཤིན་ ཅུ་ ཚེ་ བའི་ ཅུ་ ཀིད་ གུང་ །  
          མོ་ དང་ ལྷན་ ཀ་ མ་ གསེད་ དམ ॥
- 198      གཞུང་ བཟང་ དོ་ ཚེ་ ཁྱིལ་ ཡོད་ ཀ །  
          དབ་ བོ་ ལ་ ཡད་ ཡོད་ བདེན་ ཅུང་ །  
          གཞུང་ བཟང་ དབ་ ལ་ ལྷལས་ སོད་ བས །  
          བྲེག་ གི་ བཟ་ ཅུ་ ལྷལས་ བ་ ཤོས་ ॥
- 199      འད་ གིས་ ལེགས་ པའ་ ཤེས་ ཀ་ ཡད་ །  
          བྱ་ བ་ ཤམས་ ཅུད་ བྲོས་ གྱིས་ བ །  
          མི་ གང་ བྲོས་ ལ་ མི་ དགའ་ བ །  
          འབྲེད་ བ་ འིན་ ཚེན་ རོ་ བ་ ཡིན་ ॥

196. Without wealth, and without a train of servants, if there is for companion an intelligent friend, a beast also may find his concern, how much more a man?

197. With an enemy, who is from long time voracious against us, we should not coalesce, though he be desirous of our friendship. If fire meets (or comes in collision) with hot water will it not be extinguished by this?

198. We may rely upon an enemy too, when he is a good-natured, righteous and honest man. I have heard, that one, by resorting for protection to a good-tempered enemy, has been defended by him until his life's end.

199. Though you be well acquainted with the subject (or matter) do every thing with due consideration, he, that neglects it, shall dearly pay for his indiscretion.



204      ક્રોધાં દત્તં વર્જ્યં પાપં રક્ષિત્ત્વં દેહં ક ।  
             રૂદ્ધં પાં શ્લેષં પાં મિં શ્વેદં શ્રેય ।  
             અદ્યૌં રૂદ્ધં રૂદ્ધં શ્લેષં કં અદં ।  
             દત્તં શિશ્નં શ્લેષં દદં મશ્નુકં પાપં શ્રેય ॥

205      રૂદ્ધં દદં શ્લેષં શ્રેયં દેહં શ્લેષં ક ।  
             રક્ષિત્ત્વં શ્વેદં શ્રેયં શ્લેષં શ્વેદં રૂદ્ધં રૂદ્ધં ।  
             શ્લેષં શ્વેદં શ્લેષં પાપં શ્વેદં શ્રેયં પાં શ્રેય ।  
             શ્લેષં શ્લેષં શ્લેષં શ્લેષં પાપં મં શ્લેષદત્તં શ્રેય ॥

206      શ્લેષં પાં શ્લેષં શ્લેષં શ્લેષં શ્લેષં ક ।  
             શ્લેષં શ્લેષં શ્લેષં શ્લેષં શ્લેષં પાં શ્લેષ ।  
             શ્લેષં શ્લેષં શ્લેષં રૂદ્ધં રૂદ્ધં વશ્નુકં ક ।  
             શ્લેષં પાં પાં પાં શ્લેષં પાં શ્લેષ ॥

207      શ્લેષં દદં શ્લેષં શ્લેષં શ્લેષં પાં પાં ।  
             દેં દદં દેં પાં શ્લેષં શ્લેષં શ્લેષ ।  
             શ્લેષિત્ત્વં શ્લેષં શ્લેષં પાપં મિં શ્લેષદત્તં દે ।  
             શ્લેષં પાપં શ્લેષં શ્લેષં શ્લેષિત્ત્વં શ્લેષ ॥

204. It is impossible in this world, that you should obtain your wish by cursing (or abusing). Though you be selfish in your mind, be affable to all, in speaking.

205. If we have our concern and that of others, it matters not, whether we have obtained it by soft or harsh means. The Muni has not declared it to be craftiness to employ wise means in our doings.

206. When a prudent man hangs down his head, the fault falls on him that abuses. When a light is kept downwards with its mouth, (or a lighted candle or torch) it burns the hand of the light-keeper.

207. Place every thing to its proper place. A head-ornament is not tied on the legs; bracelets (or rings) for the legs will not answer as a head-ornament.



- 208      བྱ་ བ་ ཆེན་ པོ་ བསྐྱེད་ པའི་ ཆེ་ །  
          འབད་ པ་ དག་ གེས་ གྲོགས་ བཟད་ བསྐྱེན་ །  
          ཀལས་ ཚྲིལ་ ཆེན་ པོ་ མེས་ བསྐྱེད་ ཀ་ །  
          རྒྱུད་ གཅིག་ ཅི་ ཀས་ གྲོགས་ ལུ་ དཔེས་ ॥
- 209      འཕྲོདས་ རྒྱུད་ གཅིག་ བ་ མ་ བྱ་ རྩེ་ །  
          འཕྲུའ་ རྒྱུད་ དཀའ་ བས་ རིགས་ མ་ བྱ་ །  
          ལས་ གྱི་ འཕྲོད་ པ་ རྒྱུད་ རིང་ བསམ་ །  
          རྒྱུད་ རྒྱལ་ ལྷ་ ཚེགས་ ད་ བཟོད་ འབྱུང་ ॥  
          བྱ་ བ་ བཟོག་ པ་ རྩེ་ །
- 210      འཕྲོ་ མགོན་ ལངས་ རྒྱུ་ བཅུགས་ བཞིན་ ཟུ་ །  
          རྩོན་ པ་ གཞན་ ལ་ རྩས་ རུད་ པ་ །  
          ཡན་ ལལ་ བརྒྱུད་ ལྷན་ རྒྱ་ འབམ་ ཟུ་ །  
          བ་ ལྷིང་ ཁྲོན་ པ་ སོ་ བ་ ཡིན་ ॥
- 211      དདོས་ པོ་ གང་ དང་ གང་ ལ་ ཡང་ །  
          གེམས་ ཀ་ དཀའ་ བ་ ཅི་ ཡང་ མེད་ །

208. When you are about to perform any great thing, endeavour to have a good associate. If you will burn up a forest, you want of course the aid of a wind.

209.—Be not grieved, if you are indigent, neither be elated with joy, if you are in affluence, think on the consequences of your moral works. All sorts of prosperity and distress are but temporal (or of short duration).

210. If a man pays respect to another teacher, though Buddha, the patron of men, is to be found here, he sinks a salt-well on the bank of a river whose water possesses eight good qualities.

#### IX.—RELIGION ON GOOD MORALS (ཚོས་).

211. There is no difficulty to perform whatever thing, if we are

བཟོ་ཡི་རྒྱུ་ཕྱིན་སྤྲུངས་པ་ལྟར།

དམ་ཚེས་དགའ་བ་མེད་པར་འབྱུང་།

212 གང་ཞིག་རྒྱུ་རྒྱུ་ཚེས་ཤེས་པ།

དེ་ཡི་ལེངས་སྤྱོད་ཟད་མི་ཤེས།

ཚེས་ཤེས་མེད་པར་ཚེས་པ་ལ།

སྤྲུང་བསྐྱུ་ཆར་བཞིན་སྤྱོད་ཅ་འབྱུང་།

213 མཁ་དགས་ཚེ་ན་ལེན་པ་ཡི།

ནར་ནི་སྤྱིན་པར་ལྷུ་པས་གཞུངས།

བསགས་པའི་ནར་ནི་སྤྲུང་རྩ་ལྟར།

མཁ་ཞིག་གཞན་ཁྱིམ་སྤྱོད་པར་འབྱུང་།

214 འཇིག་རྟེན་འདིར་ནི་སྤྱིན་བཏང་བས།

དངོས་པོ་འདི་ཐོབ་པའི་དེས་པ་མེད།

སྤྲུང་ལ་ཕྱིན་ལ་འབྱུང་མེད་པར།

རྒྱུ་ཡང་བཞིན་བསྤྱོད་ཐོབ་པར་འབྱུང་།

215 རིགས་པསྤྱོད་སྤྱོད་ཁྱིམ་དགས་པས་ན།

སྤྱོད་རྒྱུ་རྒྱུ་ཟད་བཞིན་པ་སྤྱོད།

accustomed to. As we have learned the mechanical arts, we may exercise also virtue (true religion) without difficulty.

212. The wealth of a man, that is contented with little, is inexhaustible. He that seeks always for, and is never satisfied, will have a continual rain of sorrow.

213. Give of the goods that you have received from others, when they have need of them, as Thub-pa (Shākya) has commanded us to do. In the same manner as honey (of the bees), all hoarded treasure will once be enjoyed by others.

214. In this world, it is uncertain, if you lend money, whether you shall have the principal or not, but if you bestow it in alms, though it be small, it will increase hundred-fold.

215. From fearing that his family will be impoverished (thereby)

ਮਾਨਸਾ ਪਾ ਈਸਾ ਧਨੁੰਦਾ ਮਧਾ ਏਵਾ ਭੁੰਦਾ ।

ਧਨੁੰਦਾ ਧਨੁੰਦਾ ਧਨੁੰਦਾ ਧਾ ਧੁੰਦਾ ਪਾ ਧੁੰਦਾ ॥

216 ਫਿੰ ਭੁੰਦਾ ਪਾ ਮਾ ਸੁ ਧੁੰਦਾ ਪਾ ।

ਧਿੰ ਭੁੰਦਾ ਸੁ ਫਿੰਦਾ ਪਾ ਮਾ ਮਿੰਦਾ ।

ਪਾ ਮਾ ਸੁ ਫਿੰ ਧੁੰਦਾ ਪਾ ਧੁੰਦਾ ਪਾ ।

ਪਾ ਮਾ ਧੁੰਦਾ ਪਾ ਸੁ ਫਿੰਦਾ ਪਾ ॥

217 ਬਿੰਦਾ ਧੁੰਦਾ ਪਾ ਪਾ ਧੁੰਦਾ ਪਾ ਧੁੰਦਾ ।

ਬਿੰਦਾ ਧੁੰਦਾ ਪਾ ਧੁੰਦਾ ਪਾ ਧੁੰਦਾ ।

ਫਿੰਦਾ ਪਾ ਧੁੰਦਾ ਪਾ ਧੁੰਦਾ ਪਾ ਧੁੰਦਾ ।

ਧਿੰਦਾ ਪਾ ਧੁੰਦਾ ਪਾ ਧੁੰਦਾ ਪਾ ਧੁੰਦਾ ॥

218 ਧੁੰਦਾ ਪਾ ਪਾ ਧੁੰਦਾ ਪਾ ਧੁੰਦਾ ਪਾ ।

ਧੁੰਦਾ ਪਾ ਪਾ ਧੁੰਦਾ ਪਾ ਧੁੰਦਾ ਪਾ ।

ਧੁੰਦਾ ਪਾ ਪਾ ਧੁੰਦਾ ਪਾ ਧੁੰਦਾ ਪਾ ।

ਧੁੰਦਾ ਪਾ ਪਾ ਧੁੰਦਾ ਪਾ ਧੁੰਦਾ ਪਾ ॥

a narrow-minded man keeps anxiously all the little that he gets. A wise man, to obtain a high rank, bestows his alms, as bribes, on others.

216. As children are loved by their parents, they are not respected in the same manner by their children. After the parents have long cherished their children, when they have grown old, they are despised by them.

217. They that have become the slaves of the world, run after riches, neglecting their own souls. Contented men, though they obtain wealth, give it, as an excellent man does to others.

218. If you fight an enemy, since he does harm to you, subdue your own passions, it is on account of your passions, that, from the beginning, you are wandering in the orb of transmigration; and then you shall be perfectly free from all harm.

- 219 གལ་ ཏེ་ དཔ་ རྒྱ་ བརྒྱ་ འདོད་ ཀ །  
 གལ་ ད་ པ་ དེ་ རྒྱ་ ག་ ལ་ འདོད་ །  
 འད་ གི་ རྩོ་ བ་ གཅིག་ བཅོམ་ པས །  
 དཔ་ རྒྱ་ གཅིག་ ཅུ་ བས་ ད་ པ་ ཡིན །
- 220 མཐུ་ ཆེན་ བརྩོ་ རྒྱ་ རྩོད་ པ་ ལ །  
 རྩོ་ ཀ་ འད་ ལ་ རྒྱ་ པར་ གཅོད་ །  
 དམ་ པ་ ཉེ་ བར་ ཉི་ བ་ ལ །  
 རྩོ་ བར་ ཐུའི་ རྒྱ་ ག་ ལ་ ཡོད །
- 221 རྩོད་ པོ་ གཅིག་ ལ་ རྩོ་ བ་ ཡི །  
 ཙ་ ཀམས་ རྩོད་ གིས་ རྩོ་ བརྒྱ་ འཕྲོལ །  
 དེ་ བཞིན་ རྒྱ་ ཅིག་ རྩོ་ བ་ ཡི །  
 རྩོ་ བོ་ ལས་ རྩོ་ སོ་ སོ་ འཕྲལ །
- 222 འད་ འདོད་ འཕད་ པ་ ས་ བརྒྱ་ བ་ འདོད་ ཀ །  
 དེ་ ཡིས་ དད་ པོ་ གཞན་ དེ་ བརྒྱལ །  
 འད་ དོན་ འཕལ་ ཉིས་ གཅི་ ཐུད་ པ །  
 དེ་ ཡིས་ འད་ དོན་ འཕལ་ མི་ རྩོད །

219. If you will destroy all your enemies, you never shall be at an end with killing them. But if you have subdued only your own passion, you have at once destroyed all your enemies.

220. If you are angry with a powerful mischievous man, you hurt the more your ownself. What reason have you to be angry with a virtuous and very sedate man?

221. Herbs, that grow on the same stubble, are dispersed by the wind into the ten corners (of the world) thus men, that are born together, are separated by the effects of their moral works.

222. If you will earnestly obtain your own concern, first seek that of others. He that seeks only his own concern principally, it is impossible, that he should succeed in obtaining his own purpose.



- 223 ལྷན་ པོ་ མི་ སྒྲུབ་ ངོ་ མཚོར་ འཛིན།  
 མཁས་ པ་ སྒྲུབ་ པ་ ངོ་ མཚོར་ འཛིན།  
 དེས་ ཀ་ མཁས་ པ་ ཅིས་ གྲུར་ གྲུང་།  
 ཕྱི་ མའི་ དོན་ ཅུ་ འི་ པ་ སྒྲུབ། ॥
- 224 ཞུས་ འཕ་ མེད་ པའི་ ལྷ་ མཚོན་ ཕྱིས།  
 ལྷན་ པོ་ ཡོན་ ཏན་ མ་ སྒྲུབ་ པོ།  
 བརྟམས་ ཀ་ ཞེས་ འཕ་ མེད་ བཞེར་ ཕྱིས།  
 ལྷན་ པོ་ འབད་ ཏས་ སྒྲུབ་ བཞེས་ སོ། ॥
- 225 ལྷེ་ བ་ ལྷ་ མ་ མ་ བསྐྱབས་ པས།  
 ཚོ་ འདིར་ ལྷན་ པོར་ མཐོང་ ཏས་ ཀི།  
 ཕྱི་ མ་ ལྷན་ པོར་ ལྷེ་ དོན་ པ།  
 ཚོ་ འདིར་ བཀའ་ ཡང་ འབད་ པས་ བསྐྱབ། ॥
- 226 སྒྲུབ་ ལ་ འེས་ པ་ མི་ དཔོན་ ཞེས།  
 ལྷན་ པོ་ སྒྲུབ་ ལྷ་ ཅུང་ ཅུ་ སྒྲུབ།  
 འེས་ པ་ མེད་ པའི་ སྒྲུབ་ པ་ དེ།  
 འབད་ གྲུང་ ཅུང་ འབྲེལ་ ལྷུབ་ འབས་ ཡོན། ॥

223. A foolish man will not learn, and takes every thing for a miracle, a wise man after having studied, admires every thing. Therefore a wise man, though grown old, acquires knowledge for his future state.

224. The fool seeks not to acquire science, since he says, he has no mind of understanding; but if he would well consider, he should endeavour for this reason to learn to improve his understanding.

225. One that has not learned in his former birth, is ignorant in the present life. He that is afraid to be born again ignorant in the next world, though it be difficult, must study assiduously in this life.

226. Meditate, there is no need to learn by hearing, thus says the narrow-minded fool. Contemplation without previously hearing (experimental learning) though it be diligently pursued, is the way of preparation of a beast.

- 227 རྒྱ་ འཕྲས་ བ་སྒྲུ་ བ་ མེད་ པ་ འདི་ །  
 དམས་ ཅད་ མཐེན་ པའི་ ཁྱད་ རྩོམ་ཡོན་ །  
 མ་ བསྐབས་ པ་ ལ་ རྒྱན་ མཐེན་ ཅུ་ །  
 འཕྲོ་ ཀ་ རྒྱ་ འཕྲས་ ཅ་ ལ་ བདན་ ॥
- 228 དེས་ པ་ མེད་ པའི་ སྒོམ་ པ་ དེ་ །  
 རེ་ ཞིག་ རྒྱབ་ རྒྱད་ རྒྱུ་ ཅ་ འཛིགས་ །  
 ཅམེའ་ དངུལ་ རེགས་ པའ་ བཟུ་ ཀ་ ཡད་ །  
 མེ་ དང་ ཅལ་ ཀ་ ས་ བའ་ འཕྱུ་ ॥
- 229 ཅད་ ལ་ སྒོ་ ཅེས་ མ་ རྒྱན་ ཀ་ །  
 བཟླ་ བཅོས་ རེགས་ རྒྱད་ རྒྱ་ ཞིག་ རེན་ །  
 རྩེ་ རྒྱས་ རྒྱས་ པའི་ ཅམེའ་ རྒྱི་ རྒྱན་ །  
 མཛེས་ རྒྱད་ བ་ ལཱ་ ཅ་ ལ་ བཟླ་ ॥
- 230 མཁས་ པ་ རྩམས་ རྒྱི་ རེགས་ རྒྱན་ །  
 ཞིག་ ཅུ་ བདེན་ པའ་ ཅོ་ སྒྲུ་ ཅུ་ །  
 དེ་ དེན་ རྩམས་ རྒྱ་ མི་ རེན་ ཀ་ །  
 བཟླ་ བཅོས་ ཞེས་ རྒྱད་ རྩི་ ཞིག་ རྒྱ ॥

227. How would this infallible doctrine be true, that it is perfection in knowledge, by which the all-knowing differs (from others). If you should become all-knowing without learning?

228. Meditation without hearing (learning) though it succeeds for a while, but will soon fail afterwards. You may melt well gold and silver, but if you take away the fire, they grow hard again.

229. He that wants understanding, though a literary work be a good composition, will not take it. Though an ornament of gold, beset with jewels be beautiful, yet would any ox look on it?

230. To know well that it is very true, what is expressed in the elegant sayings of learned men: if you will not understand and practise them, to what use is your knowledge of the shastras?

- 231    स्तुं ज्ञकं इदं क्षिप्तं क्षिप्तं कं यद ।  
 मातस्य पतिं शत्रुदं शत्रुस्य शत्रुस्य पतिं वध ।  
 ईकं केकं क्षिप्तं कं यद ।  
 मं यत्रस्य पतिं कं ईकं ददं कृदं ॥
- 232            कस्य कं यं क्षिप्तं कं यद ।  
 ईकं दकं स मक्षकं कृते वं नृदं ।  
 दें यक्षिक्तं मातस्य पं मदं कं यद ।  
 शत्रुस्य यदं दृष्टुदं वं क्षिप्तं कं दक्षेकं ॥
- 233    ईं मक्षकं दक्षे वदं ईं कं क्षिप्तं ।  
 शत्रुदं दक्षुदं यदं कस्य क्षिप्तं पतिं दृष्टुदं ।  
 शत्रुदं केकं यदुदं दं क्षिप्तं दृष्टुदं ईं ।  
 मातस्य पं शत्रुस्य यदं ईं कं क्षिप्तं ॥
- 234            दक्षिणं ईकं कृते वं शत्रुस्य क्षिप्तं प ।  
 दें यक्षिप्तं दक्षं पतिं केकं शत्रुस्य दक्षुदं ।  
 देस्यं कं केकं शत्रुस्य शत्रुदं पं दे ।  
 कृदं कृदं शत्रुस्य दक्षिणं ईं कं यदं यक्षि ॥  
 केस्य यदं वं ईं ।

231. Though an intelligent man knows by himself also, yet he peruses the text-book (composition) of a learned man. Though precious metal is very fine, yet it has less price, till it has not been wrought up.

232. Though there be many forests, yet very scarce is the spot, where the Sandal-tree grows. Thus also, though there be many learned men, yet elegant sayings seldom are to be found.

233. Gold and silver are known when they have been melted. An elephant's goodness will appear in the field of battle. A learned man may be judged by his composition of elegant sayings.

234. He that is acquainted with the manners of the world, will exercise true religion. Therefore he that practises good morals, is the living biography of a saint.

*Note.*—The numbers omitted in this last enumeration have not been translated now. The whole work consists of 454 Ślōkas.







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Edw. A. S. 1850

*Notes on a forest race called Puttooas or Juanga, inhabiting certain of the Tributary Mehals of Cuttack.*—By E. A. SAMUELLS, Esq.  
B. C. S. Superintendent of the Tributary Mehals.

In the 248th Number of the Journal, there appeared an interesting memorandum by Mr. Piddington on two individuals of an unknown forest race, supposed to inhabit the jungles south of Palamow. I think it not improbable that the persons who are there described may have belonged to the forest race, called Puttooas, which inhabits the jungles of the Tributary Mehals to the South of Singbhoom, and that the female had, from motives of convenience or from fear of pursuit, abandoned the peculiar dress, which ordinarily distinguishes the women of the tribe.

These Puttooas are very little known even to the inhabitants of Cuttack. Mr. Sterling does not notice them in his History of Orissa, and the only mention I have found of them in any publication is contained in a short paragraph of a Report by Mr. Mills on the Tributary Mehals of Cuttack, which was published in the 3rd Vol. of the "Selections" of the Bengal Government. Some account of this peculiar people will not therefore, I presume, be unacceptable to the members of the Society.

I first met with the Puttooas at the Killah of Dhekenal in 1854. I saw another large party of them in the Hindole Killah last year, and a few weeks ago I visited a Puttooas village near Bhapore, on the Ungool road, in company with my friend Major Strange of the Trigonometrical Survey, to whose graphic pencil the Society is indebted for the spirited and life-like sketches which accompany these notes. My information regarding the habits and customs of the tribe is derived chiefly from the Puttooas themselves, but to some extent also from the Dhekenal Rájáh, to whom I sent a paper of queries last year on the subject.

The Puttooas are scattered over the Tributary Mehals (or Killahs as they are frequently called) of Keonjur, Pal Leyra, Dhekenal and Hindole. In Dhekenal, they are said to number one thousand and five persons of all ages and sexes, inhabiting fifty-eight different localities. Their numbers in the other Mehals I have not been able

to ascertain with any certainty. It is commonly supposed, however, that they occupy about thirty villages in Keonjur, and six or seven in Pal Leyra and Hindole.

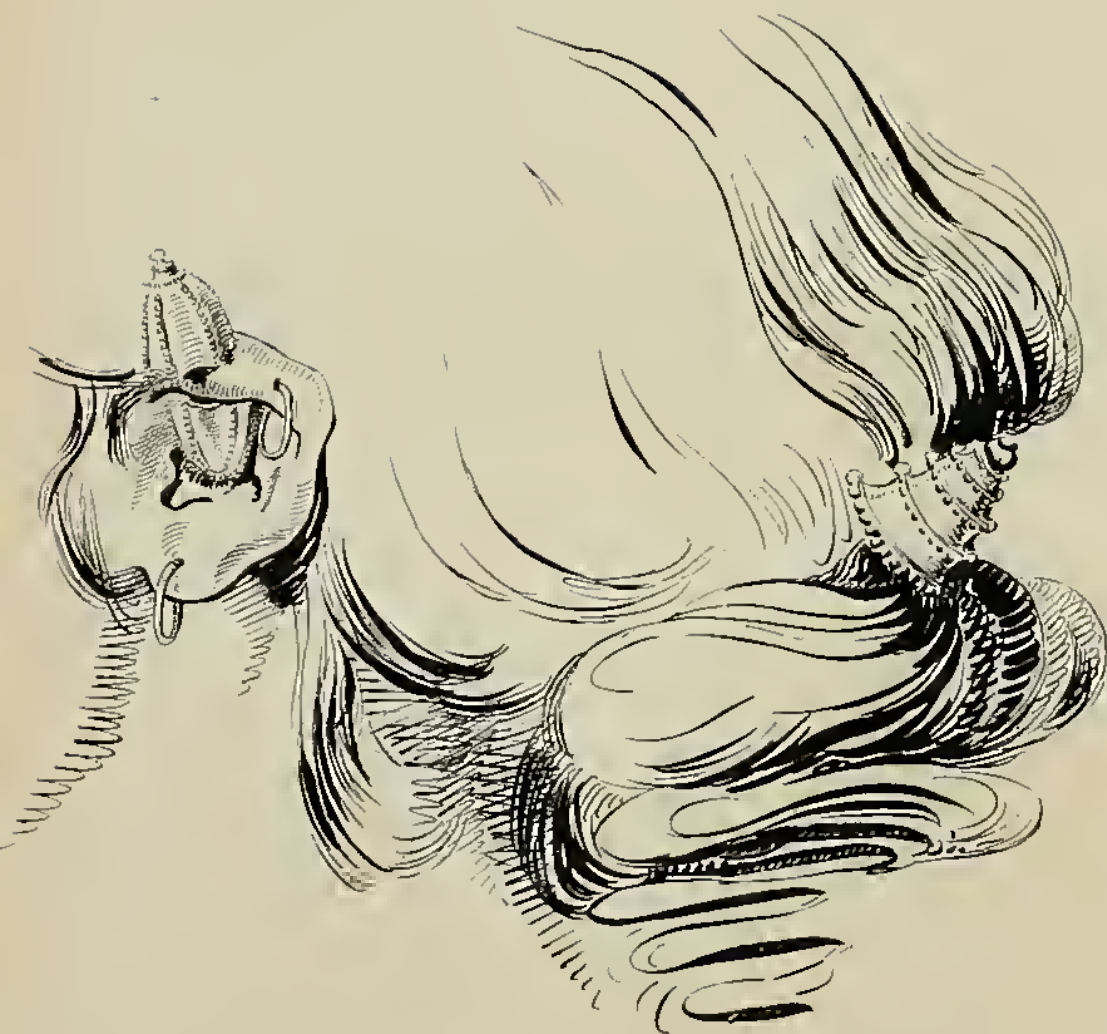
In appearance, the *Puttooas* differ materially from the *Oorians*, in whose neighbourhood they are found. Their stature is diminutive not exceeding apparently 5 ft. 2 in. the males, and 4 ft. 3 or 4 in. the females. Their forms are slight with very little muscular development and their physique seemingly weak. There is of course, a great variety of physiognomy apparent amongst them, but I remarked, as a general characteristic which rarely failed, that the face was broader and shorter than in the *Ooriah*, and that the nose was flat with wide nostrils. Their colour is not darker than that of the *Ooriah* peasant.

The men are far from being handsome, but the palm of ugliness must be awarded to the women. I must have seen altogether about forty or fifty of the *Puttooas* women, old and young, and I did not observe one who was not repulsively ugly. It was evident from what we saw in the village which Major Strange and I visited, that all the drudgery of the household devolved upon the women; and to this, and their constant exposure, may partly be attributed the coarseness of feature, which distinguishes them; they seemed to us, however, to be also insufficiently fed. Their persons were generally spare and emaciated, while the men, for the most part, appeared to be in good condition.

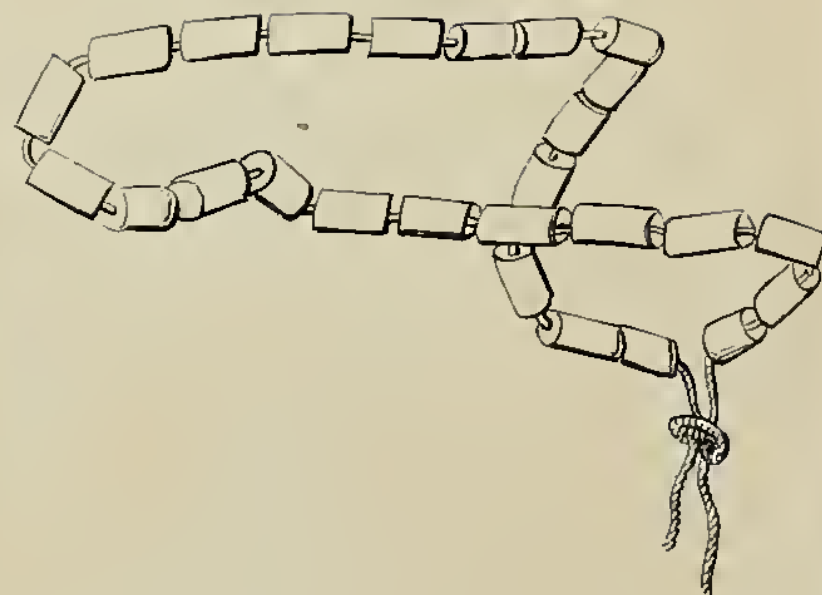
The dress of the men is the ordinary one of the native peasantry, but the women wear no clothes whatsoever. Their sole covering consists of two large bunches of leaves (or rather of twigs with the leaves attached) of which one is worn in front and the other behind. The twigs are sometimes fastened together by a strip of bark, but are more generally loose, and are kept in position by a string of glazed earthen-ware beads passed twenty or thirty times round the waist and over the stems of the twigs. It is from this original costume that the tribe have obtained from their neighbours the name of *Puttooas*—quasi *the people of the leaf*. They call themselves *Juanga*. The leaves which I observed in use were those of the *sál*, the *jамoon*, the *koorye*, and the *chaldua*, but I was told that the leaves of the *bur*, the *peepul*, the *mhowa* and the *kendooa*, in fact







EAR AND HAIR ORNAMENTS



SPECIMEN OF THE BEADS OF WHICH THE GIRDLE IS COMPOSED

all large and smooth leaves are used indifferently. These leaves are changed daily, and are generally in consequence clean and fresh-looking.

No covering is worn on the upper-part of the person ; but most of the females I have seen had necklaces of coloured earthenware beads (made by themselves they told me) which hung down to their waists in numerous folds ; and nose, ear, and hair ornaments, sketches of which will be found in the accompanying engravings, were common amongst them.

Their hair was generally of the shock order, but was gathered rudely into a knot at the back of the head, and fastened by a string terminating at each end in a silver or brass button.

No blanket or other covering, I was assured, is permitted to these women at night, and their only remedy against the extreme cold which often prevails in the hilly region they inhabit, is to sleep between two fires.

The origin of the strange costume they have adopted, was thus described to me by the different parties of Puttooas, whom I questioned. Many ages ago, they said, the women of the tribe, being much given to fine clothes and naturally averse to soiling them, fell into a habit of dressing themselves in leaves whenever they had occasion to clean out the cow-houses or to perform any other menial office. On one occasion when thus employed a Thakoorani (Seeta some said, but the majority did not seem sure of her name) appeared to them and commanded them as a punishment for their pride, never again to wear clothes, or to appear in any other dress than that in which they then stood. Should they violate this command, they firmly believe that they would sooner or later be devoured by tigers. In Keonjur, I am told by Dr. Short of the Madras Army, who has lately visited that Killah, that the legend is somewhat differently told, and that the dress is said to be worn in obedience to the commands of a Rishi. The same belief, however, appears to prevail in Keonjur as in Dhekenal, on the subject of the penalty which awaits those who presume to discard their present sylvan attire, and it is probably owing to the dread which this belief inspires, that even children of an age at which Ooriah girls usually go naked, are made to wear their little apron of leaves.

The effect of such a costume on the spectator who sees a woman rustling along in it for the first time, is, as may be supposed, ludicrous in no ordinary degree, but it is in the dance that its absurdity is most conspicuous. The Puttooas women are in the habit of dancing in a circle to the noise of a large drum beat by the men. They move round and round in the same measured step, occasionally advancing towards the musicians and then retreating, the body bent forward in what the Melbourne Secretary would call, a recumbent posture, the left hand holding the end of the necklace and the right hanging down. In this position, it will be readily understood the stiff bundle of twigs in front necessarily presses inconveniently against the legs. It is therefore, disposed of by being thrust between them. This again as a natural consequence raises up the branch behind, the limp ends of the twigs go bobbing up and down with the motions of the dancers, and when fifteen or twenty women are attitudinising together, the scene becomes as grotesque, as it is possible to conceive. The accompanying sketch gives an excellent idea of it. The attitudes are not in the least exaggerated.

Of the history of their tribe the Puttooas know little. Some of them informed me that the Tributary Mehal of Keonjur was the original seat of their race, but the majority seemed to have no idea that their ancestors had ever resided in any other lands than those they now occupy.

Their villages are small, seldom containing more than six or eight families. Their houses are of the same material as those of the peasantry around them—thatched huts of wattle and dab, but they are poor and mean in comparison. I found there was a belief among the people of my office that the sexes occupied separate houses in the villages, but this is certainly not the case. Each family appeared to have its own dwelling. The site selected for the village is generally some opening in the forest. The one which I visited in company with Major Strange was situated in a very pretty spot on the skirt of the jungle whence the eye wandered over a small cultivated valley—the out-fields of a distant Ooriya village—to the huge mass of the Satsujea mountain, which threw the shadows of its peaks across from a height of some 1800 feet. The village itself was simply a small square surrounded by six miserable looking





BALLET PUTTOESQUE









A GROUP.—KUMLEE AND HER FRIENDS

huts, the whole not larger than the house of a flourishing Ooriya ryot.

The Puttooas do not themselves own land, although they sometimes, we were told, assist in its cultivation. Their pursuits are chiefly those of the chase. They use the bow and arrow, and hunt with dogs, killing deer, hogs, and not unfrequently snakes, of the flesh of which and especially of that of the *Python molurus* they are very fond. They appear to be nearly omnivorous, nothing coming amiss to them except cow's flesh, from which they probably abstain either from fear of the Hindu Rájáhs, in whose territories they live, or out of deference to the prejudices of their Hindu neighbours. Their usual food, however, consists of roots and the seeds of jungle grasses. We found three different kinds of roots in their houses which were called by our Ooriya attendants *toonga*, *kurba* and *panee aloo*. We took some specimens of each to camp and had them cooked for dinner, but the experiment was not encouraging. Without being absolutely nauseous, they were all insipid and had an earthy flavour which was decidedly disagreeable.

No distinctions of rank exist among these people. One and all call themselves Pudhan, the title which the Ooriyas give to the headman of a village. Thus the husband of Kumlee, that most uncomely damsel who stands in the sketch with head averted, looking, as she did in truth, the very picture of sulkiness, is called Mootee Pudhan, and so on with the happy owners of the other ladies who sat for their portraits. They have no distinction of castes. Some of them told us indeed that they should object to eat with low caste Hindus, but this of course was a mere piece of bravado, intended for the ears of the Hindus who were with us; as no Hindu, however low his caste, would consent to join in their meals.

They pay no rent to the Rájáhs on whose lands they live, but they are expected to furnish him, when required, with spirits manufactured from the flowers of the mhowa and with the honey of the wild bee. They are forced also to carry his baggage when he marches through his estate, and to assist on the occasion of his hunting excursions in beating the forest.

The Dhekenal Rájáh declares, that the Puttooas are Hindus, and that they make offerings to the village deities, but although, as may be



seen from the legend by which they account for the peculiar costume of their women, they appear to recognise the existence of the Hindu deities as beings capable of exercising an influence over their actions, they uniformly denied to me that they worshipped any deity or paid respect to any image whatsoever. There were certainly no images of any kind in the vicinity of their huts, and they have no priesthood among them. Their religious homage they assured us was confined to the nameless spirits which they believe inhabit the woods and mountains. When they find a wild grape vine or a wild plum tree more than usually fruitful, or when they chance upon a spot rich in the roots or grasses upon which they subsist, they make an offering to the genius loci of a fowl, a goat, or a little rice and spirits, and address to him a prayer in which the terror which overshadows the lives of this forest race finds touching expression. "Lord, let the bears and the tigers flee when they see us. Let them not meet us." The only festival of a religious character, which they appear to have, occurs in the month of Bysakh, when they offer sacrifices and pour out libations to the manes of their deceased ancestors. They bury their dead, and, as far as I could learn, without any ceremonies worthy of note.

Marriages are arranged by the parents of the parties and are scenes of revelry and drunkenness. On these occasions all the members of the tribe within a reasonable distance assemble at the bride's house and escort her with music, and dancing to the house of the bridegroom, where the women wash her feet in water tinged with turmeric, after which the elders of the community perform the marriage ceremony. This consists, apparently, in each elder laying his hands in succession upon the heads of the bridal pair, and in tying their thumbs together with a thread. A grand feast ensues, in which the men and women eat apart from each other, and the night is afterwards spent in dancing and drinking. The festivities continue for three days. If the first wife prove unfruitful, the husband is at liberty to take another, otherwise they adhere to one wife. The husband, we remarked, has the same objection to mention his wife's name, that is observable amongst the Hindus. Not being aware of the relationship of Kumlee to Mootee Pudhan, we asked the latter, what her name was, and could not account for his

embarrassed look until we learnt from another Puttoo, that she was his wife.

The Juanga language bears no resemblance to Ooriya or to any other dialect with which I am acquainted. A list of words and phrases, which I have collected, is, however, given below, and those members of the Society who are familiar with the dialects of the Coles, Santáls, Goands, Sowrahs, and other hill tribes to the North and West of the Tributary Mehals, will be able to say whether the Juanga bears an affinity to any one of these, or is, as the tribe themselves assert, a totally distinct language. In the latter case, we must suppose that the Juangas are the remnant of a people vastly more numerous than their descendants. It is scarcely possible that a race so numerically weak and scattered over such a limited area, should have originated anything more than a dialect of some one of the languages, spoken by the more powerful tribes in their neighbourhood. I imagine, they will prove to be merely an offshoot from one of the great forest races which have, for centuries, if not for ages, inhabited the mountainous region which extends from Mirzapore to the shores of the Bay of Bengal. Had they ever formed a race of any importance, their peculiar habits could hardly have failed to attract attention, and to have been chronicled among the marvels of the East. Our knowledge of the hill and forest tribes of India is still, however, to our shame be it said, very imperfect, and it is quite within the bounds of possibility that Juangas or other people bearing a close affinity to them may hereafter be found in localities far distant from the Tributary Mehals of Cuttack.

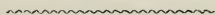
Since writing the above my attention has been drawn by a Madras friend to the Coorumbos of the Wynaad forest, in Malabar, and the Chenchoos of the Masulipatam and Guntoor jungles, as tribes whose women are said to adopt a similar costume to the Juangas, and the following extract has been sent me from Pharaoh's Gazetteer, p. 546. "Twenty years ago, the females of a degraded caste of Holiers, used to come into Mangalore with no other covering but some thick branches of a bush tied to their waist in front, and the same behind. They have now substituted a cloth for the leaves in front." It would be interesting to ascertain whether the resemblance between the Juangas and the tribes mentioned above, is confined to

the dress of the females, or whether it does not extend also to language and customs. In the former case, it would be tolerably certain, that these forest races have sprung from outcaste or persecuted tribes, which have, at various times, been driven to the jungles, and have naturally enough without any knowledge of each other, adopted a covering of leaves from inability to procure a more convenient material; in the latter, an additional argument will be afforded for the popular belief, that the hill and forest tribes are the aborigines of India, and we shall have gained an important step in our knowledge of the geographical distribution of these little known races.

*Vocabulary.*

| <i>English.</i> | <i>Juanga.</i>               |
|-----------------|------------------------------|
| Fire,           | Nélye.                       |
| Water,          | Da or Dagé                   |
| Earth,          | Nuttub.                      |
| House,          | Heea.                        |
| Man,            | Moolusso.                    |
| Woman,          | Khemé chélo or Juangurrakee. |
| Child,          | Hooale kee.                  |
| Boy,            | Koosnunde.                   |
| Girl,           | Korchetán.                   |
| Tree,           | Seemsee.                     |
| Food,           | Moorke Lukooa.               |
| Stone,          | Oola.                        |
| One,            | Minna.                       |
| Two,            | Bana.                        |
| Three,          | Teelooko.                    |
| Four,           | Chalooko.                    |
| Ten men,        | Dench dik.                   |
| Cow,            | Oopye.                       |
| Tiger,          | Keelo.                       |
| Horse,          | Ghorardendite.               |
| Rice,           | Runkoo.                      |
| Sun,            | Béló.                        |
| Moon,           | Nerango.                     |
| We are,         | Aynde asike.                 |

| <i>English.</i> | <i>Juanga.</i>       |
|-----------------|----------------------|
| You are,        | Ramde masíké lokéra. |
| I am,           | Aynde asike.         |
| To give,        | Dinkee mintuk.       |
| To come,        | Mendeldul koa        |
| To go,          | Heena daee.          |
| Mother,         | Byee.                |
| Father,         | Báa.                 |



*On the origin and progress of writing down historical facts among  
the Musalmans.—By Dr. A. SPRENGER.*

There has been a time, when every Arabic, Persian or Turkish work containing the history of Mohammod and of his successors, or any part of the history of the East—even if it referred to the antediluvian period—was considered as a source of information, the authenticity of which was above all doubt or question. It is superfluous to show how uncritical such a proceeding is, and how much wiser it would be for the historian to leave blanks in the chronicles of this world, than to fill them up with such uncertain materials. I believe, I was the first writer who attempted to submit the sources of the biography of the prophet of the Arabians, to a critical enquiry, in my *Life of Mohammod*, Allahábád, 1851. The nature of the book did not enable me to enter so fully upon the subject, as it appeared to me to be necessary, nor was I then in possession of the materials which I required for the purpose. Since then, it has been my good fortune to be able to make a more complete collection of works bearing on this subject, and on cognate matters than there exists any where else, and it is therefore, in my power to throw light on some of the details connected therewith, which I then considered to be involved in great and hopeless obscurity.

The first question which a philosopher would ask of an Arabist who talks of original works on the biography of Mohammod, is probably this: When was the first biography written? He would answer, that the earliest work which we possess is that of Ibn Isháq, who died 141 years after Mohammod. An age in which a religion



can develop itself against the truth of which we entertain doubts, must be stronger in faith than in reasoning, and we might expect that in 141 years, a number of fables would grow up regarding its founder among his followers. The philosopher would therefore, probably question our Arabist: Whence has Ibn Ishâq derived his information? Had he any written records or only traditions? I venture to assert, that none of the orientalist, who, previously to myself, have written on the Life of Mohamammad, was prepared to give a reply. Our Arabist would probably have said, the records consisted of traditions. And as he himself as well as every body else would have taken "traditions" in our own sense of the word, he would have been totally wrong, because there is a wide difference between "*hadyth*" and what we call "tradition;" though the former, for want of a better term, is usually translated by the latter.

Before we can answer the question "had Ibn Ishâq merely oral sources of the biography of Mohamammad or written ones?" it is necessary to show whether the Moslems, during the first century after the Hijrah, did write books at all. With a view of throwing light on this question, I give here an abstract of a very important monography of the Khatyb Baghdâdy (d. 464 or 465) which is entitled *تقييد العلم* and consists of 180 pages.

I.—*Sayings of Mohamammad, from which it appears that he did not approve that his followers should take his sayings to paper or have any other book but the "Book of God."*

1. لا تكتبوا عني شيئا سوي القرآن وقال الصغاني غير القرآن ثم اتفقا  
فمن كتب عني غير القرآن فليمح

"Do not write down any of my words, except the Qorân. (In the text of Çaghány is "besides the Qorân," in what follows both texts agree). Any one who has written down sayings of mine besides the Qorân is to expunge them."

In two versions of this *hadyth* of Abú Sa'yd Khodry is added "and he that says intentionally a falsehood on any authority, will find a place in fire."

2. قال [ ابو سعيد الخدري ] استاذنت النبي ان اكتب الحديث فابي  
ان ياذن لي

"Abú Sa'd Khodry, (d. 74,) relates, I asked permission of the prophet to write down *hadythes* (i. e. his sayings and life) and he refused it."

This *hadyth* is also in Bokháry, and there is one version of it which runs “we asked him” and “he refused us.”

3. قال [ ابو هريرة ] خرج علينا رسول الله صلى الله عليه وسلم ونحن نكتب الاحاديث وقال ما هذا الذي تكتبون قلنا احاديث نسمعها منك قال كذاب غير كتاب الله ائذرون ما ضل الامم فبلكم الا بما اكتبوا من الكتب مع كتاب الله قلنا انحدث عنك يا رسول الله قال حدثوا عني ولا خروج ومن كذب على معتمدا فليقتلوا مقعدة من النار

“Abú Horayrah says: The prophet came out to us and found us writing *hadythes*. He asked us: What are you writing? We answered, *hadythes*, which we hear from you. He observed: You are writing a book, besides the book of God? Do you not know that it is writing books besides the book of God what has led the people before you astray. We enquired: Shall we relate *hadythes* of you, O prophet of God? and he replied: You may relate *hadythes* of me, there is no harm. But he that says intentionally a falsehood on my authority, will find a place in fire.”

In one version of this *hadyth* is added: Then, says Abú Horayrah, we made a heap of our writings and burned them فجمعناها في صعيد واحد فالقيها في النار.

4. دخل زيد بن ثابت على معاوية وسأله عن حديث فامر انسانا يكتبه فقال له زيد ان رسول الله صلى الله عليه وسلم امرنا ان لا نكتب شيئا من حديثه فمحا

“Zayd b. Thábit paid a visit to the Khalif Mo’áwiyah, and he asked him for *Hadythes*, and ordered a clerk to take them down. Zayd observed: The prophet has commanded us not to write down any of his *Hadythes*. Upon this he expunged what had been written down.”

## II.—*Sayings and examples of companions of Mohammad showing that it is not lawful to commit hadythes to writing.*

5. قال [ ابو نضرة ] قلنا لابي سعيد لو كتبتم لنا فانا لانحفظ قال لانكتبكم ولا نجعلها مصاحف كان رسول الله يحدثنا ونحفظ فاحفظوا عنا كما كنا نحفظ عن نبيكم

“Abú Nadhrah relates, we said to Abú Sa’yed Khodry, It would be a grand thing if you were to write down *hadythes* for us, we cannot recollect them. He replied, We will not write them down for you, nor shall we collect them in books. The prophet com-

municated them to us orally and we impressed them in our memory, you must do the same."

There is a more simple and apparently more correct version of this *hadyth* extant, it runs: "We said to Abú Sa'y'd, write down these *hadythes*," and he replied: "We will not write them down. Take them from us as we have taken them from the prophet."

In another version Abú Nadhrah informs Abú Sa'y'd that they have written down *hadythes*, and he ordered them to expunge them.

6. حدثنا فلان عن ابي الشعثا المكاربي ان بن مسعود كره كتاب العلم

"Abú Sha'tá relates that 'Abd Allah b. Mas'úd disapproved of writing down *hadythes*."

7. عن الشعبي عن عبد الرحمن بن عبد الله بن مسعود قال كنا نسمع الشيء فنكتبه فظن لنا عبد الله فدعا ام ولده و دعا بالكتاب و تاخذته من ماء فغسله

"It is related by Sha'by (d. 105) that 'Abd al-Raḥmān, (d. 79) the son of 'Abd Allah b. Mas'úd said, that he (and others) were in the habit of writing down *hadythes* which they heard. 'Abd Allah (d. 32) observed it. He called a slave woman, who was his concubine, and he sent for our writings, and when she had brought him water, he washed them out."

8. حدث بن مسعود بحديث فقال ابنه ليس كما حدثت قال وما علمك قال كتبته قال فهل الصحيفة فجأ بها فمحاها

"Ibn Ma'súd related a *hadyth* and his son observed, You are not correct. The father asked, How do you know it? The son answered, I have written it down. He ordered him to bring the roll and effaced it."

9. قال [ ابو بردة ] كتبت عن ابي كتبنا كثيرة فمحاها فقال خذعنا كما اخذنا

"Abú Bordah (d. in 103) relates, I filled several volumes with *hadythes*, which I had heard from my father Abú (Músà Ash'ary, d. in 42 or 52). He destroyed my writings, and said, Take the *hadythes* from us in the same manner as we have taken them."

Another version of this *hadyth* is, that Abú Bordah and a freed slave of his were in the habit of writing down the *hadythes* which they heard from Abú Músà. When he observed it, he washed out their writing, which was probably on Gazelle skins or parchment. In another version occur the words *كتب عن ابي كتابا* "I filled a book with what I heard from my father."

10. "Sa'y'd Ibn Abú-l-Hasan says, that none of the companions of the prophet knew a greater number of *hadythes* to relate than Abú Horayrah. When Marwán was governor of Madynah and affected with paralysis, he desired him to write them down, Abú Horayrah refused compliance saying, Transmit them as they have been transmitted to us. One day when he was off his guard he sent for him having previously directed a clever and trustworthy penman to be in attendance. Abú Horayrah related all his *hadythes* and the penman wrote them down. When he had done, Marwán said, Do you know that we have taken down your *hadythes*? Indeed! replied Abú Horayrah. Abú Horayrah desired that they should be read to him, and then he said, You now know them by heart and he effaced them."

11. قال [ابو كثير] سمعت ابا هريرة يقول ان ابا هريرة لا يكتب ولا يكتب

"Abú Kathyr relates, I heard Abú Horayrah say, I neither conceal a *hadyth* nor do I write one down."

12. قال [طاوس] ان كان الرجل يكتب الي ابن عباس يسله عن الامر فيقول للرجل الذي جاء اخبر صاحبك ان الامر كذا وكذا فانا لا نكتب في الصحف الا الرسائل والقران

"Tāwus relates, A man was in the habit of writing to Ibn Abbās to enquire of any matter he wanted to know. Ibn 'Abbās said to the messenger, Tell your master, the answer to the question is such and such, and that we only write letters and the Qorān."

There are two other versions apparently of the same story: "Tāwus relates, We were with Ibn 'Abbās; and Sa'y'd b. Jobayr wrote down [his lecture]. They said to Ibn 'Abbās, They are writing. He stood up (went away) and said, If he was not a well behaved man, I should have done something severer than merely getting up." The other version runs: "When Ibn 'Abbās was blind, people from the 'Irāq made enquiries of him and wrote down what he said. There came a man of the 'Irāq, and Ibn Abbās did not open his lips until he had left his presence."

13. عن سعيد بن جبیر ان ابن عباس كان ينهي كتاب العلم

"Sa'y'd b. Jobayr (d. 95) states that Ibn Abbās used to interdict the writing down of *hadythes* (and laws)."

14. قال [سعيد بن جبیر] اذا كنا اختلفنا في الشيء كتبته حتي القى به ابن عمرو لويعلم بالصحيفة معي لكان الفيصل بيني وبينه



"Sa'yd b. Jobayr relates, If we differed on a point, I wrote it down with a view of asking the son of the Khalif 'Omar. But if he had known that I have any notes with me, our friendship would have been at an end."

III.—*Sayings and examples of Tábies (i. e. persons of the first century who did not know Mohammad) who disapproved of writing.*

15. Ya'qúb b. 'Abd al-Rahmán states that his father related to him, I was present when 'Obayd Allah b. 'Abd Allah paid a visit to the Khalif 'Omar b. 'Abd al-'Azyz. The Khalif kept people in readiness who took down [the *hadythes*] he repeated. When he was leaving, 'Omar said to him, We have done something. 'Obayd Allah asked, What? 'Omar replied: We have written down all that you related. He asked, Where are the writings? and when they were brought to him he tore them up.

16. Mokhammad relates, I asked 'Abydah, Shall I write down what I hear from you, and he answered: No. And then he said, I have found a book, shall I read it? and he answered: "No." In another version there is, "If I should find a book shall I read it before you?" instead "I have found a book, &c."

Mohammad (the Shaykh of Ibn 'Awn) relates also, "I said to 'Oyaynah, Shall I write down what I hear?" 'Oyaynah answered, "No." Then he said, I have found a book, shall I read it? He replied, "No."

17. Idrys b. Idrys relates: My father asked me: "Do you write down any of the *hadythes* I tell you." I answered: "Yes." He ordered me to show him my writings and tore them up.

18. حدثنا وكيع عن شريك عن مغيرة عن ابراهيم قال كنت اكتب عند عبيدة فقال لا تجلدن عني كتابا

Ibráhyim relates, "I used to write when I attended the lectures of 'Abydah," and he said: "Do not make a book of them."

The expression which is of interest to us in this *hadyth*, and which proves that they made a wide distinction between notes and a book is repeated in another *hadyth*, in which Ibráhyim, imitating the example of his teacher, cautions his pupils against collecting his *hadythes* in a book: حدثنا محمد بن سعيد الاصبهاني قال اخبرنا شريك عن مغيرة عن ابراهيم قال لا تجلد عني كتابا

قال [سفيان] قيل لعمر بن سفيان يكتب فاصطجع وبكى وقال

اخرج على من يكتب عنى قال سفيان وما كتبت عنده شيئا كذا نحفظ

"Sofyán relates: Some body said to 'Amr, Sofyán writes down [your lectures]. 'Amr laid down and cried, and said, I will teach any one manners who writes down from me (i. e. my lectures). Sofyán maintains that he did not write down any *hadythes* whilst he attended his lectures, but he asserts, It was our habit to impress them in our memory."

20. Abú Bakr b. 'Abd Allah sent to Ibn Aby-l-'Áliyah, requesting him to write a *hadyth* down for him. Instead of answering he came himself to him and said: If I was writing down [*hadythes*] for anybody, I would do it for you. He repeated the *hadyth*, and Abú Bakr impressed it in his memory."

21. قال الضحاك لا تتخذوا للحديث كرايس ككرايس المصاحف

"Dhahhák said, Do not collect the *hadythes* into regular books like the Qorán."

The word employed for books in this *hadyth* is Karrás, which means a fasciculus of ten leaves or twenty pages. Among the Arabs books consist of such fasciculi which are frequently not bound together, but kept loose in a port-folio, in order that several persons can at the same time read the book. There is another *hadyth*, in which this term is used. It is said of Layth that he disapproved of Karráses قال حدثنا وكيع قال حدثنا حسن عن ليث انه كره الكرايس

22. عن ابى معشر عن ابراهيم انه كره ان يكتب الاحاديث فى كرايس

"Ibráhyim disapproved that *hadythes* be written into Karráses."

Of this *hadyth*, two other versions are extant, viz.: عن ابراهيم ان قال ابراهيم "Ibráhyim disapproved of writing." كان يكره الكتاب "Ibráhyim said that they (his shaykhs) disapproved of writing."

#### IV.—Reasons why they disapproved of writing down *hadythes*.

23. ... اخبر معمر عن الزهري عن عروة بن الزبير ان عمر بن الخطاب اراد ان يكتب السنن فاستشار في ذلك اصحاب رسول الله صلّم فاشاروا عليه ان يكتبها فطفق عمر يستخير الله فيها شهرا ثم اصبغ يوما وقد عزم الله له فقال اني كنت اردت ان اكتب السنن واني ذكرت قوما كانوا قبلكم كتبوا كتباً فاكبوا عليها وتركوا كتاب الله تعالى واني والله لا ابس الله بشي

"Zohry states on the authority of 'Orwah that the Khalif 'Omar intended to write down the Sunan. He took the opinion of the companions of the prophet on the subject, and they advised him to

commit them to writing. Before commencing, 'Omar thought proper to try the Istikhárah (to consult fate or according to the Mohamadan notion, to obtain an expression of the will of God) for one month. One day, after he had obtained the expression of the will of God, he said : It had been my intention to write down the Sunan, but I found that the nations who have been before you, have written books, and trusted upon them, and left the book of God. Never will I in any way do any thing what might emulate with the book of God."

Several isnáds are given for this *hadyth*, so that its authenticity seems to me to be beyond a doubt.

24. "Khálid b. 'Orfotah relates : I was sitting with 'Omar when there came a man of the 'Abd al-Qays tribe, who dwelled at al-Sús. 'Omar asked him, Are you A. B. the son of C. D. of the 'Abd al-Qays tribe ? Answer : Yes. Do you reside at al-Sús ? He answered, again in the affirmative. 'Omar struck him upon this with a point-less spear which he had in his hand. The man said, What is my fault ? 'Omar upon this repeated the verse of the Qorân, 12, 1-3, and gave him three more strokes with the cane. The man again asked, What is the matter ? 'Omar replied : You are the man who has copied the book of Daniel *نسخة دانيال*. The man said, Tell me what I am to do, and I will obey. The Khalif answered : Go and efface it with hot water and white wool, and do not read it nor give it to any body to read. And if I hear that you read it or give it to any one to read, I punish you severely. Upon this, he permitted him to sit down, and when he was seated, he said : I went and copied a book of the believers in the scripture. Then I bound it in red leather and brought it [to the prophet] and he asked : What have you in your hand, 'Omar ? I answered, A book which I copied in order to increase the knowledge which we already possess. The prophet got very angry, so much so that he got quite red. We were just going to the Friday prayers, and the Ançar said, The prophet is angry—to arms ! and they surrounded his pulpit. The prophet said : The revelation which has been given to me contains all others and seals them, and it is an abstract of them. My revelation is of unalloyed purity. Do not allow yourselves to be made confused and do not follow those who are confused, (the Jews and Christians.)"

25. "Qásim [d. in 103] a son of Mohámmad [was killed in 37, he was a son of the Khalif Abú Bakr] relates: 'Omar was informed that the Moslims had books. He very much disapproved of it and said: I have heard that books have made their appearance among you. God loves those things best which are most equitable and lasting. Every man who has a book is to bring it to me, and I will then see what is to be done. People thought that he wished to see what the books contained, and arrange matters in a manner which might satisfy all parties, and they brought the books to him. He burned them and said: Books will lead you to the same result as they did with the Jews and Christians."

26. "'Omar intended to write down the Sunnah, then it occurred to him that it was better not to commit it to writing, and he wrote orders to all the cities, that every body who had written down *hadythes* was to destroy them."

27. "Morrah (d. in 76 or shortly after) relates that, whilst he was sitting with 'Abd Allah [b. Mas'úd, d. in 32] Ibn Qorrah brought a book, saying, I found this book in Syria, and as I admired it I bring it to you. 'Abd Allah looked into it and said, Those before you rushed into ruin, because they followed their books and abandoned the scripture. Upon this, he sent for a basin of water and washed the book in it to efface the writing."

28. "Aswad (d. 74 or 75) and 'Alqamah [b. Qays, d. about 70] got a volume *مصحفة*, and they took it to 'Abd Allah. It was about sunset when they came to his house, and they were not let in immediately. When 'Abd Allah awoke, he sent his slave woman to see who had knocked at the door. She reported to her master that it was 'Alqamah and Aswad, and he ordered her to admit them. They told him that they had a volume which contained very excellent *hadythes* *هذه مصحفة فيها حديث عجب*. And he at once sent for water and effaced the writing, repeating the words of the Qorân, 12, 1-3, and he added, Occupy yourself with the Qorân and with nothing else."

Nos. 27 and 28 seem to be different versions of one and the same story. There are five other *hadythes*, in which it is said, that 'Abd Allah b. Mas'úd destroyed books, and they are, apparently, all different versions of one or two stories. The following are the facts contained in each:



Aswad relates: "Alqamah brought writings from Makkah or Yaman. It was a volume (or roll) and contained *kadythes* regarding the family of the prophet, and 'Abd Allah effaced it." *جا علقة*

*بكتاب من مكة او اليمن صحيفة فيها احاديث في بيت النبي فمحا عبد الله*

Aswad relates: "A man who was settled in Syria, came to 'Abd Allah with a volume, which contained some of the sayings of Abú-l-Dardá or some of his stories, and 'Abd Allah after he had read a good deal in it, effaced it."

*معه صحيفة فيها كلام من كلام ابي الدردا او قصص من قصصه*

This version is, in all probability, the true one. Abú-l-Dardá entertained notions which considerably differed from those of 'Omar and his party. And it is possible that this was the cause why 'Abd Allah destroyed the book. In the following version he says that the contents were heretical.

"Aswad saw some persons in the mosque who were reading a book, containing the praises of God, invocations, and blessings upon the prophet. He wanted to copy it, and it was promised to him after another man might have copied it who had already bespoken it. Some days after he found it in the hands of Ibn Mas'úd, who said, Are not the contents of this book mischievous, erroneous and heretical?" *قال الا ان ما في هذه الصحيفة فتنه وضلالة وبدعة*

Solaym, a son of Aswad relates: that he and 'Abd Allah b. Mirdás were reading a volume, which contained stories and passages from the Qorân,\* in company with a man of the Nokha' tribe. Ibu Mirdás, according to his own statement, had bought some volumes for money.† As he was waiting in the mosque—the place of rendezvous—for his friends, Ibn Mas'úd sent for him, and saying, The right path is the path of Moḥammad, &c. he destroyed it."

29. 'Amr b. Maymún Awdy [d. 74] relates: "I was sitting in the company of several persons at Kúfah, and there came a man who had a book." They asked, "What book is this?" he replied, "The book of Daniel *كتاب دانيال*." If the mob had not protected him, he would have been killed. What! they said, "You have a book besides the Qorân?"

*صحيفة فيها قصص وقرآن \**

*قال عبد الله بن مرداس واشتريت صحفا بدرهم †*

30. Ibn, 'Awn (d. 151) said, "The men of the first century who disapproved of writing held that principle, in order that the Moslems might not be detained by other books from studying the Qorân. And the ancient scriptures have been forbidden, because it is impossible to distinguish what is true in them from what is false, and what is genuine from what is not so. Moreover, the Qorân renders them superfluous."

31. "Sofyân Thawry (d. 161) said, Woe to those who deposit their knowledge on paper قراطيس. Yet Sofyân Thawry used himself to write down [hadythes] with a view of assisting memory and fixing the true version. But his wish, was that people might learn hadythes by heart. Several of the ancients assisted memory by writing hadythes down, and they taught them from their writings, but when they knew them well by-heart they expunged them, for fear, that people might rely solely on their books." This hadyث is related by Ibn Hanbal on the authority of Yahyà b. Sa'yid, who heard the above words from the mouth of Sofyân Thawry.

32. "Masrûq said to 'Alqamah, Write down for us hadythes which are likely to be confounded. He answered, Do you not know that writing is not approved of? Masrûq said, I will destroy them when I have learned them by heart. Under these circumstances, said 'Alqamah, there is no harm in writing."

33. Sho'bah relates: "Khâlid Hadzdzâ [d. 141] said, I never wrote down hadythes unless they were very long, and then I destroyed them when I knew them by heart."

34. "Mohammad [a son of the Khalif Abû Bakr] was of opinion that a man ought to write down hadythes, but to destroy the writing when he knew them by heart."

35. "Mançûr b. Mo'tamir (d. 132) disapproved of writing, but subsequently he regretted not to have preserved his hadythes in writing."

36. The author says: Many men of the early ages destroyed their writings previous to their death or ordered in their will that they be destroyed. The following are instances of this practice:

Ibn Zawús relates, that his father [d. 106] ordered him to burn his writing *كان يامر [ابوه] باحراق الكتب*.

Al-No'mán b. Qays relates, that 'Abydah sent on his death-bed for his writings and expunged them.

Sa'd b. Sho'bah relates, that his father [d. in 160] told him to wash out his books if he should die and to bury them; and that he acted up to his orders. Even during his life-time, whenever a number of writings from various people had accumulated, he sent his son to the place where the falcons were kept (?) to bury them there *وكان ابي اذا اجتمعت عنده كتب من الناس ارسلني بها الي البازجاه* *وقادفنها في الطين*.

Hammád relates, that Abú Qilábah ordered in his will to give his writings to Ayyúb (d. 131) and if he should not survive, to burn them.

'Ysá b. Yúnos (d. 187 or 191) gave equally orders that his books *كتب* should be burned.

Ibráhyim b. Háshim relates: The books of Bishr b. al-Háarith (d. 227) filled eighteen boxes and baskets, and we buried them *حدثنا ابراهيم بن هاشم قال دفننا لبشر بن الحرث ثمانية عشر ما بين قمطرو قوصرة*. Ahmad Ibn Hanbal, who was his contemporary, said, that he could not see the object of burying books. In reference to Bishr, I would observe that he did not propagate *hadythes*, either orally or in writing, except that he now and then recited one incidentally.

Awzá'y [d. 157] says, that the science of the *Hadythes* is a noble science, but since it had been deposited in books it lost the freshness which it had, when it was orally communicated and fell into the hands of persons, who have no vocation to cultivate it.

V.—*Sayings of the prophet shewing that he commanded those who cannot trust in their memory to aid it by writing.*

قال [ابوهريوة] ان رجلا من الانصار كان يجلس الى رسول الله فيسمع منه الحديث يعجبه ولا يقدر على حفظه فشكا ذلك الى النبي صلى الله عليه وسلم فقال استعن بيمينك

“Abú Horayrah relates, a man of the Anqár used to sit with the prophet, and to listen to his sayings. And he admired them but could not recollect them. He complained of the weakness of his memory to the prophet, and he said, Assist your memory by your right hand (i. e. write them down).”

There are a number of versions of this *hadyth*, all of which rest



on the authority of "Abú Ġālīḡ from Abú Horayrah," and it is confirmed by a parallel ḥadyth of Anas b. Málík, which is evidently identical with it and runs: *شكا رجل الى النبي صلعم سوا الحفظ فقال* "A man complained that his memory was very bad, and the prophet said, Assist it by your right hand."

قال [عبد الله بن عمرو] قلت يرسول الله اعيد العلم قال نعم 38. 'Abd Allah (d. in 65?), a son of 'Amr asked the prophet, Shall I fix knowledge? and he answered, Yes. In another version is the addition: I asked, How shall I fix it? And he answered, By writing."

A version of this ḥadyth preserved by 'Amr b. Sho'ayb b. 'Abd Allah b. 'Amr b. al-'Aḡ from his father, from his grandfather runs *قال النبي قيدوا العلم بالكتاب*. "The prophet said, Fix knowledge by writing." The same saying is recorded by Anas, but the isnád is weak.

قال رافع قلنا يرسول الله صلعم انا نسمع منك شيئا فنكتبها قال اكتبوا ولا خرج 39.

Ráfi' b. Khodayj (d. in 74, at the age of 86) relates: "We said, O prophet, we hear from you many things, shall we write them down? He answered, Write them down, there is no harm."

This ḥadyth is well authenticated. In one version it is preceded by the following story, whose authenticity is doubtful:

مر علينا رسول الله صلعم ونحن نتحدث فقال ما تحدثون قلنا نتحدث عنك يرسول الله قال تحدثوا وامنوا من كذب علي متعمدا في جهنم قال ومضي رسول الله صلعم لحاجته ونكس القوم رؤوسهم وامسكوا عن الحديث وهمهم ما سمعوا من رسول الله فقال ما شأنكم الا تحدثون قالوا الذي سمعنا منك يرسول الله قال اني لم ارد ذلك انما اردت من تعد ذلك قال فتحدثنا قال قلت يرسول الله انا نسمع منك اشياء فنكتبها قال اكتبوا لاخرج

Ráfi' b. Khodayj relates: "The prophet passed us as we were conversing." He said, "What are you conversing about?" We answered, "We repeat your sayings." He observed, "Do repeat them, but speak the truth, for he who intentionally attributes to me a saying which I have not uttered: goes to hell." The prophet had some business and went along. The people hung down their heads and refrained from repeating his sayings. The prophet asked, "Why do you no longer repeat my sayings?" They answered, "On account of the remark which we heard from you." The prophet said, "This is



not what I meant, I said, He who lies *intentionally*." Upon this, we continued to repeat his sayings. I asked him: "We hear from you many things, shall we write them down. He answered, Write them down, there is no harm."

قال [عبد الله بن عمرو] قلنا يرسل الله إنا نسمع منك أحاديث لا نحفظها أفلا نكتبها قال بلى فآكتوها

'Abd Allah b. 'Amr relates: "We said to the prophet, We hear sayings from you which we cannot remember, shall we write them down? He answered, By all means, do write them down."

There are thirty versions of this *hadyth* extant, which differ very slightly from each other. Thus in most of them is *شيأ* instead of *أحاديث*, and in some the answer of the prophet is simply *نعم*. In some versions is added: *عند الغضب والرضا قال نعم إنه لا ينبغي لي أن أقول إلا حقاً*: "We asked, Even if you are influenced by likings or dislikings?" and the prophet answered, "Yes, for I never speak anything but the truth." The *isnáds* for these thirty versions can be reduced to four. 'Abd Allah related it to his son, and he communicated it to his son, 'Amr, and after 'Amr the *isnáds* diverge very much. 'Abd Allah also related these words to his grandson Sho'ayb b. Mokhammad b. 'Abd Allah, who transmitted them to his pupils, and through several of them, it has come down to us. And finally, 'Abd Allah mentioned them also to 'Atá, and he related them to his son, 'Othman, who again told them to his pupils, and they preserved them. There is besides a version, which differs in expression from the above, and which has been heard from 'Abd Allah himself by Khálid b. Yazyd and by Zayd 'Ammy. Therefore, unless 'Abd Allah himself invented the story, it must be true.

قال عبد الله بن عمرو كنت أكتب كل شيء أسمع من رسول الله صلعم نريد حفظه فنهينني قریش فقالوا إنك تكتب كل شيء تسمعه من رسول الله صلعم ورسول الله بشرتكلم في الغضب والرضا فامسكت عن الكتاب فذكرت ذلك لرسول الله صلعم فقال أكتب فوالذي نفسي بيده ما خرج مني إلا حق \*

'Abd Allah b. 'Amr relates: "I was in the habit of writing all those sayings I heard from the prophet, which I wished to remember. The Qorayshites prevented me, and said, 'You write down what you hear from the prophet, though he is but a man who is guided by his likings and dislikings.' Upon this I ceased writing, and I

mentioned the matter to the prophet, and he said, Write, by Him in whose hand I am, nothing proceeds from me but truth."

This *hadyth* has been taken from 'Abd Allah by Yúsof b. Nábik, and handed down from him by an isnád quite distinct from any other.

42. Abú Horayrah said, "No one of the companions of the prophet has preserved more *hadythes* than I, except 'Abd Allah b. 'Amr. But he used to write them down and I did not write them down."

There are several versions of this *hadyth* extant, in some is added, "He wrote them down and learned them by heart, whereas I merely learned them by heart. The prophet allowed him to write them down."

#### VI.—*Companions of the prophet who wrote down hadythes.*

43. عَنْ طَاوُسٍ عَنْ عَبْدِ اللَّهِ بْنِ عَمْرٍو بْنِ الْعَاصِ قَالَ الصَّادِقَةُ صَحِيفَةٌ كَتَبْتُهَا مِنْ رَسُولِ اللَّهِ

Táwús relates "'Abd Allah b. 'Amr b. al-'Aç said, Çádiqah is the title of a book in which I collected sayings of the prophet."

44. Mojáhid relates: "I paid a visit to 'Abd Allah b. 'Amr, and I found a volume *صحيفة* under his couch. He prevented me from taking it. I asked, 'What is it, that you prevent me from taking it?' He replied: 'This is the Çádiqah (the Truthful Book) and contains what I heard from the prophet.' There was no one between me and the prophet, when the information which it comprizes was communicated to me. As long therefore, as I have this book, the Qorân and the Waht, I do not mind the whole world."

Mojáhid says: Çádiqah is a volume *صحيفة* in which he wrote down what he heard from the prophet, and Waht is a piece of ground which he gave away for the support of the poor.

45. Anas Ibn Málík says: "that Abú Bakr wrote down for him the laws regarding alms, which were sunnah of the prophet."

Hammád relates, "I took from Thomámah b. 'Abd Allah (d. after 110) a document *كتاب* of which he believed that Abú Bakr had written it for Anas when he appointed him to collect the alms prescribed by law. There was the prophet's seal impressed upon it, and it contained the laws regarding alms."

46. سَمِعَ عَمْرٍو بْنُ أَبِي سَفْيَانَ عَمْرَ بْنَ الْخَطَّابِ يَقُولُ قِيدُوا الْعِلْمَ بِالْكِتَابِ

'Amr b. Aby Sofyán heard 'Omar b. al-Khattáb saying: "Fix knowledge by writing it down."

47. Táriq relates: "I saw 'Alyy, the son of Abú Tálíb on the pulpit, and he said, I have no book to read to you except the Qorân and this volume (roll) صحيفة. It was attached to the sword which was provided with a ring of iron, and the rings, by which the sword was suspended were equally of iron. صحيفة معلقة في السيف. عليه حلقة حديد وكرانه (sic) حديد. The roll contained the laws regarding the alms, as 'Alyy had received them from the prophet."

According to another version of this story, which rests on the testimony of another eye-witness, it contained the laws regarding the sacredness of the territory of Makkah. In this version the roll is described: صحيفة معلقة في سيفه فيها اسنان الابل وشى من الجراحات. "The roll was attached to his sword, and there were wrapped up in it camel's teeth, and some implements for surgery."

48. 'Alyy said, "Fix knowledge by writing it down."

He also said, "Who will sell me knowledge for money" or according to others, "Who will sell me a roll صحيفة to write knowledge in it, for money."

49. Shorahbyl Abú (Ibn ?) Sa'd relates: Hasan, the son of 'Alyy addressed his sons and nephews, and said, "You are now small, but you will soon be big, do therefore learn knowledge (i. e. hadythes) and if any of you is unable to repeat them (from memory) let him write them down and keep them in his house."

50. قال [عبيد الله بن ابي رافع] كان ابن عباس ياتي ابا رافع فيقول ما صنع رسول الله صلعم يوم كذا ما صنع رسول الله صلعم يوم كذا ومع ابن عباس الواح يكتب فيها

'Obayd Allah b. Aby Rafy' relates: "Ibn Abbás came to Abú Ráfi' and said, 'Did not the prophet one day like this? Did not the prophet one day like this?' Whilst he was saying so, he wrote on tablets which he had."

51. Ibn 'Abbás said: "The best mode of fixing knowledge (hadythes) is writing."

52. Abú Sa'yd Khodry says: that they used to write nothing else but the Qorân, and the Tashahhud (a prayer).

53. 'Itbán b. Málík (died under the Khalifat of Mo'awiyah) relates: "I had a sore-eye, and I wished that the prophet might



come into my house, in order, that I might say prayers in it. He came with some of his companions and said prayers. They talked of the mischief which the Moslems, who were not sincere, were doing and ascribed the greatest part of it to Málík b. Dokhayshim. The prophet said, Does he not profess that there is no god besides the God, and that I am his prophet? No man who makes this profession will go to hell. 'Itbán continues, This hadyith pleased me so much, that I told my son to write it down and he did write it down."

54. قال كنا إذا اتينا انس بن مالك وكثرنا عليه اخرج الينا مجال من كتب فقال هذه كتب سمعتها من رسول الله صلعم وقرانا ها عليه

If we went to Anas and bothered him much, he produced volumes of books and said: "These books (writings) contain what I heard from the prophet." And we read them before him.

This important story rests on a double isnád, and there are besides three other versions of it extant which run : قال كانوا إذا كثروا : قال انس بن مالك في الحديث اتاهم بمجال فقال هذه كتبها ثم قراتها علي رسول الله صلعم — قال كان اذا حدث فكثر عليه الناس جا بمجال فاقاها ثم قال هذه احاديث سمعتها وكتبها عن رسول الله ثم عرضتها عليه — كان اذا حدث فكثر الناس عليه للحديث جا بصكال فاقاها اليهم فقال هذه احاديث سمعتها من رسول الله صلعم وكتبها وعرضتها علي رسول الله صلعم

55. عبد الله بن المثنى قال حدثني عمي النصر وموسى ابنا انس بن مالك عن ابيهما انس انه امرهما بكتابة الحديث والاثار عن رسول الله صلعم وتعلمها وقال انس كنا لا نعد من لا يكتب علمه علما

'Abd Allah b. al-Mothanniy relates: "My two uncles, al-Nadhr [d. shortly after 100] and Músà, [d. after his brother] the sons of Anas b. Málík [d. 92] said, that their father ordered them to write down the sayings and example of the prophet, and learn them." For, he observed, "We never considered the knowledge of a man to be knowledge if he does not write it down."

56. "Al-Hasan b. Jábir (d. in 128) asked Abú Imámah [Çodayy] Báhiy [d. in Syria in 86] regarding writing down knowledge, and he answered, there is no harm."

57. 'Abd Allah b. 'Amr relates: "Several men went to the prophet and I was the youngest among them," and he said, "If a person, intentionally attributes to me a saying which I have not uttered, he will go to hell." When they had left the prophet, I



asked them: How do you repeat *hadythes* you have heard from the prophet? I find you are paying great attention to *hadythes*. They laughed and said, "all what we have heard from him we have con- signed to writing," قالوا يا ابن اختنا ان كل ما سمعنا منه هو عندنا في كتاب

There are two versions of this *hadyth*.

VII.—*Distinguished men of the first century who have not seen the prophet, but who approved of writing down hadythes and did so themselves.*

58. 'Abd al-Rahmán b. Harmalah [d. in 145] says, "I had a bad memory" (or according to Çayrafy's version, "and I could not learn any thing by heart") "therefore Sa'yd b. al-Mosayyab [d. in 90 odd] gave me leave to take notes."

59. كان الشعبي يقول في الكتاب قيد العلم

Sha'by [d. in 105 aged 77 years] used to say "Writing fixes knowledge." He also used to say, "If you hear anything from me write it down, and in the worst case on the wall." He also said, "Write down every information you collect."

60. عن الاعمش عن الحسن قال ان لنا كتبنا نتعاهدها

Al-Hasan [Baçry? d. in 110] said, according to A'mash [d. in 148], We have books on which we place our reliance.

61. عن ابي مجلز عن بشير بن نهيك قال كتبت عن ابي هريرة كتابا فلما اردت ان افارقه قلت يا ابا هريرة اني كتبت عنك كتابا فارويه عنك قال نعم اروه عني

Bashyr b. Nahyk said, according to Abú Mijlaz [see p. 220]: I collected the *hadythes* which I had heard from Abú Horayrah in a book. When I was about leaving him I said, "I have collected your *hadythes* in a book, shall I propagate its contents on your authority?" He answered, "Yes, do propagate them."

62. عن محمد بن سيرين عن ابن افلح يعني كثيرا قال كنا نكتب عند زيد بن ثابت

Kathyr b. Aflah said, according to Mohámmad b. Syryn [d. 110]: we used to write when we attended the lectures of Zayd b. Thábit [who used to write the revelation for the prophet and died in 45 or 48, or after 50]."

63. عن تمام بن نجيع عن الحسن انه كان يكتب للناس العلم ويعرضه لهم

Tamán b. Najyh relates of Hasan [Baçry? d. in 110] that he used to copy the *hadythes* for the people and rehearse them for them [with a view of correcting them].

64. عن سعيد بن جبیر قال كان ابن عباس يملی علی فی صحیفه حتی املاها و اکتب فی نعلي حتى املاها

Sa'yd b. Jobayr relates [d. in 95], "Ibn Abbás used to dictate to me *hadythes*, and I wrote them on a roll, till I had filled it and then I wrote on my shoe [they wear yellow shoes or boots]."

In another version it is stated, "I wrote the *hadythes* which I heard from Ibn 'Abbás on tablets, and when I had filled them I took my shoes (or boots) to write upon." A third version runs: كنت اكتب عند ابن عباس فی صحیفه حتى املاها ثم اكتب فی طهر نعلي ثم اكتب فی کفي

"In the lectures of Ibn 'Abbás I used to write in my roll and when it was filled I wrote on the upper leather of my shoes (or boots) and then on my hand."

To expedients, like these, though perhaps not quite as bad, students and short-hand writers take refuge in our days if they are short of paper. The following *hadyth* shows that Ibn Jobayr subsequently made a fair copy.

عن سعيد بن جبیر قال كنت اسمع من ابن عمرو و ابن عباس الحديث بالليل و اكتبه فی واسطه رجلي حتى اصبح وانسخه

Sa'yd b. Jobayr relates: "I used to hear *hadythes* from 'Abd Allah b. 'Amr and Ibn 'Abbás, and I used to write them down on my two feet (boots), and the next morning I copied them." The words which I translate by "my feet or boots" run in another version على واسطه الرجل فاكتبه

65. The pupils of Qatádah asked him whether they might write down his lectures? and he answered, What prevents you?

66. قال ابو قلابه الكتاب احب الى من النسيان

Abú Qilábah (d. 104) said: "It is better to write down than to forget."

'Abd Allah b. Moḥammad b. 'Aqyl [d. after 140] relates: "We used to go to Jábir b. 'Abd Allah (d. in 70 odd at the age of 94 years) and ask him regarding the life (according to another version, 'regarding the *sonnan* or institutions)' of the prophet, and we wrote it down."

In another version it is stated, that 'Abd Allah b. Moḥammad b. 'Aqyl was accompanied by [his relations], Moḥammad b. 'Alyy Abú Ja'far, and Moḥammad b. al-Hanafyyah. And in one version it is stated that they were provided with tablets الواح for writing.

67. عن عبد الله بن حنبل قال رأيتهم يكتبون عند البراء بكفهم بالقصب.  
'Abd Allah b. Hans (?) relates: "I saw them in the lectures of Barâ [d. 72] employing their hands in writing with reeds."

68. 'Obay b. al-Mokattab says: "I saw them writing down the comments on the Qorân in the lectures of Mojâhid [who died at the age of 83 in A. H. 102]."

69. عن عبد الله بن دينار ان عمر بن عبد العزيز كتب الى ابي بكر بن محمد بن عمرو بن حزم يامره انظر ما كان من حديث رسول الله صلعم اوسنة ماضية او حديث عمرة فاكتبه فاني قد خفت دروس العلم و ذهاب اهله

'Abd Allah b. Dynâr [d. 127] relates: "that the Khalif 'Omar b. 'Abd al-'Azyz wrote orders to Abú Bakr b. Moḥammad b. 'Amr b. Hazm, See what *hadythes* on ancient institutions are extant and pay particular attention to the *hadythes* which 'Amrah knows, and write them all down, for I fear that the knowledge of *hadythes* will disappear, and those who know them will die away."

There are various versions extant of this *hadyth*. In one it is said, "He wrote to Abú Bakr b. Moḥammad at Madynah," and in one, "He wrote to the people of Madynah." See on Abú Bakr b. Moḥammad *suprà* p. 209.

70. يقول [معمر] ان الزهري ربما كتب الحديث في طهر نعله مخافة ان يفوته

Ma'mar relates: "Zohry frequently noted down a *hadyth* on the upper leather of his boot for fear it might escape him."

71. معمر عن الزهري قال كنا نكرة كتاب العلم حتى اكرهنا عليه هولا الامرا فراينا ان لا يمنعه احدا ( احد ) من المسلمين

Zohry said according to Ma'mar: "We disapproved of writing down *hadythes* to such an extent, that we induced also those chiefs [who are not mentioned] to disapprove of it, but at last we saw that no Moslim forbids writing."

72. قال [ابن اخي الزهري] سمعته يعنى ابن شهاب يقول لولا احاديث تاتي من قبل المشرق لنكرها لا نعرفها ما كتبت حديثا ولا اذنت من كتابه

The nephew of Zohry relates: "that he heard his uncle saying: It is only on account of *hadythes* which come to us from the east,

and which we deny and do not acknowledge, that I write down the *hadythes* and permit them to be written down."

73. Rijá b. Haywah [d. in 112] said: Hishám b. 'Abd al-Malik asked me regarding a *hadyth* which I had forgotten, but fortunately I had written it down.

74. Abú Sofyán says: "Salmán Saykary used to write down *hadythes*, but I did not write them down."

75. عن منصور قال قلت لابراهيم ان سالما اذا حدث تحزم قال ان سالما يكتب وانا لا اكتب

Mançúr relates: "I said to Ibráhyim, if Sálím b. Aby-l-Ja'd [d. in 98] relates *hadythes*, he does so at full length but you seem to be conglomerated." He replied, "He is in the habit of writing them down and I do not write them down." In another version it is said لسالم اتم حديثا منك

76. Mo'áwiyah b. Qorrah said: "The knowledge of him who does not write it down is not considered as knowledge."

77. عن سلم العلوي قال رايت ابان بن ابي عباس يكتب عند انس بن مالك في سورة يعنى الواح

Salm (?) says: "I saw Abán b. Aby 'Abbás write on tablets in the lectures of Anas b. Málik."

78. Ayyúb [d. in 131] said: "They blame us for writing down *hadythes*, though it is said in the Qorán 20, 54. The Lord preserves the knowledge thereof in writing."

79. Mo'áwiyah b. Aby Maysarah relates: "I saw Abú Shaybah writing at al-Hakam's, who had the *hadythes* written on papyrus." رايت ابا شيبه يكتب عند الحكم معه الحديث فى القراطيس

80. Yahyà b. Sa'yd [d. in 144] said, "If I had written down all what I heard, I should be better contented with my position than I am now." [Yet we learn from the Tahdzyb, that he left writings which were used by Hammád].

81. Hammád [born in 98, d. in 179] relates: "Jaryr b. Házim and others send to me words. We intend to (collect and) write down the *hadythes* of Yahyà b. Sa'yd, and hope you will take a part in it. I met them, and we repeated to each other his *hadythes* and they wrote them down." قال حماد قال لي جرير بن حازم وغيره انا هممنا ان نكتب حديث يحيى بن سعيد فلو حضرتنا قال حماد فحضرتهم وتذاكرنا حديثه بعد فكتبوا



82. Hammád b. Salimah [who was the author of several works هو صاحب تصانيف and d. 167] said: "that he used to go to his Shaykh and heard ten *hadythes*, more or less, and impressed them in his memory, then he went home and wrote them down."\*

83. Mo'atamir relates, "My father wrote to me when I was at Kúfah, Buy books كتب and write down knowledge, for wealth is transitory, but knowledge is lasting."

84. 'Abd Allah b. Idrys says, "My father used to say to me, Learn by heart, but attend above all to writing. When you come home, write, and if you fall into need, or your memory fails you, you have your books." "With all that," he says, "I have not written down any *hadythes* of Layth, or Ash'ath or A'mash." From this and the preceding passage it would appear that books found a good market.

85. Abú Çaliĥ Farrá asked Ibn al-Mobárak regarding the writing down *hadythes*, and he answered, "If we had them not in writing we could not learn them by heart."

86. Khalyl b. Ahmad says: "Whatever I heard I wrote down, and whatever I wrote down I learned by heart, and whatever I had learned by heart I found useful."

VIII.—*Various Hadythes of the Khatyb Baghdády bearing on the value of books.*

87. عن ابي الدرداء عن النبي تحته كنز لهما قال صحف علم خبأ لها ابوهما  
"The prophet said according to Abú Dardá that under the 'treasure' mentioned in the verse of the Qorân 18, 81, volumes containing knowledge are to be understood which had been concealed by the father of the two orphans for their use."

Ibn 'Abbás, according to a *hadyth* preserved by Bokháry and others gives the same interpretation to that verse.

88. قال ذو الرمة لعيسى بن عمر اكتب شعري فالكتاب اعجب الى من الحفظ ان لاعرابي ينسى الكلمة قد سهرت في طلبها ليلة فيضع في موضعها كلمة في وزنها ثم ينشده الناس والكتاب لا ينسي ولا يبدل كلا ما بكلام

Dzú-l-Rummah [d. in 117] said to 'Ysà b. 'Omár [d. 149], Write down my poetry, I like it better than if you learn it by heart. The Bedouins forget a word, in search of which I have spent a restless

\* Dzohaby says : لم يكن لعماد بن سلمة كتاب الا كتاب قيس بن سعد Hammád possessed no other book but that of Qays b. Sa'd [who was a companion of the prophet and d. in 60].

night and they put another word of the same measure in its place, and people repeat the wrong reading. A book does not forget, nor does it substitute one word for another.

89. قال [زهير] حدثنا موسى بن عقبة قال وضع عند — حمل بعير من كتب ابن عباس فكان علي بن عبد الله بن عباس اذا اراد الكتاب كتب اليه ابعت الي بصحيفة كذا وكذا فينسخها ويبعث بها

Músà b. 'Oqbah [d. in 141, and left a work on the biography of the prophet, see p. 218 *suprà*] relates, In the house of (the name is not legible,) the writings (autographies) of Ibn 'Abbás [a companion of the prophet, d. in 68] were preserved which would have formed a camel's load (equal to about six hundred weights). Whenever 'Alyy b. 'Abd Allah [d. in 113] a grandson of Ibn 'Abbás wanted a book, he wrote to him requesting him to send him such and such a volume, and he copied it and sent it to him.

90. Ibn Dāb [on whom see Ibn Qotaybah, p. 269] was frequently seen carrying a book, some one said to him that it was below his dignity, but he was of a quite different opinion.

91. قال المبرد ما رايت اختص على العلم من ثلثة الجاحظ والفتح بن خاقان واسماعيل بن اسحاق القاضي فاما الجاحظ فانه كان اذا وقع في يده كتاب قراه من اوله الى اخره اي كتاب كان واما الفتح فكان يحمل الكتاب في خفه فاذا قام بين يدي المتوكل ليبول او يصلى اخرج الكتاب فينظر فيه وهو يمشي حتى يبلغ الموضع الذي يريد ثم يصنع مثل ذلك في رجوعه الى ان ياخذ مجلسه واما اسماعيل بن اسحاق فاني ما دخلت عليه الا وفي يده كتاب ينظر فيه او يقلب الكتب لكتاب ينظر فيه

Mobarred said, The only three men I have seen who were really devoting themselves to sciences were Jāhitz, Fatḥ b. Khāqān and the Qādhiy Isma'yl b. Ishāq. Jāhitz used to read every book, he could get hold of from one end to the other whatever its contents might be. Fatḥ used to carry a book in his boot (being a Turk, he evidently wore the wide Tatar-boots). Whenever he left the presence of the Khalif to say his prayers or for any other business, he took out his book and read on his way to his destination and on his way back again, until he again took his place in the presence of the Khalif. And whenever I paid a visit to Isma'yl I found him reading in a book or seeking a book in his library to consult it.

92. Ibn 'Abbás Daghúly [d. 325] said, that he always had the following four volumes مجلدات with him: The book of Mozany [d

264 and left four celebrated Sháfiite law books], [the dictionary-called] Kitáb al'ayn, the Tarykh al-Bokháry (on biography) and Kalylah wa Damnah.

قال [ ابن شهاب ] خرجنا مع الحجاج بن يوسف الى الحج فلما كنا بالسجوة قال تبصروا الهلال فان في بصري عهدة فقال له نوفل بن مساحق اتدري مم ذاك من كثرة نظرك في الدفاتر

Zohry [d. 123, or 125] relates: "We accompanied Hajjāj b. Yúsof [d. 95] on a pilgrimage to Makkah, and when we had arrived at Sakrah, he said, "Look, whether you can see the new moon, my eyes are too weak." Nawfal b. Mosáhiq [d. shortly after 90] observed, "Do you know why? on account of your incessant reading books."

IX.—*Extracts from other authors than the Khatyb Baghdády bearing on the same subject.*

94. Ibn Sa'd, in the chapter on "Deputations which waited on Mohámmad" mentions several instances of documents granted by the prophet or Abú Bakr to persons, which were in his time [d. 230] still in possession of their descendants.

95. The same author says in folio 64 *verso* أخبرنا محمد بن عمر حدثني إسحق بن عبد الله بن نسطاس عن أبي عمرو بن حريث العذري قال وجدت في كتاب أبي قالوا قدم رسول الله الخ

Abú 'Amr b. Horayth 'Odzy said: I found written in the book of my fathers: "The prophet, &c."

The same author says in the same page أخبرني محمد بن عمر حدثنا يحيى بن سهل بن أبي حثمة (خيثة؟) قال وجدت في كتب أبي says, I found in the books of my father.

96. The following instance in which men who had learned *hadithes* by heart referred to their notes, is mentioned in the *Iṣābah voce* Qárib: Sofyán [Thawry? d. 161] said, My recollection was borne out by what I found stated in my book on the authority of Ibráhyim b. Maysarah [d. 132] who had it from Wahb b. 'Abd Allah, viz.: that the name in question is spelled "Ibn Márib," whilst people commonly say "Ibn Qárib."

97. Ibn Banná Moqaddasy who wrote in 375 says in his Geography, in describing Rámhornoz والداران جميعهما بالبصرة والكتب كالتى بالبصرة والداران جميعهما بالبصرة والتأخذها بن سوار وفيهما اجرا على من قصدهما ولزم القراءة والنسخ الا ان

خزانة البصرة اكبروا عمرو اكثر كتبها وفي هذه ابدأ شيخ يدرس علم الكلام على مذهب المعتزلة. "In this town is a library like that of Baḡrah. Both have been founded by Ibn Sowār. Those who visit the library with a view of reading or copying books get stipends. The library of Baḡrah is larger, in better condition and contains more books. To this library of (Rámhormoz) there is always a Shaykh attached, who teaches dialectic theology according to the system of the Mo'tazilites."

Another large library was at Shyráz in the palace which was built by the nephew and successor of 'Adhod aldawlah. The palace was the most extensive and splendid building that existed in those days and contained three hundred and sixty apartments, and one of them was devoted to the library, which is described by Ibn Banná in the following words: *وخزانة الكتب حجرة على حدة عليها وكيل وخازن ومشرف من عدول البلد ولم يبق كتاب مصنف الى وقته من انواع العلوم كلها الا وحصله قريبا وهي ازج طويل في صفة كبيرة فيه خزائن من كل وجه وقد الصق الى جميع حيطان الازج و الخزائن بيوتا طولها قامة في عرض ثلاثة ادرع من الحشب المزوق ينحدر من فوق والدفاتر منضدة على الرفوف لكل نوع بيوت وفهرستات فيها اسمي الكتب لا يدخلها الا وحيه وطغت في هذه الدار كلها سفلا وعلوها*

"The library occupies a separate apartment. And there are appointed over it an agent, a librarian and a superintendent. These officers are chosen from among the most respectable persons of the place. The founder has procured for this library every book on every science and of every author. The apartment consists of a very long arched-room which stands in an immense Çoffah (a platform walled in on three sides and open on the fourth side towards the courtyard and provided with a roof, see p. 63 note). On every side of this arched-room are chambers (or recesses) and against the walls of the arched-room and of the chambers, are closets six feet long and three cubits wide. The closets are of wood lacquered with gold and silver, and the entrance into them is from above. The books are piled up upon the shelves of the closets. To every science a number of those closets is allotted and there are catalogues which contain the names of the books. Only persons of respectability are allowed to visit the library. I have gone over the whole palace."

The Fihrist of Ibn Nadym, who wrote in 377 or two years after



this description was given, seems to be the catalogue either of this or the Basrah library.

98. This and the following five paragraphs are taken from the *Ilmá* of the Qádhíy 'Iyádh [d. 544].

قال عبد الرحمن بن مهدي كان عند مخزومة كتب لاييه لم يسمعها منه قال الحكم ابن مقسم عن ابن عباس انما سمع منه اربعة احاديث والباقي كتاب و حكى ان اسحاق بن راشد قدم الري فجعل يقول حدثنا الزهري فسيل ابن لقيته قال لم القه مررت ببيت المقدس فوجدت كتابا له

'Abd al-Rahmán b. Mahdiy relates: "Makhrimah had books from his father, the contents of which he had never heard from him [yet he related the *hadythes* which they contained on his authority] 'Abd al-Rahmán also relates, Al-Hakam, the son of Miqsam heard only four *hadythes* from Ibn Abbás, the rest he had from him in writing. He also says, Isháq b. Ráshid came to Ray and said, Zohry informed, &c.' He was asked, Where have you met Zohry? and he answered, "I have not met Zohry, but I found a book of his at Jerusalem."

Isháq b. Ráshid died during the reign of Abú Ja'far.

99. Awzá'y relates: "that he heard Thábit b. Ma'bad say, The diacritical dots are the light of a book," نور الكتاب العجم. Some persons said according to Awzá'y, Diacritical marks are required in difficult passages ما يشكل. انها يشكل.

100. At the time of Málík b. Anas it was so common that the pupil first copied the *hadythes*, and then read them before the Shaykh, that Malik said to 'Abd Allah b. Moslimah Qa'naby. The transmission is more valid if you read to me than if I read to you قرأتك على. Málík was also asked whether hearing or rehearsal was better in his opinion, and he said rehearsal سئل مالك فقيل له العرض احب اليك ام السماع فقال بل العرض.

"Hearing" means that the Shaykh relates or reads a *hadyth*, and the pupil listens to him. "Rehearsal" means that the pupil copies it and reads it to the Shaykh, who rehearses it.

101. سمعت عبيد الله بن عمر العمري يقول كنا ناتي الزهري بكتاب من حديثه فنقول له يا ابا بكر هذا من حديثك فيا خذه فينظر فيه ثم يرده ويقول نعم هو من حديثي قال عبيد الله فناخذه وما قراء علينا وما استجزنا اكثر من اقرارة بانه من حديثه فهذا مذهب الزهري امام هذه الشان

'Obayd Allah b. 'Omar 'Omary said, "We took a book to Zohry which contained *hadythes* of his, and we asked him, Are these *hadythes* of yours? He took the book and looked into it, then he returned it, and said, Yes, these are *hadythes* of mine." 'Obayd Allah says, "We took the book [and propagated the *hadythes* on his authority] though he had not read it to us, nor did we ask him for an *ijázah* beyond the affirmation that the book contained *hadythes* of his. This is Zohry's system of propagating *hadythes*, who is the greatest man in this science."

102. قال الواقدي قال ابن ابي الزناد شهدت ابن جريج جا الى هشام بن عروة فقال له الصحيفة التي اعطيتها فلانا هي حديثك قال نعم قال الواقدي فسمعت بن خريج بعد ذلك يقول حدثنا هشام بن عروة

Wáqidy relates: "Ibn Aby-l-Zinnád said, I was present when Ibn Jorayj came to Hishám b. 'Orwah, and asked him, Does the roll which you have given to A. B. contain your *hadythes*? and he answered, "Yes." Wáqidy observes, "I subsequently heard Ibn Jorayj repeat these *hadythes*, saying, I have been informed by Hishám b. 'Orwah."

103. Zayd b. Ayyúb said to Moḥammad b. Syryn: "Some body has left me his books by will, shall I repeat the *hadythes* which they contain quoting his authority?" And he replied, "Yes." Subsequently he said, "I do not tell you to do it nor do I tell you not to do it."

I refrain from repeating passages bearing on this subject, which have already been published and postpone collecting the information contained in Dzohaby's *Tahdzyb* for a time, when I may have more fully examined that work than at present. I may refer here to what I have said on writing in early days in p. 211 to 213 of this volume.

*(To be continued.)*

*Notes on the Iron Ore Statistics and Economic Geology of Upper Assam.—By Lt.-Col. S. F. HANNAY, communicated by the Government of Bengal.*

SIR,—Having on a late visit to Seebisagur obtained through the kindness of Capt. Holroyd, Collector, a few notes on the iron ore statistics of Assam in the olden time, as well as up to the present date, I have put them together in the hope that they may be found interesting, and perhaps draw attention to the vast extent of our iron ore resources in the shape of clay iron ores, I presume of the same description as those found and worked in Europe. Many of these beds lie stratified with the coal, and others, if not in a position conformable with veins of workable coal, are near enough to admit of the coal being made available for smelting purposes.

I note particularly the localities of Teeroogong and Hattighur, within one march of Seebisagur, where coal abounds in the Suffry and Teeroo valley, besides inexhaustable tracts of timber. Abundance of lime also is now to be procured in the Naga hills, as well as in the Morung district near Golahghat, of a description suitable to be employed as a flux, of the importance of which in the smelting of iron ore the Assamese are entirely ignorant.

My own researches in regard to iron ores, have been altogether, I may say, on the South side of the valley; lately, however, the remains of iron scorix were found at the gorge of the Dergmoo river on the North bank, where there is iron ore in abundance.

I have not sent a great variety of samples of ore, as this is not the season for collecting them; I need hardly say, however, that I shall be most happy to attend to this at a future period, should there be any wish for further information as to the quality of the iron ores in comparison with those of other parts of India.

The following is a list of the samples now sent:—

- No. 1. Sample of pig iron from Teeroogong hill ore.
2. Ditto of ore, ditto ditto.
3. Sample of pig iron from Bosa Doyung ore.
4. Ditto of ore extracted from the plastic clay.

5, 6. Samples of ore—bearing plastic clay of Bosa Doyung.

7, 8, 9. Samples of clay iron from the Jeypore field.

10. Sample of ore from the gorge of the Dergmoo river opposite Dibrooghur.

11, 12, 13. Samples of lime.

In remote times and up to a certain period in the annals of Assam, the valley was undoubtedly under Western India influence, and for the commodities of salt and manufactured iron its inhabitants were indebted to their trade and intercourse with Gangetic India.

The period to which I allude dates from the commencement of the supremacy of the Ahorns, early in the 16th century. This people, a branch of the great Shan nation, by the overthrow of the Chooteeahs (descendants of a Western Indian race of Rajputs) became masters of the Upper, and Central divisions of the province and finally conquered the whole valley; which, with Indo-Chinese jealousy of foreign intercourse with the nations of the West, they closed to the people of India, and trade was entirely restricted to the Goalparah Chowkeys—then it was, that the inhabitants of Upper Assam, at least, became dependant upon their own resources in the articles of salt and iron.

In regard to the latter article, we have evidence throughout the whole of the Jorhath district that the smelting of iron was carried on to a great extent, both from the quantities of scoræ visible at different points between Jeypore and the Bosa Doyung, and the number of native manufactured iron guns found throughout the province, (but particularly in the Seeksagur district) varying in size from a matchlock barrel to the great gun at Rungpore (see note at the end of table No. 2.)

I cannot however do better than record the information I have received on this matter both historically and statistically through the collectorate of Seeksagur.

In the year 1422 A. S., A. D. 1500 and during the reign of Deehingeeah Swarga Narain, on the defeat of the Chooteeah Rajah, after a war with these people, the Ahorns acquired many fire-arms, one of which was named "Meeta Hoolaug." The victors also captured many blacksmiths, and from this date blacksmith shops were established for the manufacture of fire arms, and other



measures taken by the Ahorn Rajah, for classing the iron workers under *Hazaree Keihs* and *Saikeahs* and they amounted at one time to 3,000.

Subsequently in the war with Turbuck in the year 1454 A. S., 1532 A. D. the Assam Rajah, Buddhi Swarga Narain, after having defeated and pursued the Turbucks as far as the Korotyah river in Northern Bengal, captured many cannons, fire-arms, and other weapons, from the defeated party. Again in the year 1549 A. S., 1627 A. D., after the retreat and discomfiture of the invading army of Said Abu Bakr, the Soobah of Bengal, the Rajah of Assam became possessed of many handsome cannons, both iron and brass, and other weapons, and he was thus induced to call in, from foreign countries, several able blacksmiths and brass-founders to instruct his own people.

The manufacture of guns and other fire-arms continued to flourish until the civil wars and rebellion of the Muttocks, which so disorganized the country, that during the subsequent ministry of the Bura Gohain, the *Khel* of blacksmiths and iron-workers became reduced to 500 in number and eventually to 100 on the invasion of the Burmese and its attendant evils.

At the present date, there are only from forty to forty-five persons in the Seeksagur district, who understand the smelting and working of iron ores, and but one or two blacksmiths who may have witnessed the manufacture of small arms; the manufacture of cannon ceased in the commencement of the civil wars.

Throughout the whole Southern Frontier zillah Seeksagur, i. e. from Jeypore to the Doyung River, iron ores are in abundance; and in former days, in several localities, large establishments were formed by the Assam Government for the smelting of these ores and the manufacture of iron.

The localities of Teeroogong hill and its vicinity about twelve miles S. E. of Seeksagur and of Hattighur further to the East, are considered the best, both as to the quality and quantity of the ores.

In the districts of Bosa and Doyung a ferruginous sand is washed from the plastic clay, which was smelted largely in former times, and still remains at the present day a field for the employment of the few remaining iron smelters.

In lower Assam the Garrow Haths of Pulashbarree and Gohain supplied iron hoes, manufactured by the Cossyals; and these were largely imported into Upper Assam for Government purposes. This iron from its soft or malleable nature was considered the best for the manufacture of nails, fire-arms of small size, and the inner tubes of the large cannon; the iron of the Upper Assam ores being found best adapted for swords, axes, knives, shovels and hoes, &c.

At Teeroogong hill and Hattighur thirty or forty workshops were established for the smelting of the ores, and manufacture of crude iron. These workshops consisted of a master and four workmen, who could, in twenty-four hours, turn out eight pieces of crude iron, similar to the sample now sent. The forges commenced operations in the beginning of the cold, or dry season, and continued in work for six months, when the manufactured iron of the season from these localities was delivered into the Government storehouses.

The ferruginous sands of Bosa Doyung are deposited in plastic clay, in detached beds of variable size, and scattered over a wide expanse of both undulating and level country. The beds containing the iron oxide being found at a depth of 10, 12, 15 and 16 cubits under the surface.

To find the beds containing this ore some little prospecting is necessary, and the work generally takes from four to five days (vide table No. 1). The bed being found, six men are employed as follows. Two men dig out the lumps containing the oxide, a third takes these and places them at the passage of entrance into the pit, a fifth\* takes them outside, and the sixth forms them into a large rectangular-shaped heap 12 cubits long, 7 broad, and from 3 to 4 cubits high, and thus in about ten days, the labours of six men have collected in this heap about one thousand maunds of the ore bearing clay.

The heap is now divided into seven shares, which gives one share to the landlord, leaving six shares to be divided amongst the working party. The next process is the washing out of the ore, and this is accomplished in a large pit filled with water into which the lumps are thrown, and the separation of the ore is effected by stamp-

\* The fourth remains unaccounted for.—Ed.

ing with the feet, this operation occupying a period of ten or twelve days.

The washing out and collecting the ore having been accomplished, the smelting process is commenced, and a furnace made after the common Indian fashion on the spot.

The operations of smelting are carried on by five of the party, one of them being the *oustad*, *ojah*, or head-smelter, whose business is to supply ore and fuel when the furnace has been heated, and to draw out the melted lump of pig-iron from every fifteen seers of ore, which he elongates and cuts (as shewn with sample sent).

The process is simply that which prevails throughout India, besides the master there being two assistants, one man to blow the bellows, and another to bring the ore and charcoal, which is thrown into the heated furnace, in quantities of a chittack of ore with its accompanying charcoal at a time, no flux being used—in this manner working day and night, with two men, as a relief, thirteen pieces of crude iron were turned out of the ore furnace in twenty-four hours. The lumps of pig-iron averaging about four seers in weight were sold for two, three or four annas a piece, according to quality and the quantity of pure malleable iron they contained.

The following is a table shewing the number of persons employed, the number of days, and the expense of digging, washing and smelting one hundred maunds of the Bosa Doyung ore.

Table No. 1.

| Detail of work.                         | No. of men employed. | No. of days. | Total number of men. |
|-----------------------------------------|----------------------|--------------|----------------------|
| In searching for the ore bed, . . . . . | 6                    | 5            | 30                   |
| To dig up ore, &c. . . . .              | 6                    | 15           | 90                   |
| To wash the ore, . . . . .              | 6                    | 11           | 66                   |
| To make charcoal, . . . . .             | 6                    | 30           | 180                  |
| Smelting the ore, . . . . .             | 5                    | 20           | 100                  |
| Grand total number of men employed, ..  |                      |              | 466                  |

which at the rate of 1 anna 4 pie per diem is, . . . Rs. 38 13 4  
 1000 maunds of ore-bearing clay produce 100 maunds  
 of ore, which smelted with 200 maunds of charcoal  
 produce 266 pieces of pig-iron, averaging 4 seers in  
 weight, which, sold at 3 annas each, fetch, . . . . . 49 14 0

Leaving a balance of, . . . . . 11 0 8

*N. B.*—Presuming the foregoing table to be correct, it would appear that the out-turn of pig-iron from the ore is about 25 per cent. ; and if, as I am told, 1 piece of pig iron of 4 seers weight is the produce of a basketful or 15 seers of the Teeroogong hill ore, the out-turn is much the same ; an analysis of either of these, however, would afford the best test of their respective qualities.

The following is a table shewing the progress of the works carried on formerly in the fabrication of fire-arms and cannon, extracted, I believe, from old Assamese Government records :

Table No. 2.

| No. of black-smith's shops. | Names of fire-arms, &c.                              | No. of fire-arms made in the month. |
|-----------------------------|------------------------------------------------------|-------------------------------------|
| 1                           | Small <i>hatnul</i> , or hand-gun, . . . . .         | 4                                   |
| 1                           | Large ditto, . . . . .                               | 2                                   |
| 1                           | <i>Pahlunga</i> , . . . . .                          | 2                                   |
| 1                           | <i>Ganthea Yomoonee</i> , . . . . .                  | 1                                   |
| 1                           | <i>Meeta Hoolang</i> , . . . . .                     | 1                                   |
| 1                           | <i>Baghmoorah</i> (or tiger-headed mouth), . . . . . | 1                                   |
| 2                           | Large cannon, . . . . .                              | 1                                   |
| 4                           | Larger ditto, . . . . .                              | 1                                   |
| 20                          | Still larger, . . . . .                              | 1*                                  |
| 50                          | Larger ditto, . . . . .                              | 1†                                  |

\* Four of this description made.

† Only one of this description made, which is the great gun at Rungpore.

Note.—Cannon and fire-arms continued to be manufactured from the year 1427 A. S. 1505 A. D. during the reign of Swarga Narain to the year 1636 A. S. 1716 A. D. in the reign of Rájáh Ruddra Singh. In the reign of Goureenath Singh that Rájáh prohibited the manufacture of the old match-lock and introduced the making of muskets.



*List of specimens subsequently forwarded illustrative of the Economic Geology of Upper Assam.*

1. *Kaolin Clay or Rooknunsee Peeta.*—This is the washed clay from a decomposing granitic rock, probably composed of silex and alumina. It appears to be infusible without admixture. A very short distance inland from the mouth of the Doza Panee, a small river on the upper Brahmaputra, large masses of this substance are found in different stages of decomposition, some in a state of powder and accompanied by debris of felspar and limestone rock. It can be procured in any quantity and can be brought down the Brahmaputra in small boats.

2. *Washed clay from a decomposing Felspar Rock.*—The decomposing felspar is deposited in large masses on both banks of the Degaroo river, Upper Brahmaputra, at the foot of the Northern mountain ranges; and in the same line East and West is a common deposit. The deposit is extensive, but its distance from the Brahmaputra would make its transport difficult and expensive.

3. *Washed clay from decomposed Felspar Rock or Marl.*—This is found in the vicinity of limestone, at the falls of the Namber river, Golaghát district. The deposit is large and accessible at all times, and, by means of the Namber and Dhunseree rivers, water transit is easy during the rains.

4. *Washed clay from decomposing Felspar Rock.*—This rock in a state of decomposition is found in the bed of the Namber river, under the falls, associated with the shell and slaty compact lime-

The largest of the cannon made during the sovereignty of the Assam Rájáhs is still visible within the fort of Rungpore. This cannon was presented to Rájáh Rajeswar Singh by Bohikhowa Bur Phokun of Gowhatti.

It is fabricated entirely from Cossyah wrought iron, and is remarkably well finished, its dimensions are as follows:—

|                                                                |                  |
|----------------------------------------------------------------|------------------|
| Length from end of handle to sight on the breech, .....        | 5 ft. 10 inches. |
| Ditto from breech to muzzle, .....                             | 12 ft. 3½ in.    |
| Measurement round the breech, .....                            | 5 ft. 7 in.      |
| Ditto round the muzzle behind the ornamented ring of ditto, .. | 5 ft. 1 in.      |
| Diameter of bore, .....                                        | 0 6½ in.         |
| Total length of gun, .....                                     | 17 ft. 3½ in.    |
| Thickness of metal, .....                                      | 0 7¾ in.         |

stone. The first washing of this rock is of a pinkish colour from reddish coloured specks in the stone, similar to that of the Degaroo, and the two rocks may be considered analogous.

5. *Ditto ditto*.—Ditto 2nd washing of No. 4.

6. *Washed clay from red marl deposit*.—This deposit apparently from a decomposing Felspar rock is in a state of marl on the road in the vicinity of Bur Pathur, Golaghát district. The out-crop is extensive, and the deposit looks of great extent. It is very accessible by means of the Dhunseree river and the road to Bur Pathur.

7. *Washed clay from pinkish colored marl*.—Jeypore coal measures, Upper Assam. This is not deposited in a regular stratum with the coal, though found close by. It is a deposit from a decomposing Felspar rock of which there are many varieties, and a very old deposit apparently, running along the edge of the low hills. It is plentiful and accessible.

8. *Tough clay bluish colored*.—This is the common tough clay or clunch of the Jeypore coal measures. To be had in any quantity. It makes a very good wash for walls and is no doubt a good pottery clay.

9. *Clay*.—From an extensive deposit in the bank of the Booree Dehing at Jeypore. This clay deposit apparently dips under the low hills at Jeypore, and covers a rubble containing gold.

10. *Black clay*.—Found in several localities in Upper Assam. A large deposit at the foot of the hills in Dopa Bur, near Gerghon, Seeksagur district; also visible on the Booree Dehing at Hooloo-goorie. Accessible, extent of the deposit unknown; that at Dopa Bur appears the largest deposit.

11. *Washed clay from ferruginous deposit*.—This is found in the bank of the Dibroo river, the deposit contains magnetic iron sand. The fishermen use this in colouring the walls of their houses and the ochre washed from it, is a very fine one.

12. *Tough clay*.—Banks of Dhunseree river, Golaghát district.

13. *Ditto ditto*.—Ditto.

14 to 25 (inclusive). *Tough clays*.—Of various shades and textures from the Brahmaputra bank and the Dhunseree river. These are given to shew the variety of clays procurable in the Seeksagur district, and visible on the banks of both the Brahmaputra and Dhunseree river.

These clays are first seen on the South bank of the Brahmaputra immediately after leaving Dekhoo Mookh. The bluish tough clay is first visible, and at the mouth of the Jansee crosses the Brahmaputra to Saulmarah, where an extensive native pottery work is established, supplying Upper Assam above the Dekhoo. A fine under-stratum of various coloured clays continues visible until past Kokilah Mookh, when the bend in the stream, and the sand deposit opposite Moghur, shuts them out; but I think the same clays will be found along the whole line of the extreme South bank running down into the great clay deposits of the Golaghát district and Dhunseree, where the section made by the river develops the same variety of clays, extending from what is called Mourah Mookh to Bur Pathur, and probably to Dhennapore. This clay deposit must be of great age and depth—some of the clays forwarded having been found under-lying a bank of gravel and sand 60 to 70 feet high. In many parts of the Dhunseree river, the clays have become mixed with a highly ferruginous marl, attaining to a state of sandstone. Laterites are also abundant in the bed of the Dhunseree, which shews these to be formed in the clays. An oxide of iron, consisting of small grains mixed with very hard laterites is washed from the whitish coloured clays at several points on the line of the river as well as inland. Proceeding upwards on the Dhunseree river, the land becomes higher above the Doyong river, and in the vicinity of the Namber, the clays are more indurated and of a slaty clay nature.

In the Namber the sulphureous hot springs are situated a few yards distant from the junction of that stream with the Dhunseree. At the springs nothing is seen but Felspar gravel. In the Dhunseree the next turn above the Namber, are several hot springs, containing salt. The bed of the river exhibits masses of Felspar rubble cemented together forming a hard rock, and large masses of fossil wood appear to be imbedded in this as well as lying in the stream. From the Namber to Bur Pathur, for a distance of nine miles the country is undulating with low hills, the soil bearing a profusion of timber trees, the nohar and toon the most conspicuous, and many rare and beautiful plants. Throughout this tract, which seems an offshoot from the Rengma Naga hills, there are many deep dells,

most of which according to native account contain poongs or springs of mineral water, similar to those exposed and known. The surface soil is a vegetable mould, but the small nullahs which are crossed expose clays and gravel, and some of the ascents and descents of the low hills are entirely composed of small felspar boulders and rubble. Within one and a half miles of the descent to the Bur Pathur plain at Hulgootee Jan, or pebbly brook, a fine bed of marl is exposed (vide No. 6) on one side of the nullah, a similarly coloured but more compact bed (probably containing iron) on the other side. Mr. Masters also mentioned that in the same nullah above this point there is a bed of white clay marl, similar to No. 3. The low hills and undulating ground stop abruptly, and the Bur Pathur plain is formed by these, running inland West from the Dhunseree river, turning round South and East, again meeting the Dhunseree river, enclosing a tract of land several miles in area, and mostly under rice cultivation. The deposits in the Pathur or rice-land are clays of the best description. Mr. Masters also mentions a deposit of white Kaolin marl visible in the bank of the river near one of the villages in a very convenient spot. Water is always abundant in the rice-land, several small streams passing through it, and one or two natural springs of pure water rise up directly under the fall of the high land. Viewed from the North, on entering the Pathur the scenery is very pretty, and altogether the site is promising and ought to sustain twice the number of inhabitants it does. A report on the several thermal springs which are known in the Golaghát district has been forwarded by Mr. Masters' Sub-assistant in charge. The heat of the water in the two I have visited, he makes  $112^{\circ}$ . The Namber river springs smell strongly of sulphur when fresh taken, and the water issues out of a gravel deposit in large quantities. No attempts, that I am aware of, have been made to dig in the direction of the spring, to ascertain the nature of the underlying strata, the upper gravel of felspar being evidently brought down and deposited by the river. From the continuous deposits of bluish hard clay in the Namber, the probability is, that the waters pass through this from beds of limestone, perhaps underlying this clay; the waters of the springs called bálee poong in the Dhunseree, and not half a mile distant from these, do not reach the



surface, but on digging through the sand, the water is found plentifully, and smells strongly of muriatic acid, affording, when immediately boiled in a small flat dish, a residue of sharp tasted salt.

Proceeding up the Namber river to the first falls, a distance of about two miles, no rocks in situ are visible on either side, only clays, and deposits of largish felspar rubble, the bed of the river being small felspar gravel, holding a great quantity of black metallic sand. In approaching the falls there are one or two springs, or jalyes, on the West or left bank of the stream. The fall itself is insignificant, being formed by a ridge of granite about 15 feet in height, over which the river leaps. On the right bank the low hills commence a short distance before reaching the falls, and in the bed of the river immediately under these the different limestones forwarded are found, together with the decomposing felspar rock, affording the specimens, Nos. 4 and 5 of the list, together with hard slaty clay, probably calcareous. The mass of granite forming the fall passes from West to East, it does not look stratified in situ, but some of the fragments break off like gneiss, and might be called stratified granite; it appears very durable, however, and not easily broken. In colour and its component parts it looks much like the red Aberdeenshire granite and takes a good polish; the breaking up of the slaty and stratified portions of the strata no doubt affords the black metallic sand of the Namber and Kallianee rivers, and both sands afford a good iron, if properly smelted. Immediately above the fall, the bed of the river is one continued layer of large boulders, which, however, have not been examined, but most probably they belong to the granitic formation. Finer, and larger falls are said to exist two days' journey further up the Namber river, but they are not very accessible. I have failed to find any traces of gold in the metallic sands of the Namber river. The sands of the Dhunseree river, however, and particularly below the mouth of the Kallianee river (which rises in the same range of hills as the Namber) contain gold according to native account, also the Kallianee river was in former times considered a prolific gold stream, the washings having been carried on close under the hills.

26. *Decomposing granite rocks, &c.*—High bank of Brahmaputra at Choonpoora. In the high bank of the Brahmaputra at Choon-

poora, boulders of this description are found, but they have been deposited there ages ago, probably from the vicinity of the limestone strata holding the decomposing property.

27. *Similar to proceeding (unbroken).*—Ditto ditto. Ditto ditto.

28. *Deposit from Brahmaputra after heavy rain.*—Found principally in the inland offshoots and *churs* of the Brahmaputra. It is of the nature of rotten stone. This is found sometimes in large quantities and requires to be scraped off as the river falls, and is evidently washed down from the decomposing rock associated with the limestone.

29. *Washed from calcined lignites, also of the nature of rotten stone or crocus martis.*—Large masses of true lignite are imbedded in the soft sandstones of the Booree Dehing, and large quantities of the same kind but less compact are to be procured in the bed of the Dhunseree.—From the true lignites of the Booree Dehing a substance suitable for pigments, as also for polishing metals, is procurable. The decayed fossil wood of the same localities (from a state of chert or flint) also supplies excellent rotten stone capable of giving the highest polish to precious stones. The Burmese lapidaries invariably use this substance in their lapidary work.

30. *Compact rock, supposed dolomite or magnesian limestone.*—This limestone is found both in the Brahmaputra and Dora Panee, but principally in the latter stream, and seems to be associated in situ with the accompanying granite and felspar rocks, forming the Kaolin clay, and in this case is a valuable addition to these as containing magnesia. This is procurable along with the Rooknunsee Peeta and decomposing granite and felspar rocks of the lower ranges, Upper Brahmaputra, and probably thus associated causes the decomposition of these rocks; some of the varieties of this marble, are yellow, streaked with dark colored delineations. All the rocks of this locality contain a quantity of very bright colored whitish pyrites, or sulphate of iron—the primitive lime marble in particular containing large quantities of bronze coloured and white pyrites of all the varieties of this mineral.

31. *A variety of No. 30.*—Ditto ditto. Ditto ditto.

32. *A variety of Nos. 30 and 32.*—This is also found in the Upper Brahmaputra of a purer white than the rocks of the same kind in

the Dora Panee. The rock is more easily frangible and appears to contain more magnesia. Ditto ditto.

33. *Primitive limestone*.—This rock is in situ in the first ranges of the Upper Brahmaputra from the Dehong to the Brahma Koond. The specimen is a good sample of the mineral as it might be required for purposes of ornamental work, particularly for pavements and table slabs. Boulders of the limestone for mortar purposes can be procured in any quantity during the dry season. The boulders of a large description of this, and the magnesian limestone, and the variety passing between serpentine and carbonate of lime with handsome granite, are found close up to the Northern mountains, but they could only be brought into use for ornamental work by having slabs cut on the spot which might not be a very difficult matter, provided protection could be given to the workmen.

34 and 35. *Shell limestone*.—From under the Namber falls. This is in large quantities and only requires to be quarried.

36 and 37. *Limestone*.—Found associated with Nos. 35, 36, and decomposing felspar and slaty clay. These limestones in their various beds, of which the extent is quite unknown, probably contain the decomposing power which affects the granite and felspars in the same manner as on the Upper Brahmaputra.

38 and 39. *Iron*.—Smelted from the ore (oxide of iron sand) washed from the plastic clays of Golaghát and Gilikha in the same district. These ores have been deposited no doubt along with the clays from the breaking up of granitic rocks under the influence of water, vide specimens, Nos. 26 and 27, the latter containing a quantity of metallic sand. But it is evident that in course of time, what was originally magnetic and non-magnetic iron sands, has become oxidized and altered. The appearance now being that of natural exuviae. Both these ores are found in extensive beds, throughout the Golaghát division inland, as well as on the banks of the Dhunserree river at Golaghát, and Dehing Gohainghát. The natives seem to think that the resources of these ores are inexhaustible, but this requires investigation. The quality of the ore is considered good, and, even under the rude processes adopted by the iron smelters, the manufactured iron ought to undersell that of the Cossyah or codal iron, if not the English bar iron, though the convenient form, of



English iron is always an inducement to smiths to work it into different articles of agricultural use, rather than take the trouble of working up their own native blooms, which also is more difficult to effect from the want of proper tools.

I am led to believe that the Golaghát ores furnish a very good percentage of *cutcha* iron—twenty seers of charcoal, and twelve seers of ore, producing five seers of iron, forming a bloom, black, heavy and sonorous; but like the Cossyah iron blooms, I have found on trial, that they lose between fifty and sixty per cent. before being made fit for steel, or the formation of any cutting instrument. I am not sufficiently versed in the statistics of iron to offer any explanation on this point, beyond the idea, that the native furnaces do not contain sufficient heat to smelt thoroughly any ore which holds either quartz or clay; nor do ores of this kind answer in any furnace without a flux, for which their furnaces do not appear to be adapted, as I am inclined to think that a proper proportion of limestone introduced into a native furnace would cause it to run. However 45 per cent. from any iron ore is good, and there is no reason why even the native method of smelting should not be improved, so as to give 30 per cent. of really valuable malleable iron. The ores of the Golaghát district certainly offer a fair prospect of remuneration to the iron smelter, and I see no reason why with such resources at command, Cossyah iron codals, which sell at twenty rupees per maund need be imported.

40. *Iron*.—From clay iron ore, Jeypore. This ore is not that which is found deposited conformably with the coal, but is found in beds throughout the whole range of low hills flanking the Naga mountains; and even amongst the clay slates, in these higher ranges we find the same strata. Reniform nodules are generally lying imbedded in a marly clay, and in some localities quite exposed. The amorphous lumps, are generally imbedded deep in the soil of the low hills, and in former times, this ore seems to have been excavated from the Tipam hill, the locality of a now extensive tea-garden belonging to the Assam Company, where the plant grows most luxuriantly. The present sample is from an amorphous clay iron ore, or hydrate of iron, dug from the face of the hill, forming the gorge of the Booree Dehing river at Jeypore. The quantity of



scoriæ lying about, shews the extent of the smelting in former days, but whether from this ore, or from other sources along the line of the river, I cannot say ; my opinion is that these ores would answer well, smelting them on the English plan, but I think the smelting of clay iron ores like these could not be attended with either good or profitable results on the native plan.

41 and 42. *Iron*.—Smelted from the two descriptions of metallic sands in which gold is found in the Brahmaputra and in the hills inland from Jeypore. The difficulty of fusion without addition is a great drawback to the smelting of these ores, for they afford excellent iron, easily converted into steel. The magnetic black sand will not fuse without the addition of glass, and cannot be managed in native furnaces. The magnetic iron fuses, and no doubt, with sufficient blast heat, would furnish a good proportion of pure iron, I have not, however, completed my trials of smelting these ores so as to give a correct opinion as to their usefulness.

43 and 44. *Washed gravel*.—From the Degaroo and Tedding rivers, Upper Brahmaputra. These are no doubt metallic, but in all probability contain iron only.

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*Narrative of the Travels of Khwajah Ahmud Shah Nukshbundee Syud who started from Cashmere on the 28th October, 1852, and went through Yarkund, Kokan, Bokhara and Cabul, in search of Mr. Wyburd.—Communicated by the GOVERNMENT OF INDIA.*

At the request of Major Macgregor and Colonel Mackeson, I on the 28th October, 1852, taking with me six horses and six servants started for Ladakh, which it took me twenty days to reach owing to the quantity of snow (it being now winter) on the Ijogicbal mountain.

In the Ladakh valley the climate is very cold and only produces “*jorve*” and wheat, which can be obtained at every stage. Rice is brought from Cashmere and Manoo (I do not know where the latter place is.) It is sold at 4 or 5 seers for the Rupee. Travellers and strangers are hospitably received by the people. It is under the

rule of Maharajah Golab Singh, and the people live generally upon *tulkair* (parched wheat and barley) which they take with black tea (the latter is brought from Lassa) and *ghee* from Cashmere.

When they once put on their clothes they never take them off or change them until they are worn out. They are generally of black *puttoo*.

The people are idolaters and worship a god designated by them 'Manee.' All the brothers of a family have one wife common to them. They eat raw meat. Fuel for burning is scarce, and they use the dung of animals for fuel.

From Rodukh and Chantun they bring the shawl wool, which is carried upon goats. From Lassa they import green tea, musk-bags and *judwa*, (a medicine.) From Ludia they procure cloth, opium, spices and leather. From Yarkund *baraj*, China ware, and *lowar* (silk).

A few *Ferozas* (Turquoise stones) imported from Bokhara are found, used by the women as ornaments. The females go at all seasons of the year with uncovered heads.

Travellers, owing to the necessities of life being all imported, find living in the country very expensive.

Apples and plums grow here, and the trees are principally the willow and the poplar. I remained at Ladakh for a month and eighteen days, awaiting the arrival of a *kufilah*, and arranging for the procurement of animals for my further progress towards Yarkund. Travellers are obliged to carry every thing with them, nothing being procurable on the road, as it passes through an unpopulated country. The hire of a horse from Ladakh to Yarkund in the winter is 100 Rupees. These animals are all of the Yarkundee breed, and come in *kufilahs* from Yarkund, loaded with goods. For each animal they have to take a double set of shoes. The ordinary dress of travellers is a *posteen* and *senabund*, and coats of *puttoo*, gloves of leather, and long felt boots, they carry with them on their horses a carpet to lie upon and a blanket to cover themselves. The country is too cold for cotton clothes of any description.

On the 7th of January I started for Yarkund, the road to which is through a rocky barren country, and through defiles. In spring, about the time of the equinox, it is generally very stormy, and

there is a great deal of snow ; the road is blocked up for some three months.

From Ladakh to Lamakeet is five days journey. A stream coming down from the direction of Ladakh and known as the Shahyeak, flows past the latter place ; this was fordable. Lamakeet is merely a halting-place, it contains a few huts.

From Lamakeet to Ak Musjid is thirty marches. The country is totally uninhabited. The Kurra Koorum mountains have to be crossed on the road. There are two roads, known as the Maryhan and Ekdan ; the former is the summer road. There are three *kothuls* on this line. The tract between the Kurra Koorum range and Lamakeet, a distance of three days' journey, is called Dubsun, which, during winter, is blocked up with snow, rendering this road impassable. The Ekdan (snow) or winter road was, according to the people of those parts, blocked up for twenty-two years, and water accumulating above it, caused the snow at last to give way and they say that this was the cause of the great flood of the Indus in 1840. This is the route almost always now followed by the *kufilaks*, and is two marches shorter than the other.

I witnessed a curious phenomenon on this road ; the snow while melting did so at some distance from the ground leaving masses in the shape of large trees, from which hung icicles, and between which the traveller moved along ; and it seemed as if you were in the midst of a sea of crystal, from which innumerable colours were reflected, and moreover, on the top of the snow were large rocks and stones of a red and white colour. We have to pass through this sort of country for half a day's journey. The Kurra Koorum is a small mountain, but when a wind which is known as the *sootuk*, blows, the air becomes very rarified, and breathing becomes difficult. During the spring the north winds prevail and there are very heavy falls of snow, which frequently oblige *kufilaks* to return from whence they came. The *sootuk* frequently causes the death of horses ; if an animal dies on the road and there is no spare one for his load, it is buried and left there until its owner can go back and bring another from Ladakh. From the Kurra Koorum to the Akhtab mountains a journey of three days, there is no water on the road, and frequently when bad arrangements have been made and

no water has been carried along for the animals, horses on arriving at Akhtab drink so much that they die; the road traverses a pass through the Akhtab mountains, through which there are two roads, the Kullian and the Kookrai. On the Kookrai road, water and fuel are procurable, but this road is difficult in the summer, as it winds along the beds of torrents, at that season swollen by the melting of the snow. The people of Kunjoot, robbers by trade, infest this road during the winter, but it is free from them during the summer months. On account of these banditti, *kufilaks* frequently go round by the Kullian route, which is longer and more difficult, besides being dangerous from the continual moving of glaciers. It takes some six or seven days to get through the Kullian, after which four days' march brings you to Kurgulluk, a large place containing a bazar, and well populated. Here every thing is procurable, being brought from Yarkund.

From Kurgulluk to Yarkund it is three marches through a plain cultivated country, irrigated from hill streams. About half way you cross the Yarkund river, which, during winter is frozen and crossed on the ice. At present, there is a ferry with one boat. This of no great breadth, but is very rapid. The country is studded with numerous villages.

I reached Yarkund on the 17th February and remained there and in its vicinity for three months, during which period I was making enquiries regarding Mr. Wyburd, and sent a man for the same purpose to Aksoo distant eighteen marches. At every stage on the road there are buildings called *Wurtung*; where the authorities have men from the city to carry *dâks* from Yarkund to Aksoo, and from Aksoo to China, to Biejun (Pekin). To this place it is six months' regular journey, but the *dâk* arrives at Pekin in twenty days, an answer arriving to a message from Yarkund in forty; daily communications are passing between the two places. The *dâk* men are mounted on their own animals; for the performance of this service they are exempted from taxation.

Half way to Aksoo, nine marches from Yarkund, the Chinese have built a new city called Inyshuhr (the new town) which is situated on the Kashgur river, here four roads meet, viz., one from



Kashgur, another from Yarkund, a third from Aksoo, and a fourth from Khoottan (a province of China.)

Whenever an army is required for any purpose, it is sent from this city. The Mahomedan city and the Chinese fort are separate. In the latter there is a garrison of from 15,000 to 20,000 men, they have guns but no sowars (cavalry). Their troops are all footmen.

Aksoo is a very fine city, containing springs of water. The climate is temperate. The residence of Seduk Beg, the present governor, is on a height in a fort separate from the city, at about the same distance as the Bala Hiszar is from the town of Peshawur.

From Inyshuhr to a large place, Oochtoorfan, on the direct road to Pekin is three days journey. Travellers are not allowed to go by this route.

Najmoodeen, the man I sent to Aksoo, returned without being able to hear any thing of Mr. Wyburd.

Yarkund is a large walled city supplied with water from the Yarkund river, distant some three or four koss. It is a great place for fruit; here grapes, pomegranates, apples, melons, mulberries, plums, aloochas, cherries, and quinces, all grow luxuriantly. Yarkund is such a dusty place that the new moon cannot be seen, and when it rains, it rains mud; for this reason people do not wear any white apparel; their dress is long and loose; they wear boots. Travellers and learned men are much respected. The king of the country is always a Mahomedan, to him the people look for justice. The Chinese governor is designated the Umban, and his deputy Dalocah; they reside in a fort along with their troops who are all Chinese, and of whom there are some 6 or 7,000 here; the "Khalaie Shuhr," (Chinese fort) is separate from the town. They have little or no communication with the people of the country. Whatever they require they procure through the Mahomedan ruler of Yarkund. After five days I went and paid my respects to this authority, whose name was Afreedond, and title "Wauk;" he is the executive ruler and decides all matters after referring them to the Umban. The latter signs all passports. The actual walled city of Yarkund is not so large as that of Peshawur, but there are extensive suburbs outside. Horses are very numerous here, but the troops being all

Chinese unaccustomed to horses, accounts for their not having any cavalry.

The people generally are contented and well pleased with their rulers. There are no other taxes in the country save the land-tax, which amounts to about one-tenth of the produce.

After making full enquiries and not getting any information regarding Mr. Wyburd, I started for Kashgurb on the 27th May, and sent Myeefoodeen to Khoottan. From Yarkund to Kashgurb the country is cultivated, and along the road at regular stages the dāk is kept up. After three marches I arrived at Inghissar, a small town, having a Chinese fort and garrison of about one thousand men, situated on a commanding position. Water is abundant and fruits plentiful. I remained here a short time, and then proceeded to Kashgurb, which I reached after three days. I remained at Kashgurb, in order to enquire after the fate of Mr. Wyburd, for two months. The reason of this delay was as follows. The road between Yarkund and Kokan was closed in consequence of the ascendancy of Bizong Khoja, whose ancestors formerly ruled over Yarkund, Aksoo, Kashgurb, Khoottan, Inghissar and Oochtoorfān; the Umban of Kashgurb having by order of his superior the Yarkund Umban, ceased to grant passports to travellers by this route; and also because Aksukol Ingamat Khan, a deputy of the Khan of Kokan, who, according to custom, with the sanction of the Chinese authorities, was collecting tribute from certain subjects of the Kokan Khan (traders residing in the city of Kashgurb) had been ordered, on account of some former disputes, to desist from doing so. For these reasons the Kashgurb Umban refused to grant me passports until he received authority for so doing from Yarkund. Nyamat Khan also informed me that I could never get to Kokan without first receiving the sanction of the Khan of that place to proceed there, so I accordingly despatched Kasim Jan, a man of my own, with presents for the king; asking for his permission to proceed; and I myself returned to Yarkund to get passports, which I had the good fortune to obtain through the influence of Afreedond Wauk, the governor. Here I met with Nujeeboodcen, who had returned from Khoottan having been unsuccessful in obtaining any information regarding Mr. Wyburd. From Yarkund to Kurrakash

in Khoottan is nine days' journey. Khoottan is a district containing six towns, viz.: Kurrakash, Ilchee, Uronakash, Shukra Cheera, Kurria, and Tagh.

Kurrakash. There is a large river near to this place which is crossed by boats, and the horses here are taught to swim.

Ilchee is the residence of the Umban of the district; the name of the present man is Ulsh Beg,

Uronakash. From Ilchee this place is distant half a day's journey, and between the two the Uronakash river has to be crossed; in the season when this is shallow, the people of the country find *johurs*, which are described as precious stones, which when clear are valued at their own weight in silver. They are used by the Chinese for making handles of knives and plates of different descriptions.

Shukra Cherra. In this place they manufacture a great deal of silk and many carpets.

Kurria. This is also a great place for silk.

Tagh. The climate of this district is good; grapes are dried here to a great extent; the ordinary fruits of Yarkund are plentiful.

The men of Khoottan are extremely handsome, and by order of the emperor of China, the whole of the population have to go during the winter months to a place (name forgot) distant forty days' march, and there dig for gold, for which they respectively receive seven *puls* of silver (equal to about 30 Rs.) whatever be the result of their operations; the gold that is collected, all becomes the property of the government. All over the Yarkund country, Chinese coinage is in general currency.

From Yarkund, going by Aksoo, it is fifty-eight days' journey to Ihl, near to which the Russians have their frontier Cantonments, the head Chinese functionary in this place is called Joongtang.

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There are no Russians in Ihl itself, but this is one of the routes by which Russian goods find their way into China, and Chinese commerce passes up into the Russian territories.

After receiving my passports I returned to Kashgurb where I arrived on the ———, here I found that Kasim Jan had returned

with a letter from the Khan of Kokan, and I remained for about another month, making arrangements for my onward journey as I had to go without a *kufilah*.

Kashgurb is a considerable town surrounded by a fortified wall and supplied with water from running streams. To prevent an enemy during the time of hostilities from cutting off the supply, there is an extensive tank inside the town, large enough to keep the people supplied; one man holds the special office of keeper of the tank; the town is surrounded by numerous gardens, and tanks, and private residences. The Chinese fort is distant from the town about three koss in the direction of Yarkund. The builder of this fort was severely rebuked for building it in the direction of Yarkund in place of towards the frontier. The climate of Kashgurb is salubrious and fruits plentiful. The people have great intercourse with the Kokanese, and they are very similar to the latter in their manners and customs. The boundary of the Chinese territory extends to one march beyond Kashgurb on the Osh road.

On the 18th December I left Kashgurb, and after twenty-eight days' march through a mountainous, difficult wild country inhabited by wandering tribes, I reached Osh in the Kokan territory. I carried all my provisions, &c. upon five mules. There are no great streams to cross on this route, but about half way you cross over the Temkhdewan mountain, which is the most difficult portion of the road.

Osh is a small city near a hill called the Tukhti Suliman, on the top of which is erected a musjid. In this hill there is a large cavern which can only be entered by a man on all fours; in the midst of it water is found in a sort of tank. From the summit of the Tukhti Suliman, you have a commanding view over all the city which is at the foot of it. It is a dry hill without any vegetation upon it. The climate of this place is salubrious. From Osh it is two marches to Moorghela, another small city with an extensive bazar, and many hummams, schools, and seraies, a plentiful supply of water and numerous gardens; it is situated in the midst of a well cultivated country. From Moorghela to Kokan Khas there are two roads, the one over a "*murah*" or desert, and the other through a cultivated tract. It is distant two days journey, I arrived at Kokan on the —.



Kokund or Kokan is a large and thickly populated city ; the houses are built of pukka bricks ; they generally are only of one story, though there are a few of two or more. Houses here do not last long, owing to the dampness of their foundations ; the soil is very moist, and during the winter there is a great deal of mud in the streets ; it is so bad that people can only move about at that season on horseback, and horses frequently sink into it as deep as their shoulders ; when storms of wind coming from the west prevail, they dry this up to a great extent. The city is a walled one ; the principal officer in it, besides the Khan is the "Ming Bash," or prime minister, who performs the general duties of the Government ; the military and civil establishments are all mixed up together. There is abundance of water every where, and in the city there are numerous fine bazars and extensive seraies.

The name of the present ruler of Kokan is Khuda Yar Khan, he is a man of about 25 years of age, he has a brown beard and only wears his turban out of doors. His palace is situated in a fort which is separated from the town by a stream ; it seems to be a place of no strength and has no command over the town ; it has two gates, across which there is a chain, which has to be removed each time to admit of the ingress or egress of passengers ; over one of these there is a balcony in which the king locates himself when he reviews the troops or upon high days and holidays. Both in the court yard of the palace and outside of the town there are guns. The army are armed with muskets, lances, knives, axes, and swords on the end of muskets ; they consist entirely of Cavalry with the exception of a new Regiment of Infantry which they are forming and which may be some 3 or 400 strong ; there is no regular army, but the troops consist entirely of Ooloos or Militia. Many landholders hold their lands from Government on condition of their being ready always to turn out a contingent when so required. The Kokanese under Kasim the Ming Bash, when they were defeated by the Russians at Ak Musjid, were about 10,000 strong and lost 20 guns, all that they had with them. These guns are drawn by horses two or three to each, they have men kept specially as gunners ; gunpowder is made in the city ; I do not know where they get their sulphur from, but there was lots of it exposed for sale in the Kokan bazar ; saltpetre is manufactured on the spot.

On the occasion of great festivals, the Sowars amuse themselves at a game called "Koke Boree," a goat is killed and taken outside the city to a plain and a goal is marked off at some distance, the Sowars make a rush and there is a regular scramble for the goat, or for parts of it, which are immediately carried off to the goal, on arriving at which the flesh becomes the property of the carrier of it. There is sometimes such a resolute struggle for the pieces that men frequently get killed. The king himself sometimes joins in this pastime. They are fond of horse-racing, but practise it (by their own account) to enable them by their fleetness to escape from pursuing enemies; they all wear boots with large iron spikes on the heels of them; as also small caps (a sort of fez bent to one side) which out-of-doors they cover over with a *pagree*.

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Ak Musjid is forty days' march from Kokan. In the Kokan bazars, Russian goods and merchandize of all descriptions are common, the principal of which are nanka, (common cotton cloth,) chintzes, turbans, and fine cloths, fur, trays, boxes, &c. The principal road is by Ak Musjid. The tax upon these articles is collected at Tashkund, distant five days' journey from Kokan.

The exports of the country are Kokan chintzes, which are here manufactured of a very fine quality; the goods are sold to Badra-nashar merchants who carry them on camels, which are numerous; no Russians ever come themselves, there are only two in the country, and these were prisoners captured by Kasim at Ak Musjid. These unfortunates are now slaves. I saw them and, upon seeing their circumstances, it struck me that they might be the Europeans of whom I was in search, but I was soon undeceived. At Kokan I made every enquiry after Mr. Wyburd in all the bazars and seraies, and from the people of influence. I also sent a servant by name Abdoolla to Tashkund, he returned without being able to procure any information. The only intelligence I received of any Europeans ever having been here were of Messrs. Martin and Allen,\* who

\* The Syud shewed me a scrap of paper which he got, and I found it was a good character given to a servant by Dr. Martin Honigberger, now in Cashmere, who formerly traversed these countries. The other name, Allen, is I suspect meant for that of Lieut. Conolly still called by the natives of Kokan "Khan Ali."

arrived within the reign of Mahomed Alli Khan, the late Khan, about fifteen years ago. The former departed and took the route by Russia, while the latter returned to Bokhara. I now took my leave of Kokan and started for Bokhara, the first stage was, 1st, Berharuk ; 2nd, Mharrum ; 3rd, Khojund, a town situated on the river Syr, having good bazars and many mosques ; here also I enquired after Mr. Wyburd without success. 4th, Ribat, (a fort ; ) 5th, Arra Suppah, which is situated in a hollow on both sides of a stream ; the Mullick of the place has his house on an adjacent eminence. This place is on the boundary between Bokhara and Kokan, paying tribute to neither, though nominally subject to Kokan. We had passports from the Khan of Kokan to take us as far as this, after which we proceeded without any. 6th, Ijour in the Bokhara territory. 7th, Kirghizwad. 8th, Jeezukh, a small town of which Kunnatshue is the present ruler. Travellers are stopped here, their baggage examined, and intimation of their arrival sent express to the Khan of Bokhara. 9th, Boolak Tash. 10th, Peshkobrook (five bridges). 11th, Samurkund, a large town situated on a stream of the same name, a tributary of the Oxus. This was the capital of Timour Sháh Koorghanee, in whose time there was a pukka bridge across the river, the remains of which now exist ; there is a tablet upon it bearing date 986 Hegira. It contains many fine old mosques and has numerous seraies and schools, the king of Bokhara makes this his summer residence. From Samurkund there are good roads to Tashkund and Shuhrasulz, the former distant fifteen days' march and the latter some five or six. The people of the country are generally pleased with their rulers and happy under their rule ; there is little or no oppression. Not being able to learn or hear any thing of Mr. Wyburd here, I proceeded on my journey.

|                       |                                                                                                                                                                               |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12th, Dhola,          | } The road runs through a well cultivated district, producing wheat and grain of all sorts, and irrigated by canals from the river ; seventeen marches from Kokan to Bokhara. |
| 13th, Kutta Koorghan, |                                                                                                                                                                               |
| 14th, Koosh-house,    |                                                                                                                                                                               |
| 15th, Ak Chali,       |                                                                                                                                                                               |
| 16th, Royi,           |                                                                                                                                                                               |

On the 1st of May I arrived at Bokhara, and put up in Muhulla Kasigram (potters) for a period of one month. I continued making enquiries in every direction regarding the fate of Mr. Wyburd. I



met one person, that I at first thought might be he, a stranger who would not tell his name to any one, but upon my shewing him Major McGregor's English letter that I had with me from him, he could not read it, and moreover I discovered that this individual had spent some ten years in Cashmere, which convinced me that he was not the man I was in search of, besides which, this person had not the appearance of a European.

It is notorious in Bokhara that the king was the murderer, or rather caused the murders of Conolly and Stoddard.

Bokhara is a densely populated city, in the summer it is very hot and in the winter extremely cold ; there are stone-tanks in every street ; these are filled by water-cuts from the river, but for three months of the year, during which the leaves of the mulberry tree have been decaying in the water, people who drink from these tanks become unhealthy, and suffer much from the Guinea worm, which is a common disease in the country. There are several physicians in the city who are great practitioners in curing it by extraction of the worms. Water for the king's private use is brought from a great distance. In Bokhara are found merchants from Persia, Oorgung, Cabul, and Kokan, each of which places have their respective market-places. The Jews have also a separate division. The bázárs are clean and kept in good order, and well stocked with merchandize of all descriptions. There are fifty seraies and three hundred and sixty musjids ; the town also is divided into three hundred and sixty mohullas or divisions. There are numerous hummams or baths. For every division of the town, the king has a news-writer, who supplies him with daily information of all that occurs, and weekly reports are sent in the same manner from the country ; for this reason the people fear him greatly, as he is acquainted with all their transactions. The present ruler Behadoor Khan styled Syud Ameen Nusseeroollah Khan is about fifty years of age. No great friendship exists between the governments of Kokan and Bokhara, but I know that an envoy went to Bokhara during my stay at Kokan, as on the road I met him returning accompanied by an envoy from Bokhara. Both in the Kokan and Bokhara states, gold and silver coins are coined and are current, the people are generally well off, though the subjects of Bokhara are the wealthiest, owing to their having a few



years ago plundered the Kokan country with an army. There is a brother of the Khan of Kokan's now at Bokhara; he had a dispute with his brother and sought refuge in Bokhara. There are some regular troops at this place which are drilled by Summund Khan, a Cabuli. The horses of Bokhara are superior to those of Kokan; I saw no Russians at Bokhara, and know it to be an ancient law that they are not allowed to travel within the boundaries of this state. The Russian *kufilaks* come direct to Bokhara and have to pay heavy duties upon goods upon their crossing the frontier. Not being able to procure any information regarding Mr. Wyburd, I suspected that perhaps he might be in prison, and so made friends with Meer Shah, the keeper of the prisons, from whom I learnt, and I feel confident, that no foreigner was there in custody; so leaving Khwajah Mahomed Shah, one of our fraternity, to continue the search and make enquiries, and with instructions to keep me informed if he should learn any thing about Mr. Wyburd, I myself started on my way back.

*From Bokhara to Cabul.*

On the 2nd June I left Bokhara.

1st stage, Mimleck. If you leave early in the morning you reach this place in the afternoon. At this season of the year it is so hot that people ride upon camels and not upon horses.

2nd, Kraool, water from small streams, country cultivated, provisions for cavalry and infantry plentiful.

3rd, Khojah Umbanik, left at sunset one night, and by day light next morning arrived here on a camel. Water here from a stream.

4th, Khasan, about the same distance as yesterday.

5th, Kuslice, a small town subject to Bokhara, from this place a road branches off to Shukur-i-Sulz, distant five marches.

6th, Shore Koodook; here water is procurable from a well; country now barren.

7th, Chul Boor: this is only an encamping ground; the water for the supply of travellers is collected in a tank, it is all rain water, and very little of it. (If an army was to move by this route they would have to carry all their water along with them); country sandy desert.

8th, Banks of the Amoo or Oxus. From Hushee the road all the way to the river traverses a sandy desert; there is no village or city

here ; there are two boats at this ghat (the property of the Bokhara king) ; the breadth of the river is very great ; you cannot distinguish a man's features across the steam ; it is more than four times the breadth of the Jhelum at Sounuggur ; one boat can make but two trips in the course of the same day ; all the *kufilaks* cross at this place. It is three marches from this ferry to Balkh : upon crossing the river the aspect of the country quite changes, you are now in a cultivated country covered with villages tolerably populated, I forget the names of the halting places, provisions of all sorts plentiful, even for an army ; there are no Seraies for travellers.

Balkh is an old ruined city, containing the remains of many old buildings. Hot winds blow here, as also occasionally the Simoom ; for fear of the latter, travellers seldom stay at Balkh itself but go on to Muzaree Shureef where there is a well known Izearut and also a town. This is now the residence of Sirdar Ufzul Khan ; it is considered healthier and cooler than Balkh itself. I could hear nothing of Mr. Wyburd here, so on the 23rd June I went a long night's march to—

1st, Yarh Kooryhan, this is a small city which is also called Khoollum ; the present ruler is Mahomed Shureef Khan. It is a cooler place than Balkh and the country is irrigated by numerous hill streams.

2nd, Lungi, a short march through hills. A tax called Khurygya is here levied upon every horse.

3rd, Ghuznee Kuk, to-day's march is good for camels, and even for guns, which were taken up by this route when Mahomed Shureef Khan was turned out.

4th, Char Baghi Sultan, country hilly, road difficult, crossing many streams, no provisions to be got.

5th, Hybuk ditto, ditto.

6th, Saibagh.

7th, Khoorum.

8th, Rowee.

9th, Doab.

10th, Budder.

11th, Kamurd.

12th, Saighan.

13th, Akraubuk.

} Water is plentiful, road tolerable  
for camels, provisions scarcely pro-  
curable, road passes up and down hills  
during the whole distance.

14th, Bumam, here are the remains of an old city formerly called Golgoolla, it was destroyed by Jengh Sing Khan.

15th, Lopchi.

16th, Kaloo, this is a very difficult march.

17th, Gurdun Daver.

18th, Takanah.

19th, Kote Ushnoo.

20th, Cabul.

This route passes over Dunda Shikun (breaker of teeth) and the Kaloo mountains as also over the Purypilan. The inhabitants along the whole route are notorious robbers, and for this reason *kufilaks* are always obliged to travel by day, but have even then always to be on the look out. Ghee, wheat, barley and fuel are procurable in places, but provisions are altogether generally scarce.

I arrived at Cabul on the 12th July, stayed there some time and then came by the regular marches to Peshawur, where I arrived some ten days ago.

The above information was taken on the 22nd November.

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PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR JUNE, 1856.

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At a monthly general meeting of the Society held on the 4th instant, at the usual hour,

A. Grote, Esq., Vice-President, in the Chair.

The proceedings of the last meeting were read and confirmed.

*Presentations were received,*

From Lieut. A. Trotter, a collection of fossils from Kohat.

On the proposition of Captain Thuillier, seconded by Mr. Woodrow, the best thanks of the Society were voted to Lieut. Trotter for the valuable collection of fossils sent by him.

2.—Some drawings of fossil bones from the same district by Lieut. Garnett, Engineers.

Professor Oldham read the following extract from a letter of Lieut. Garnett, Engineers, regarding the fossils, sent by Mr. Trotter.

“They have been selected as the most portable, and at the same time characteristic specimens of the fossil fauna of the valley of the Indus. The extent of the bone bed in this part of the Indus, as far as it is at present known, is limited to about eighteen miles of the river’s course from the village of Choorlukkee to the mouth of Kohat Towy. Fragments are sometimes found five to seven miles from the banks of the river. The great depth of the ravines near Kooshalghur, and indeed all the way along both banks of the river, facilitates the search for the bones very much;—some of the Khudds are 200 feet and upwards in depth. The tertiary beds here consist of a softish sandstone, generally of a light grey or green tint, with partings of red and grey marks. The strata have been slightly tilted since deposition, which has caused the sandstone to form parallel ridges of from ten to sixty feet high all over the valley.



These ridges of rocks have one side steep like a wall, whilst the side to which they dip is at a tolerably gentle incline. The dip of the strata is always conformable to that of the higher ranges in the vicinity. The whole of the valley of the Indus is highly interesting in a Geological point of view, but peculiar interest attaches to the part about Kooshalghur since the discovery of these fossil remains of mammals and reptiles of the Tertiary period. I discovered the first bone accidentally in laying out a road between Kohat and Kooshalghur in 1852, since then several thousand fragments have been brought to me. The people of that part of the country have been encouraged to search for the bones, and now nearly every villager at Kooshalghur has become a collector. Both men and children hunt for them when not employed in the fields. They call this "the harvest of bones." I have no doubt strata of the same age will be found on examination to extend along the greater part of the upper valley of the Indus. Mr. Greenough's map shews that they appear again in Scinde and near the embouchure of the river. In conclusion, I will only add that I shall be very happy to forward any interesting specimens which come to hand to the Asiatic Society at Calcutta, and also to supply any information in my power concerning these fossil remains, and the district in which they are found. As my professional duties afford me no leisure for prosecuting the study of the subject, I hope the Society will afford me some information regarding these fossils—they evidently belong to animals of several different types, and I am anxious to know with what known animals they are identified, or if referable to unknown species, what conjectures may be formed concerning them. With this view, I have numbered all the specimens sent, and have kept a duplicate copy for reference."

Mr. Oldham pointed out the great importance of obtaining further collections of fossils from these deposits.

3.—From H. Haughton, Esq., blocks of fossiliferous limestone from the farm caves near Maulmain.

4.—From the government of Bengal, a collection of Geological specimens collected in the vicinity of the Hurriogan Nuddee, by J. W. Masters, Esq., Sub-Assistant, Golaghat, and forwarded by Colonel Jenkins.

5.—From the Hon'ble Court of Directors through the Government of Bengal, a copy of the Catalogue of the birds in the India House Museum.

6.—From the Government of Bengal, maps of the districts of Beerbhoom, Maldah, and Twenty-four Pergunnahs for the Musuem of Economic Geology.

7.—From the Royal University of Christiania, Norway, the latest publications of the University.

8.—From Mr. W. Elliot, M. C. S., copies of Sanscrit MSS.

\* Jábál, Brihadjábál, Rahasya, Kauisiki, Chetta, Sárira, Amrítábindu. Bráhma, Gárbha and Ithibása. noted in the margin\* obtained from the Library of the

Rájá of Tanjore.

Bábu Rájendralál Mittra observed that from a cursory inspection of these MSS. he believed them to be very rare and of considerable value.

The following gentlemen, duly proposed and seconded at the last meeting, were ballotted for and elected ordinary members.

Lieut. R. De Bourbel, Engineers.

Dr. Mouat, and

Lieut. Chancey, Madras Army.

Captain H. Yule, Engineers, was proposed for election by Lieut.-Col. W. E. Baker, seconded by Professor Oldham.

The Council submitted a report recommending that the Rev. J. Porter, of Damascus; Monsieur A. Von Kremer, of Alexandria; Dr. E. Smith, of Beyrout; J. Taylor, Esq., of Bussorah; M. M. H. and A. Schlagintweit, and Dr. Wilson, of Bombay, be elected corresponding members of the Society.

The election of Bábu Rájendralál Mittra as a member of the Council, reported at the last meeting, was confirmed under bye law 60.

Pursuant to notice given at the last meeting, Captain Thuillier moved "that a proposition be submitted to the Society at large, that the subscriptions of members of the Society be reduced from sixteen to ten Rs. per quarter."

Professor Oldham proposed the following amendment, "that it being the opinion of the present meeting, that the subscription of the members should be reduced, they request that the votes of the

non-Resident members may be collected on the proposition, and a special meeting summoned for its decision."

The amendment was put to the vote and lost.

A second amendment was proposed by Mr. Beaufort, "that the reduction be made experimentally for one year, and in regard to new members only, with a view to ascertain in what degree such reduction will attract members to the Society."

This amendment was also negatived.

The original motion, seconded by Lieutenant-Colonel Baker, was then put to the vote and carried.

Mr. R. Hamilton then moved, seconded by Mr. Atkinson, "that the second Wednesday in September be fixed for a special general meeting, for the purpose of finally deciding the question and be duly advertised accordingly."

Carried.

Communications were received—

1.—From Sir Proby T. Cautley, offering thanks for his election as an Honorary Member of the Society.

2.—From Bábu Rádá Náth Sikdár, forwarding copy of a Meteorological Register kept at the Surveyor General's Office, Calcutta, for the month of March last.

3.—From Mr. Assistant Secretary Oldfield, enclosing copy of a Meteorological Register kept at the office of the Secretary to the Government of the N. W. P., Agra, for the month of April last.

4.—From Lieut. R. Stewart, submitting a sketch of the Kooki Grammar and a Meteorological Register kept at Apaloo for the month of November last.

5.—From W. Grey, Esq., Secretary to the Government of Bengal, enclosing correspondence relating to the existence of iron ores in the Carribari Hills and at Dhubri in Assam.

The substance of this correspondence was contained in a letter read at the last meeting. The specimens forwarded to the Government were submitted to Dr. M. C. Macnamara for examination.

His report is as follows:—

"The iron is chiefly combined in the ore with sulphur, but some oxide of iron is also present. The quantities of metallic iron amount to only 17.3 per cent.

"The copper is also partly present as a sulphuret, partly as oxide? The proportion of metallic copper amounts to 70 per cent."

The Curator of the Museum of Economic Geology read a report.

The Librarian submitted his usual monthly report.

Mr. Oldham at the request of the President, described in detail the Geological structure of the Talcheer Coal field, in the tributary mehals of Cuttack, which had been examined during the past season by Messrs. Blanford and Theobald attached to the Geological Survey, illustrating his remarks by maps and sections of the field. The full details will shortly be published.

On the motion of the Chairman, the best thanks of the Society were voted to Mr. Oldham for his very interesting information.

#### *Report of the Curator, Museum of Economic Geology.*

*Geological and Mineralogical.*—We some time ago received from Captain Blagrave, a collection of rocks and minerals from the hills of Shahkol, Sanglee and Chemot (?) in Jhung, but I was, and have been since, prevented from taking them up by other researches then on hand. This I hope to do forthwith, but I mention them here that the donation may be on record, which it should have been earlier had I not proposed first to examine them before mentioning them and then passed them over for more urgent matters.

In the Rev. Mr. Hislop's collection from Nagpore, I have found a very fine specimen of the scarce mineral Condroidite, which is upon the table, as well as the museum specimen of it from New Jersey, U. S.

From Dr. Spilsbury we have received a specimen of Schorl in quartz from Choor Serai, North of Nagpore.

I have had to revise my second paper on the silt of the Hooghly announced at a former meeting, and in consequence of the farther views to which I have been led, to repeat several of the examinations, and to add some new ones, which has delayed it greatly: I now present it complete for the Journal.

*Economic Geology.*—We have received a series of copper ores from Dr. Campbell of Darjiling, who was in hopes that he had found blue copper (the azurite or blue carbonate of copper) amongst them, but this was merely a deceptive appearance, and the ores are the same unpromising sulphurets as before, in a very tough rock, and apparently not found in large masses. However this is but the surface indication, the produce of a shaft or gallery may be something widely differing.



I have been occupied for a considerable time since my last report with analyses of iron ores for Col. Drummond, of which the following are the tabulated results:—

|                                  | Water and Carbonic Acid. | Earthy matters. | Arsenic. | Carbonate lime. | Magnesia. | Iron peroxide. | Loss or excess. | Contains metallic iron. |
|----------------------------------|--------------------------|-----------------|----------|-----------------|-----------|----------------|-----------------|-------------------------|
| No. 1. Dechourie, . . . .        | 1.56                     | 19.10           | 5.70     | 0.50            | ..        | 68.65          | 4.49*           | 47.60                   |
| No. 2. Dechourie, . . . .        | 2 00                     | 22.40           | 0.91     | 2.60            | ..        | 73.50*         | 1.41            | 50.96                   |
| No. 3. Loha Bhurbur, ..          | 2.50                     | 20.00           | 7.91     | 1.90            | ..        | 75.05†         | 7.36†           | 52.00                   |
| W... ..                          | 2.75                     | 43.75           | 3.90     | 2.43            | ..        | 42.02          | 0.15            | 29.13                   |
| No. 4. Loha Bhurbur, C. A. . . . | 5.00                     |                 |          |                 |           |                |                 |                         |
| Native iron-slugs, . . . .       | ..                       | 40.25           | 3.65     | ..              | ..        | 60.13‡         | 4.03‡           | 46.42                   |
| No. 5. Turwagar, {               | W.. 5.40                 | 44.40           | ..       | 12.00           | ..        | 27.60          | 6.15§           |                         |
|                                  | C.A. 4.35                |                 |          |                 |           |                |                 |                         |

\* Excess from peroxidation.

† In No. 3 much specular iron and peroxidation of protoxide.

‡ Loss from water of combination with the earthy matters and ore.

§ Some excess from peroxidation.

We have received from Mr. Hodgson of Darjiling two bottles of water from the Minchu spring, near that station, and from A. Grote, Esq. C. S. some small bottles of mineral water from Sosoneah, North of Hazareebagh, and also a larger quantity of a mineral water from Kudjorah in Jessore. Of these three waters I have completed a preliminary examination which will form a paper for the Journal.

From Mr. Cowan of the Gas Light works, who called for some information about a yellow earth, of which a quantity was procured in the bazar, and which they find useful to mix with the English fire-clay for their retort furnaces, I have obtained a specimen of the Boghead Cannel coal of Linlithgowshire, which is a great acquisition to the coal collections. In sending it, that gentleman writes:—

“I have left you as promised a sample of the Boghead Cannel coal found in Linlithgowshire. I have now had a fair trial of the Bengal coal for gas-making and find it very good indeed.”

I have received from Major Ramsay a specimen of a supposed coal shale from the Nepal Terraie, close to the plains, at a place called Hetounda, where the mineral, it is said, abounds. It was discovered by a brother of H. H. Jung Bahadoor, and the minister was desirous of having an opinion upon it.

Though a surface specimen, and a good deal mixed with a promising kind of sandstone in layers and nests, it proves to be a very fine bituminous Lignite, giving on analysis—

|                       |        |
|-----------------------|--------|
| Gaseous matter, ..... | 35.50  |
| Carbon, .....         | 50.25  |
| Ash (reddish),, ..... | 14.25  |
|                       | <hr/>  |
|                       | 100.00 |

which are nearly the average constituents of the common Burdwan coal, so that it is thus a very good fuel; and if good workable beds or veins of it are found, and water carriage is within reach, no doubt it may prove highly advantageous to the river steamers at Dinapore and higher up.

Babu Rammanath Bannerjee has handed to me a specimen of coal and four of sandstones. The coal is found very near to the surface, at Darjeeka, seven miles to the N. West of Ranneegunge. It is of an excellent quality being quite equal to the average of the good Ranneegunge and Chinakuri sorts.

|                                |        |
|--------------------------------|--------|
| Its specific gravity is, ..... | 1.32   |
| Its contents in 100 parts are, |        |
| Water, .....                   | 2.90   |
| Gaseous matter, .....          | 31.85  |
| Carbon, .....                  | 54.85  |
| Ash, .....                     | 10.40  |
|                                | <hr/>  |
|                                | 100.00 |

Of the four sandstones three are quite worthless, but the fourth is a tough compact brown sandstone with a calcareous cement, splitting in layers thin enough to be used for roofing, like slates.

To Dr. Spilsbury we are indebted for the following valuable specimens:

Hematite iron ore with manganese from Ponhoga, near Jubbulpore.

Manganese ore from Ramtek Nagpore.

Quartz rock with gold from Australia.

Massive gold from Australia.

Gold in ferruginous clay from Frederick's valley near Summerhill, Australia.

Massive gold with matrix from California.

From Captain Saxton of the Cuttack Survey we have received a specimen of the washed sand from the gold washings of the Bráhminee and some of the gold sand. I do not find the washed sand to contain any thing worth notice, and the auriferous sand is in too small a quantity to afford a portion for analysis.

Dr. McGowan of Ningpo has sent us from that country, with some other specimens, which I shall advert to in a future report, a small bit of alum stone from the Sung-Yang hills bordering on Foh Kien, together with a newspaper extract describing some of the uses of alum in China, and the works from whence this his specimen is obtained. The extract is as follows :—

*“Alum.*—About eleven hundred tons of Alum have been exported within a short period, chiefly to India. This mineral is largely employed by the Chinese in dying, and to some extent in paper-making as with us. Surgeons apply it variously after depriving it of its water of crystalization, and in domestic life it is used for precipitating vegetable substances suspended in potable water. It is used also by the Chinese in a manner peculiar to themselves. Fishermen are usually provided with it, and when they take one of those huge Rhizostoma which abound on the coast they rub the animal with the pulverized styptic to give a degree of coherence to the gelatinous mass. Architects employ it as a cement in those airy bridges which span the water-courses. It is poured in a molten state into the interstices of stones, and in structures not exposed to constant moisture the cohesion is perfect, but in damp situations it becomes a hydrate and crumbles, a fact of which the whole empire was officially informed by the government about thirty years ago. It was discovered that water had percolated into the mausoleum of Kiaking, having been built too near to the mountain side, the alum cement imbibed moisture, segregated and opened the way for to enter the tomb. In those peaceful days such an event was of such importance as to call forth edicts and rescripts, memorials and reports in succession for several months. The son-in-law of the deceased monarch to whose care the construction of the edifice had been entrusted was fined and degraded, and a statesman from Fohkien acquainted with the properties of alum was appointed to remove it a short distance from the mountain.

“Alum was first introduced into China from the West, and until a comparatively recent period the best kind called sometimes Persian, and at others Roman Alum was brought from Western Asia. Numerous localities where an inferior article is manufactured are mentioned in the Pharmacopœa—*viz.*, Shan-tung, Shan-se, Kiang-su, Hukwang, Sz'-chuen, also in the South-western frontier and in Tibet. That from Sz'-chuen is represented as having the property of converting iron into copper or of coating iron with copper, by placing the former metal in a solution of rice-liquor and alum, the stone of that province. The most recent editions of works on materia medica contain no reference to the mines in this province, the products of which have surpassed in quality the foreign, and rendered

its importation unnecessary. From this and from other circumstances it is certain that the works which we shall now describe have not been long in operation. They are in the Sung-yang hills bordering on Foh-kien in the district of Ping-yang, Wan-chau prefecture, and in close proximity to Peh-kwan harbor ( $27^{\circ} 9' 10''$  N.,  $120^{\circ} 32' 6''$  E.)

“The locality has been visited by one foreigner only, to whom we are indebted for most of the following particulars. About two months ago he started from Chih-k'i bight in Lannai harbor to which Ningpo boats resort for this commodity to the Northward of Peh-kwan. Three hours' hard walking over a succession of precipitous hills crossed by stone steps and pathways brought him to the mines. Ten Alum-making establishments were in operation, which, with the exception of one on a hill opposite, occupied about a mile of the side of a lofty hill. The works were adjacent to the quarries from which the Alum-stone seemed to crop out of decomposed rock of the same lithological character. The stones were thrown into a fire of brushwood where they burnt with a slight lambent flame and as they cracked, the fragments were raked out broken into small pieces, and macerated in vats. Subsequently the disintegrated mineral was thrown with water into a vessel having an iron bottom and sides of wood and boiled for a short time. The lixivium was then poured into large reservoirs where it crystallized into a solid mass. Blocks of alum weighing about fifty catties each were hewn out of the reservoir and carried in this state in bamboo frames, one on each end of a porter's pole to the place of shipment, where it is broken into fragments. When not designed for immediate exportation, the blocks are stored away for drying. On reaching the depôt the alum is found charged with a double quantity of moisture, the porters being obliged to deliver a certain weight, they slip their burdens in the mountain streams which they pass in the journey. Judging from the number of labourers engaged in transporting the mineral on the day of our informant's visit, the quantity brought from the works could not be less than eighteen tons. This was represented as less than an average day's work, as labour was in such demand just then for agricultural purposes that double pay was given;—and aged men, and women, with boys and girls were pressed into the service. Assuming that day's product as a basis for calculation and making an allowance for rainy days, we may safely estimate the annual supply as between five and six thousand tons. The quantity consumed by the dyers of Ningpo prefecture alone, being nearly twenty-two tons per annum, is corroborative of this estimate. The supply is literally inexhaustible. Five dollars-and-a-quarter a ton at the landing would afford the manu-



facturer a fair profit. It often fetches much more, as there has been an increasing demand for the article owing to the greater facilities afforded for exportation from Ningpo in foreign vessels.

"The Wan-chau Alum is equal to the best Roman,—a roseate tint in some specimens indicates the presence of minute quantities of iron.

"We have no means of ascertaining the precise geological position of the rock from which this alum is procured; some circumstances seem to indicate it to be a new mineral. It is stated that no potash nor any other material is employed in the works. Granitic and porphyritic rocks abound in the vicinity, and some parts of the district produce iron and silver. According to the Wan-chau Topography, the working of silver was discontinued in the reign of Wan-lih (1615) in consequence of imperial prohibition. This part of the coast has recently become the seat of extensive poppy cultivation for the bane of the Chinese race.

"As a contribution to the physical description of the alum district, we would add that the typhoon of September last was preceded by a rising of water in wells and ponds many miles inland. When the cyclone reached the coast it submerged about a hundred square miles, occasioning a vast destruction of life and property. The waters of the sea were retained in the country by strong Easterly winds for several days leaving a strip of land bordering on the sea quite dry."—*North China Herald*, 23rd January, 1856."

The rock, for it is one, and not a mineral, is a grey felspar porphyry with minute brilliant white specks, which may be arsenical pyrites, silvery mica or sulphuret of Nickel, but I was unable to sacrifice enough of the rock to ascertain what it was. When polished it shews a very pretty surface, and a small portion pulverised and calcined and then boiled gave sulphuric acid and alumina to the usual tests, so that it is probably an alum porphyry, i. e. a porphyry containing Alunite.

H. PIDDINGTON.

#### LIBRARY.

The Library has received the following accessions during the month of May last.

#### *Presented.*

Oeuvres Complètes De N. H. Abel, Mathématicien, Avec des Notes et Développement, Rédigées par ordre du Roi par B. Holmboe, *Christiania*, 1839, 2 vols. bound in one, 4to.—BY THE ROYAL UNIVERSITY OF CHRISTIANIA, NORWAY.

Recherches Cliniques sur La Syphilisation, par Dr. Wilhelm Böeck, pamphlet.—BY THE SAME.

Christian Den Fjerdens Norske Lovbog af. 1604, Efter Foranstaltning af.

det Akademiske Kollegium ved det Kongelige Norske Frederiks Universitet af. Fr. Hallager og Fr. Brandt. 1855, 8vo.—BY THE SAME.

Universitatis Regiæ Fredericiæ, Novæ Ædes.—BY THE SAME.

Beretning om Bødsfængflets Perklomhed.—BY THE SAME.

Om Dodeligheden i Rorge Bidrag til Kundskab om Folkets Karr af. Gilbert Sundt, Christiania, 1855, 12mo.—BY THE SAME.

Midlertidigt Reglement for Gaustad Sindssyge Asyl. 1855, 8vo.—BY THE SAME.

Det Kongelige Rørste Frederits Universitets, Aarsberetning for 1853, pamphlet.—BY THE SAME.

Das Christiania-Silurbecken, Chemisch-geognostisch. untersucht, von. Theodor Kjerulf, 1855, qto. pamphlet.—BY THE SAME.

De prisca re monetaria Norvegiæ et de Numis Aliquot et ornamentis, in Norvegia Repertis, by C. A. Holmboe, *Christiana*, 1854, 8vo. pamphlet.—BY THE SAME.

Nyt Magazin for Naturvidenskaberne, udgives af. den physiographiske Forening i Christiania ved Chr. Langberg, 1854. vol. VIII. Parts 3 and 4, 8vo.—BY THE SAME.

Recueil d' Observations sur les Maladies de la Peau par W. Böeck et D. C. Danielssen, *Christiana*, 1855.—BY THE SAME.

Catalogue of the Birds in the Museum of the East India Company, Vol. I. 8vo.—BY THE HON'BLE COURT OF DIRECTORS.

Appendix to the Report on the Government Central Museum of Madras.—BY THE GOVERNMENT OF BENGAL.

Report of the Director of the Public Instruction on the Lower Provinces for 2nd and 3rd quarter of 1855-56, i. e. from Nov. 1855 to 31st Jan. 1856, 2 copies, pamphlets.—BY GORDON YOUNG, ESQ. DIRECTOR OF PUBLIC INSTRUCTION.

The Qorän ; with the Commentary of the Imam Abou Al-qasim Mahmood Bin 'Omar Al-zamakhshari, entitled "The Kashshaf'an Haqaiq Al-tanzil," 4to. Calcutta, 1856 —BY LIEUT. W. N. LEES.

Selections from the Records of the Government of India, No. XI.—BY THE GOVERNMENT OF INDIA.

Bydhorbo Dhurmoodhoy, pamphlet, 8vo.—BY BABU RA'MA'NA'TH GOSAIN.

The Oriental Baptist for May, 1856.—BY THE EDITOR.

The Calcutta Christian Observer for May, 1856.—BY THE EDITORS.

Upadeshak for May, 1856,—BY THE EDITOR.

The Indian Annals of Medical Science, No. VI. April, 1856. 8vo.

*Exchanged.*

The Calcutta Review, No. LI. for March, 1856.

June 1st, 1856.

GOUR DOSS BYSA'CK, *Asst. Secy. and Librn.*

FOR JULY, 1856.

At a monthly general Meeting of the Society held on the 2d instant, at the usual hour.

Dr. G. G. Spilsbury, Vice-President in the Chair.

The proceedings of the last meeting were read and confirmed.

*Presentations were received—*

From Colonel G. B. Tremenhoe through Messrs. Allen, Deffell and Co., a box of minerals and specimens illustrating the different stages of metallurgical processes, particularly of the manufacture of Iron, for the department of Economic Geology.

2.—From Mr. H. Piddington, a silver coin obtained from Mr. Downward at Sreecond.

Bábu Rájendraál Mittra stated the coin was a good specimen of a well known type. It belonged to the reign of Jeenu, who obtained the sovereignty of Bengal in the year of Hejira 795, and died in 812. It bore no date, but the title of the king—Mahammad Shah, which he assumed on his conversion to Islam—was perfectly distinct. The weight of the coin was 163 grains, and its diameter 12-10ths. The barred lines both on the obverse and the reverse were alike, and included the Mahammedan creed "*La Ilaha illil la, &c.*"

3.—From the Bavarian Academy of sciences, the latest publications of the Academy.

4.—From Dr. Cheek of Benares through Mr. Blyth, a Santhal sword, battle-axe, and bow and arrows.

5.—From Mr. C. Hollings, Gya, through Mr. Grote, the skeleton of a Dingo—the so-called wild dog of Australia.

6.—From Mr. Grote, C. S. the superb Meteorite from Soogoulee which was exhibited at the meeting in February last by that gentleman.

Captain H. Yule, Engrs., proposed and seconded at the last meeting was balloted for and elected a member.

On the recommendation of the Council the following gentlemen proposed at the last meeting were balloted for and elected corresponding members of the Society:—Rev. J. Porter of Damascus, Mons. A. Von Kremer, of Alexandria, Dr. E. Smith of Beyrout,

Mons. H. Schlagintweit, Mons. A. Schlagintweit, Dr. Wilson of Bombay and J. Taylor, Esq., of Bussorah.

The following gentlemen were named for ballot at the next meeting :—

A. Roberts, Esq., C. S. and

Major W. C. Erskine, proposed by Mr. J. G. Meddlecott and seconded by Mr. T. Oldham.

Raja Suttoshurn Ghosal Bahadoor, proposed by Bábu Rámgopaul Ghose and seconded by Dr. Spilsbury.

*Communications were received—*

1.—From the Governor General in Council, through G. F. Edmonstone, Esq., Secretary to the Government of India, a narrative of the Travels in Central Asia of Syud Khwajah Ahmud who was despatched by the late Colonel Mackeson in October, 1852, in search of Lieutenant Wyburd.

Dr. Thompson read portions of the narrative, and remarked that this paper having been made over to him for report, he had much pleasure in directing attention to the many points of interest which it presented. The traveller had passed through those unknown districts of Central Asia to which the eyes of Geographers are turned with great interest, but from which Europeans are excluded by the jealous policy of the Chinese. Leaving Le in the winter of 1852-3 he proceeded to Yarkund, sent one of his party to Khoten and Aksoo, and proceeded himself to Kashgur and thence to Kokan, Samarkund and Bokhara, from which place he returned viâ Cabul to Peshawur without having obtained other than negative information regarding the object of his mission.

He gives many interesting details regarding Khoten, Aksoo, Yarkund and Kashgur, the general aspect of the country and the population and the nature of the authority exercised by the Chinese.

Dr. Thompson further remarked that the publication of the present report would doubtless direct the attention of Geographers to this interesting journey, so as to obtain from the traveller information regarding many points of great geographical interest which are not alluded to in it, but with which he must be well acquainted.

2.—From Bábu Rádhá Náth Sikdár, forwarding copy of a Meteor-



ological register kept at the Surveyor General's Office, Calcutta, for the month of April last.

3.—From Mr. E. A. Samuells B. C. S. notes on a Forest race, called Pattooa or Juanger, inhabiting certain of the tributary Mehals of Cuttack.

The Librarian submitted his usual monthly report.

#### LIBRARY.

The Library has received the following additions during the month of June.

#### *Presented.*

Abhandlungen der Mathemath-Physikalischen Classe der koeniglich Bayerischen Akademie der Wissenschaften, *München*, 1851, 4to. 6th vol. 2nd and 3rd parts, and 7th vol. part I.—BY THE ACADEMY.

—— der Philosoph-Philologischen Classe der königlich Bayerischen Akademie der Wissenschaften, *München*, 1853, 4to. 6th vol. parts 3rd and 7th vol. part I.—BY THE SAME.

—— der Historischen Classe der ditto ditto, 1852, 4to. 6th vol. part 3rd.—BY THE SAME.

Architektonische Zeichnungen als Beilage zu den zwei Abhandlungen über das Erechtheum in B. V. 3 u. VI. I. der Abh. der I Classe d. k. b. Ak. d. Wiss. von E. Mezger, 4to.—BY THE SAME.

Gelehrte Anzeigen, *München*, vols. 33, 34 and 35, July to December, 1851, and Jany. to Decr. 1852.—BY THE SAME.

Afrika vor den Entdeckungen der Portugiesen von F. Kunstmann, *München*, 1853.—BY THE SAME.

Bulletin of the Royal Academy of Sciences, *München*, Nos. 34 to 43 for 1851—Nos. 1 to 29 for 1852 and Nos. 1 to 25 for 1853.—BY THE SAME.

Zeitschrift der Deutschen morgenländischen Gesellschaft, zehnter Band I. und II. heft, 8vo. Leipzig, 1856.

Ueber den Chemismus der Vegetation, von Dr. A. Vogel, Jr. *München*, 1852, pamphlet, 4to.—BY THE SAME.

Verzeichniss von Abhandlungen und Selbständigen Schriften aus dem Gebiete der Sprachforschung, erschienen in Ferd. D. Verlagsbuchhandlung, Jany. 1856.—BY THE SAME.

Die Gegenwartige Aufgabe der Philosophie, Von Dr. Prantl, 1852, pamphlet.—BY THE SAME.

Natuurkundig Tijdschrift voor Nederlandsch Indie, Deel X. 8vo. Batavia.—BY THE EDITORS.

Reports of the Juries of the Madras Exhibition, 1855, pamphlet.—BY THE GOVERNMENT OF BENGAL.

General Report on Public Instruction in the Lower Provinces of the Bengal Presidency from 27th January to 3rd April, 1855.—BY THE SAME.

Report of the Administration of the Salt Department of the Revenue of Bengal, for the year 1854-55.—BY THE SAME.

Selections from the Records of Government, N. W. P. Part XXV. 1856.—BY THE AGRA GOVERNMENT.

Half-yearly Report of the Committee of the Bengal Chamber of Commerce, 1st May, 1856.—BY THE CHAMBER OF COMMERCE.

The Oriental Christian Spectator for May, 1856.—BY THE EDITOR.

The Oriental Baptist for June, 1856.—BY THE EDITOR.

The Calcutta Christian Observer for June, 1856.—BY THE EDITORS.

Upadeshak for June, 1856.—BY THE EDITORS.

Tuttwabodhini Pátrica.—BY THE TUTTWABODHINI SOBHA'.

The Citizen Newspaper.—BY THE EDITOR.

The Durbin ditto.—BY THE SAME.

*Exchanged.*

The Calcutta Review, No. LII. for June, 1856.

The Athenæum for March, 1855.

The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science, No. 72, for April, 1856.

The Journal of Indian Archipelago and Eastern Asia, from April to September, 1855, Vol. IX. Nos. 4 to 9, 2 copies.

*Purchased.*

The American Journal of Science and Arts, No. 62, March, 1856.

Comptes Rendus, Nos. 10 and 11, for 10th and 17th March, 1856.

The Westminster Review, No. XVIII. April, 1856.

Revue des Deux Mondes, 1st April, 1856.

Annales des Sciences Naturelles, No. 3, Tome IV.

Journal des Savants, for March, 1856.

Revue et Magasin de Zoologie, No. 2, of 1856.



JOURNAL  
OF THE  
ASIATIC SOCIETY.

No. V. 1856.

*On the origin of writing down historical records among the  
Musalmans.—By Dr. A. SPRENGER.*

(Concluded from page 329.)

There is reason to believe that there existed Arabic books, more particularly on religious subjects at and previous to the time of Mohámmad.

All the most powerful tribes of Arabia had embraced Christianity, as the Ghassánites, whose chief was king of Petra, the Lakhmites whose representative was king of Hyrah, the Taghlibes, the Taym allát and most of the Arabs who were settled in towns and villages in Najrán and other districts of Yaman.

Only the wild sons of the Najd and of the depth of the desert resisted the progress of civilization. Yet even among them we find Christian priests and hermits, and numerous converts. The chief of the *Tay* tribe—the celebrated *Hátim Tayy*—was a Christian and he lived in the very heart of the Najd. Barrád, whom I mentioned above, was equally a Christian, and we find Christians—apparently missionaries—preaching in the fair of 'Okátz, we find Christian chapels in Yamámah and Baḥrayn, (among the 'Abd Qays) and we find professors of Christianity at Makkah and Madynah.

We have the most positive evidence that there was a religious literature, though probably very limited, among these Christian congregations. When Khálid conquered *Hyrah* he found young men



immured in monasteries, occupied in multiplying the scriptures. He, like a practical man, gave them wives and made soldiers of them.

Waraqah, the uncle of Mohammad's first wife copied part of the scriptures and Khadyjah herself had read them. From para. 24, we learn that 'Omar transcribed a religious work. I mentioned in a former article, p. 146 *suprà*, that there seems to be internal evidence that the book of Enoch was translated into Arabic before the time of Mohammad.

It seems there existed profane books as well as religious ones among the Arabs. In the Kashsháf the story of Isfendyár in an Arabic garb is mentioned. There is also reason to suppose that the Jews had Arabic books written in the Hebrew character.

From page 218 *suprà*, it appears that books—no doubt such as had existed a long time previously among Arabic Christians and Jews—spread among the Moslems, but 'Omar put them down with a strong hand.

In order farther to illustrate this subject, I have to say a few words on the Book of Daniel, which is mentioned in paras. 24 and 29 *suprà*.

The book of Daniel which is sometimes met with, and frequently quoted, treats on Oneirocritics and is inscribed *في اصول التعبير*. But we have no evidence that this work existed at the time of Mohammad, and it is probable that it is not the one alluded to in paras. 24 and 29.

The book of Daniel which was extant in those early ages contained prophecies and also an apocryphical history, and was known to 'Abd Allah b. Sallám. This man as it has been stated in p. 213 of this volume was a friend of Mohammad, and died thirty-three years after him. He had a good knowledge of the scripture and also of several apocrypha. Among the latter was a work which is called in Hebrew *עילם חשין* in Syriac *جفت عيلم* and in Greek *chronicon*, and it contained an account of the festivals *اعیاد* and a great deal of historical information *وهو كتاب قد جمعت فيه تواريخ واخبار من اخبار الامم والافات كثيرة*. Of this work Ibn Monajjim has preserved numerous extracts.

'Abd Allah b. Sallám it seems recast the book of Daniel. D'Herbelot (under Daniel, again under Odhmah and Abdalla), says:

Abdalla est aussi auteur d'*Odhmat* (?) *almanqûl'an Daniâl alnabi*, qui est un ouvrage tiré d' un livre Apocryphe du prophète Daniel, dans lequel les livres d' Adam sont cités sur l' histoire de la création du monde. Cet ouvrage de Ben Salam se trouve dans la Bibl. du Roy, n. 410.

Next we find an account of the book of Daniel in Leutprand, who in A. D. 968 went as ambassador of the emperor Otto to Nicephorus at Constantinople. He says (*apud* Fabricium, Cod. Apoc. Vet. Test. I. p. 1136): Sed cur Imp. Nicephorus Phocas exercitum nunc in Assyrios duxerit quæso advertite. Habent Græci et Saraceni libros quos *ὄρασεις*, sive visiones Danielis vocant, ego autem Sybyllinos, in quibus scriptum reperitur, quot annos Imperator quisque vivat, quæ sunt futura eo imperante tempora, pax aut similitas, secundæ Saracenorum res aut adversæ. Legitur itaquam, hujus Nicephori temporibus, Assyrios Græcis non posse resistere, huncque septennio tantum vivere.

It appears that on the strength of this prophecy the enlightened monarch went to war.

Zonaras mentions that the Khalif Mo'awiyah, captured the book of Daniel, which along with the scripture had been translated, by order of Ptolemy from Hebrew into Greek, and had it translated into Arabic. Later in A. D. 1145 it was re-translated from Arabic into Greek by Alexius Byzantius, a prisoner of war, who knew well Greek and Arabic. This seems to be another book than the prophecies of which we are speaking, because of the prophecies there existed an Arabic version before Mo'awiyah, and the Greek emperor was guided by them two hundred years before Alexius. Zonaras probably means the work on the explanation of dreams.

It would be important to know from what language the prophecies of Daniel were translated into Arabic. It is most probable that they were translated from the Syriac. In the Imperial library of Vienna (see Lambecius, Lib. I. p. 171) exists in Syriac a "Prognosticon singulorum annorum" ascribed to Daniel. It would be of great importance to know whether its contents coincide with the *Odhmat* of 'Abd Allah b. Sallâm, and it is to be hoped that the great Syriac scholar, J. Kœrle, will give to the public a notice of the former and the learned and energetic De Fréméry of the latter work. The

dialect in which the Arabic text is written, and the style of the book might throw light on the literary history of that period.

As a farther contribution towards the literary history of the time of Mohamammad, I add here two passages on the *Çohof* Ibráhym or Rolls of Abraham, which are referred to in the Qorân, as books which were well known to the Arabs.

Ibn Monajjim who wrote in A. H. 131, says in p. 28 of his history, after enumerating the canonical works of the Bible, that the Jews have some books which are not recognized by the Christians, and the first of these books which he mentions is كتاب الاشمعت وهو صحف ابراهيم وموسى صلى الله عليهما وهو كتاب يجمع الاخبار من ادم الى موسى على طريق التنزيل والامر والنهي. "The book al-Ashma'at. This is the 'Rolls of Abraham and Moses.' It is a work which contains the history from Adam to Moses in the form of divine revelations, commands and prohibitions."

In page 52 he says: هذا قول المجوس في كيمرث وولده وملكهم واما ما وجد في كتب اهل الكتاب مثل شمعتا (sic) وهو كتاب في ايدي اليهود دون النصراني يسمى بصحف ابراهيم وموسى وفيه ما انزل على ادم وشيث وادريس و ابراهيم وموسى من الصحف فان ذلك جمع موسى

"This is the account which the Magi give of their first king, Kayumarth, and his descendants and their reigns. The account which those who believe in the Bible give of him in their books [follows below]. Such books are the Shama'atá. This is a work which is recognized by the Jews but not by the Christians. It is called the Rolls (or Volumes) of Ibrahym and Moses, and it consists of those Rolls (or Volumes) which have been sent down from heaven to Adam, Seth, Enoch, Abraham and Moses, and have been collected by the last named prophet."

Shama'atá, I believe is a mistake in this passage for Ashma'at, because according to a statement in p. 28 Shama'atá is the name of a collection of traditions of the Rabbins.

There is an Arabic work in my possession which bears the title of صحف ابراهيم وموسى, but it is evidently not the same which is mentioned by Ibn Monajjim.

So much on books and writing among the Christian Arabs at and before the time of the prophet. We will now turn our attention to his followers.

That writing was but little employed among the early Moslims for preserving records, is best shown by the specimens which are enumerated above in paras. 44-47, and also by the sayings of Mo-hammad recorded in paras. 37-42. It is, however, not to be supposed that the author should have possessed information of all the writings which then existed.

With 'Omar's conquests of Syria, Egypt and Persia, begins a new period in Mo-hammadan history. The Arab residing in the palaces of Damascus and Ctesiphon would soon be quite a different man from him who lived in a tent in the desert, or in a hovel at Makkah or Madynah.

The Khalif 'Omar, the great Representative of the barbarians of Arabia, the founder of Musalman empire, and the destroyer of the Alexandrian library, forcibly resisted the growth of a written literature. This fact is certain. He says in para. 24, that he had applied himself during the life-time of Mo-hammad to copying a book of the Jews or Christians, and was, as it might be expected, reprimanded for it. This statement which would imply that ever since he came to the Khalifat, he had an objection to writing, stands in contradiction with what is stated in paras. 23 and 26, where he says that he himself intended to collect the records of the sayings and actions of the prophet in writing. Yet both *had*ythes are undoubtedly genuine. Para. 23 gives us altogether the impression that his contemporaries were wishing to prepare a written code and written records, but that he was opposed to it, and with a view of the more completely putting down their effort, he professed to be of the same mind but anxious first to consult the will of God.

It was the policy of 'Omar to separate the Arabs from all other nations, and by preserving their savage bravery and keeping up their religious fanaticism to make them the rulers of the world. Writing and erudition did not suit his purpose. Not only because, as the poet says of such a tendency, *emolit mores nec sinit esse feros*, but also because he wished that the Arabic method of preserving their doctrines should be different from that of the Jews and Christians "who have been led into errors by their books." We find that the Moslims from the earliest times were most anxious to have institutions of their own, as is exemplified in the debate between



Mohammad and his friends on the best method of calling the faithful to prayers, also in the choice of their sabbath and in other practices.

Most of the older companions of Mohammad were either entirely illiterate or had no great taste for writing books, and even most of those who were learned in law and religion, followed the views of 'Omar and condemned writing. In proportion as the Moslims felt that they were the lords of the Jews and Christians, they affected to despise their institutions and took pride in keeping up their own.

Some of them only condemned the practice of preserving and propagating knowledge by writing, whilst others went a step further and even disdained to take notes for assisting memory.

There were nevertheless some men even among the theologists and traditionists, who from the earliest time wrote down the information which they wished to preserve. The most important among these are 'Abd Allah b. 'Amr, Anas b. Málík and Ibn Abbás, who were companions of the prophet, and preserved more records of him than any one else. The *hadythes* of 'Abd Allah and Ibn 'Abbas were preserved by their families in writing; regarding the latter, para. 89 is particularly important. (See besides the preceding passages, also p. 212 *suprà*).

From several of the preceding paras. it appears that at the court of the Omayyides, *hadythes* were taken down and though in some instances they were again expunged at the desire of the informants, it is to be supposed, to judge from these very instances (which alone excited interest, because they were extraordinary), that in most cases they were preserved. The Omayyides also attended to the introduction of other sciences into the Arabic language. It is said in the *Fihrist* اصطفي القديم ونقل لخالد بن يزيد بن معاوية Khálid, died in A. H. 82, and we may therefore suppose that these translations were made about the middle of the first century.

Soon after the middle of the first century—say about A. H. 60, when the older companions had died away, and men who had been brought up in large and flourishing towns took their place, the question—whether it was lawful to write down *hadythes* was much agitated, and it appears that the *hadythes* recorded in paras. 1 to 4 and 37

to 42 were then first collected, (and some of them perhaps invented). Opinions were divided on the subject, but it seems that about A. H. 70, the views of those who were against writing, got the upper hand.\* But the necessity of having written records was more and more felt, and it appears that several men (among them 'Orwah who died about A. H. 90,) repented towards the end of their days of having destroyed their writings, and whilst some of the traditionists continued even during the second century to resist the progress of a written literature, others—and among them the Khalif 'Omar b. 'Abd al'Azyz—made great efforts to preserve *hadythes* in books. In the third century the question whether it was lawful to take *hadythes* to paper was purely theoretical. Writing was so common that whatever evidence there might have been of its not being lawful, nothing could have put it down. The unfortunate system, however, of giving the *Isnáds* instead of referring to books, and of considering every *hadyth* as a whole, continued and did much mischief and causes great confusion, as I have shown in former articles.

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*Entomological Papers—being descriptions of new Ceylon Coleoptera with such observations on their habits as appear in any way interesting.—By JOHN NIETNER, Colombo, Ceylon.*

Introductory Note—on the publication of new species under disadvantages such as describing entomologists necessarily labour under, in countries remote from the European centres of science.

I little doubt that the following descriptions of new Coleoptera will meet with anything but approbation from the entomological world at home. As, however, in spite of this anticipation of an ungracious reception I shall hardly desist from my purpose of publishing such descriptions hereafter, I may as well try to vindicate this measure by setting forth the reasons which induce me to consider

\* They may have been actuated by the spirit of 'Omar and by conscientious motives but from para. 8 and also partly from para. 12 we see that these old men who had seen the prophet were partly influenced by a childish desire to have the monopoly of information regarding him. Childish objects of this description are conspicuous throughout all the sciences of *hadyth*.

the difficulties which beset the path of the entomological author in this country as not insurmountable.

The objections raised against me will be these: considering the state the entomological literature is still in, that is to say, considering that it has not, generally speaking, been condensed into a certain limited and obtainable number of volumes as is the case in the higher branches of Zoology and Botany, that on the contrary the bulk of it consists of fragments which float without order in the misty and unfathomable ocean of scientific journals—it is next to impossible that an individual entomologist abroad should surround himself with this shapeless mass of learning and keep himself by this or other means so well informed of the details of the actual progress of the science as not to be exposed to mistakes of one kind or another, but more especially to creating synonymy in attempting to work independently. It will further be said against me that not having the facilities and the wholesome checks which arise from the diligent use of extensive and well named collections, not even having the gratification of a brother entomologist's views and opinions on doubtful cases, it will be impossible even to determine whether an insect be new or not; and from these reasons (the résumé will be) entomologists abroad should confine themselves to collecting and observing the habits of the objects of their attention, but they should never go to print with matters on which it is an impossibility for the ablest among them to be quite competent. These arguments are unfortunately too true, but still I think admit of being mitigated sufficiently to lead us to final conclusions less disheartening than the above.

First of all every entomologist gives the preference to a certain order of insects—say Coleoptera—and in this even, in almost all cases, to one or two particular families. In studying for the publication of new species under the disadvantages just mentioned, he will confine himself to this order or perhaps family. Now, although as objected above, the information existing on this particular branch is for the most part fragmentary, still there are certain families on which it has received a tangible shape from having been condensed by able hands: Burmeister's *Lamellicornia*, Dejean's *Carobidæ*, Erichson's *Staphylinidæ*, Schoenherr's *Curculionidæ*, Boheman's *Cassidæ*, Westwood's



Paussidæ, etc. as well as the latter author's general work on the families, and Lacordaire's on the genera, Coleopterorum, diligently consulted, go as guides a long way, and should, although some of them have by the rapid progress of the science grown rather antiquated, guard against a number of mistakes of a systematic nature.—As to whether a beetle be new or not, I admit that in forming an opinion on this question the entomologist situated as above will have quite as much to be guided by a certain tact (not clearly definable but understood by scientific men) as by anything else, and I am forced to concede that under any circumstances almost it is totally impossible to arrive at an *indisputable certainty* either the one way or the other. This, however, by no means excludes the possibility of his forming an opinion with so much precision as to enable him to pronounce on the matter with a very *high degree of confidence and all probability* in his favour. In attempting to come to a decision on this difficult point he will receive a first superficial idea from careful reflection on certain accidental circumstances such as size, scarcity, or other peculiarities of the insect in question. This idea, which ever way it may incline, will then either gain or lose in strength by diligent reference to his library, until at length, with a certain amount of tact and judgment, he will arrive at a result, which under such circumstances must carry much weight with it. I shall illustrate this case by an example: If for instance after collecting five years in Ceylon generally and in the Colombo District more especially, I find at the latter place an insect—say the *Chlænium 5 maculatus* described below—for the first time—am I not entitled to consider it as very scarce? If, on consulting my library, I discover nothing which can possibly refer to it (finding that not a single *Chlænium* is marked as occurring in Ceylon), are not the chances greatly in favour of its being an undescribed species? If again I collect beetles as small and inconspicuous as the *Trichopteryx* described below, and consider at the same time that, although they are in certain localities of common occurrence, no professional Coleopterologist has ever collected before me in this Island; if moreover again my library offers nothing that could possibly refer to them individually (there being hardly an Asiatic species mentioned),—am I not under these circumstances justified in consider-



ing them as undescribed? Decidedly I am. Circumstances like these would indeed be altogether conclusive, if there was not a chance of the beetle's occurring in some neighbouring country and its having thence found its way into the normal collections of Europe. The possibility of such being the case enhances the difficulties of the case of course very materially, but I do not see why they should not, to a certain degree, be overcome by the same or similar means as those cited for overcoming them in one particular country.

I think I have said enough to show that the disadvantages the entomologist encounters here, or in other places similarly situated, in *conscientiously* attempting to publish new species, may (his principal assistance being perseverance, a good library and tact—entomological instinct I am almost tempted to call it) be overcome—I am far from saying *entirely*—but so far as not to expose him, from *want* of resources in the execution of his plan, to *more mistakes* than entomologists expose themselves to under more favourable circumstances by *neglecting them*.—But I am not satisfied with obtaining the simple grant of permission to describe on the spot a part of what he collects—I claim more for the entomologist abroad: I wish to show that he should naturally be expected—nay desired—to do so, for although he labours under distressing disadvantages in some respects, he happily enjoys a proportionate share of advantages in others.—It is unsatisfactory in the extreme for an enthusiastic entomologist to be obliged to let his collections go out of his own hands, and see others reap the honours from them, which are to be reaped on such occasions, or perhaps see as it were a gulf close over them, hear no more of them, and find himself forgotten. For what is a mere collector? Let him display as much industry as possible, he is hardly looked upon as an entomologist, certainly, as long as he is prevented from publishing anything, not as a scientific one. Now, if such a man merely desists from publishing the fruits of his researches from want of resources to assist him to go creditably through such a task, if he suffers his collections to go out of his hands, because he is too true a lover of science not to see the credit, in a great measure due to himself, reaped rather by another than to hoard up his entomological treasures, a useless heap, eventually to be destroyed by moths and time—I say, that a man who acts upon

principles like these finds himself not seldom disheartened in the prosecution of his studies under difficulties such as I have set forth. If, however, as I have endeavoured to point out, these difficulties can be overcome to a very considerable extent, is anything more natural but that he should be the herald of his discoveries himself? Could anything be more unkind and ungenerous on the part of his scientific brethren at home, than to oppose and discourage him by their disapprobation? I might enlarge on this subject, which has been a sore one with me for a long time, to a great extent, but I think this is sufficient to direct the reader into the train of my ideas and to enable him to follow it up.

I hasten therefore to conclude. As mentioned above, the tropical entomologist has a proportionate share of advantages to balance what falls to his lot of the contrary; one of these advantages which he has over his brethren at home is that he has an opportunity of seeing and studying alive, what can at home only be examined in a state differing more or less from that of life. Therefore, if he is *enabled* and *expected* to describe new species, it is moreover *highly desirable*, for the sake of the promulgation of *sound* information, that he should do so; that he should avail himself of this, his principal advantage, and describe fresh from nature as many of his favourites and their habits as possible; and discouraging him in such an undertaking, on any of the above grounds, would be discouraging the progress of science in general.

FAM. CARABIDÆ, TRIB. CHLÆNIDÆ.

1. *Chlænius Ceylanicus*. *N.*

C. subellipticus, subconvexus, glaberrimus, nitidus; supra brunneo-æneus, capite, thoracis elytrorumque margine aureo-viridibus; subtus piceus, margine, pedibus oreque dilute castaneis. Long. corp.  $5\frac{3}{4}$  lin.

Caput ante oculos 2-impressum. Antennæ art. 3<sup>o</sup> quarto paulo longiore. Mentum dente magno excavato. Thorax subquadratus, latitudine parum longior, obsolete punctulatus, antice subconvexus, lateribus deflexus postice, depressus, planus, 2-impressus. Elytra subtiliter striato-punctata, obsoletissime punctulata.

In stagnorum ripis inter arundines habitat, in prov. occid. et merid. infrequenter legi. Per occasionem nocte ad lumen advolat.

A handsome and interesting species, distinguished as well by its general shape, which is more elliptic and convex than usual, as by its polished surface. The head is oblong and, with the exception of the mouth the parts of which are of a deep brown, of a bright metallic green divided longitudinally by a streak of copper color. The thorax is rather longer than broad, round in front and flat behind and finely punctured all over; it is of a brownish metallic color bordered laterally with bright green. The elytra are of the same color as the thorax, the same bright green stripe running along the sides. The margin, properly speaking, is deep brown. They are impressed with rows of fine indistinct punctures and with the usual series of larger setigerous ones within the margin. They are rather narrowed near the apex.

The female, in addition to having the anterior tarsi not dilated, has the basal impression of the thorax of a somewhat semicircular shape, and is broader in the body than the male.

2. *Chlœnius 5-maculatus*. *N.*

C. præcedente major, minus convexus, latior, rugosus, pubescens; supra obscure nigro-viridis, capite viridi-æneo, nitente, glabro, elytris maculis 5-flavis; subtus piceus, pedibus, elytrorum margine antennisque flavis, ore thoracisque margine magis minusve brunneis. Long. corp.  $6\frac{1}{2}$  lin.

Caput ante oculos leviter 2-impressum, punctulatum. Antennæ art. 3<sup>o</sup> quarto plus sesqui longiore. Thorax subquadrato-rotundatus, latitudine haud brevior, dorso planus, ad basin 2-impressus, rugosus, pilosus. Elytra subdepressa, subtiliter striata, rugosa, pilosa, maculis 2 humeralibus, 2 intermediis, 1 apicali flavis ornata.

Specimen singulum m. in lacus Colombensis ripis sub graminibus putrescentibus legi.

Not less distinguished than the former, especially by the rounded shape of the thorax and the 5 yellowish spots with which the elytra are adorned. These are arranged in the following manner: 2 small ones at the shoulders, 2 large transverse ones at the middle stretching from the external margin towards the suture reaching, however, but little more than half across, 1 at the apex; this is of the shape of a hammer, and half in one and half in the other elytron. The palpi appear to me longer and more markedly elbowed at the joints

than is usual with insects of this genus, the last joint is deeply excavated at the tip. The thorax is of sub-orbicular form, the back and hind part are flat, the sides slightly depressed, the margin sharp, the basal impressions very near the angles; it is, as are also the elytra, rough and finally pubescent, the striæ of the latter being thereby rendered obsolete. Legs of m. stout, anterior tarsi strongly dilated.

### 3. *Chlænium pulcher*. N.

C. elongatus, subconvexus, subglabratus, æneo-viridis, elytris obscurioribus, limbo pedibusque flavis, subtus piceus. Long. corp.  $6\frac{3}{4}$  lin.

Caput oblongum nitidissimum, ante oculos 2-impressum. Mentum dente fortiter excavato. Antennæ art. 3<sup>o</sup> quarto sesqui longiore. Thorax oblongus basin versus angustatus, parce punctulatus, antice lateribus deflexus, postice dorsoque planus, basi 2-impressus. Elytra striata, ad strias, præcipue apicem versus, subtilissime pilosa, flavo-marginata. Pedes flavi, spinulis castaneis. Abdomen flavo-marginatum.

Specimen singulum m. in ripis Maha-Oyæ fluminis prope Negombo cepi.

Distinguished by its elongate shape. The head is of a bright green color with the labrum and the mandibles of a deep, and the antennæ and palpi of a light brown, the latter being darkened towards the end. The thorax is of the same color as the head reflecting a copper hue from the back, its anterior angles are obtuse, the basal ones being right. The elytra are of the same greenish copper color but darker, they are impressed with longitudinal lines, which are bordered on each side by a row of minute hairs. They as well as the abdomen have yellowish margin.

### 4. *Chlænium cupricollis*. N.

C. subconvexus, subglabratus, capite thoraceque cupreis, elytris nigro-æneis, limbo pedibusque flavis, subtus piceus. Long. corp. m.  $5\frac{3}{4}$  f.  $6\frac{1}{4}$  lin.

Præcedenti affinis. Caput ante oculos indistincte 2-impressum. Thorax ut in præcedente sed minor, antice lateribus magis deflexus, linea media impressionibusque basalibus longitudinalibus, præcipue



in f., profundioribus. Pedes flavi, trochanteribus spinulisque castaneis. Elytra præcedentis.

In prov. occid. flaminum lacuumque ripis infrequenter legi.

Allied to the former, but easily distinguished by size, color and sculpture of the thorax. The male is shorter and the female plumper than the former. The thorax is smaller and, as is also the head, of a bright copper color with greenish sides, its impressions, especially in the female, are deeper and its anterior part laterally more deflexed. Moreover the yellowish margin of the abdomen is wanting and the tooth of the mentum is not excavated. The elytra, antennæ and palpi are, making allowances for size, etc., those of the former.

5. *Chlænius rugulosus*. N.

C. subconvexus, subglabratus, thorace occipiteque rugulosis cupreis, elytris nigro-viridibus, pedibus, elytrorum limbo lunulisque apicalibus flavis, subtus piceus, abdomine apice margineque flavis. Long. corp.  $6\frac{1}{4}$  lin.

Caput fronte 2-impressum, subtilissime longitudinaliter rugulosum. Menti dens laciniis extus rotundatis. Thorax lateribus rotundatus, deflexus, basi sat fortiter angustatus, obsolete 2-impressus, parce punctatus, subtiliter transversim rugulosus. Elytra ut in præcedente sed apice utrinque lunula flava signata, ad strias distinctius pilosa, his apicem versus per paria coeuntibus. Pectus abdomenque picea, hoc segmentis 2 ultimis, præcedente dimidio margineque flavis.

Specimen unicum f. in Ch. pulchri N. societate cepi.

Of the general appearance of the preceding two species. The head finely longitudinally, the thorax transversely rugose; the latter with rounded and deflexed sides. The mandibles are of deep brown, the palpi and antennæ of yellowish color darkened towards the tip. The lobes of the mentum tooth are externally rounded. The elytra are marked by two subapical spots of yellowish color and semi lunar shape (the back of the lunules being turned towards the suture). The striæ verge near the apex by twos into each other. The abdomen is distinguished by having a yellow margin and apex.

## TRIB. SCARITIDÆ.

6. *Scarites minor*. N.

*S. elongatus*, niger, nitidus, subtus nigro piceus, pedibus piceis, tarsis, antennis, palpisque castaneis. Long. corp. 5 lin. lat.  $1\frac{1}{2}$  lin.

Caput subquadratum, ante oculos 2-impressum, pone irregulariter sulcatulum. Mentum rugosum, medio costatum, lateribus utrinque profunde uni-sulcatum, lobis obtusis, dente forti, lobis paulo brevior. Maxillæ validæ, breves, apice extus leviter arcuatæ et excavatæ, subacuminatæ. Mandibulæ validæ, inter medium et basin fortiter dilatatæ, obtuse dentatæ, dextera dente obtuso subapicali, supra subtusque longitudinaliter sulcatæ. Antennæ art. 1<sup>o</sup> sequentium trium—2<sup>o</sup> tertii prope longitudine. Thorax oblongo-quadratus, angulis anterioribus obtusis, posterioribus oblique truncatis, anguste marginatus. Elytra thoracis capitisque prope longitudine, striata, ante medium ad striam 2<sup>m</sup> uni—apicem versus ad striam 3<sup>m</sup>. 2-punctata, punctis piliferis, basi granulata, angulis oblique-truncatis, anguste marginata. Pedes anteriores tibiis apice extus 5 dentatis, dentibus 2 ultimis parvis, omnes tarsis subtus leviter excavatis.

In prov. occid. arenis humidis sub vegetabilibus putrescentibus specimina nonnulla legi.

Scarce; but little distinguished excepting by its size, for which reason, a lengthened description becomes necessary. The head is subquadrate, in front with 2 deep longitudinal impressions behind the eyes finely sulcated. The labrum is of the usual shape, the eyes are not very prominent; the antennæ are of about the same length as the head, the first joint is about as long as the 3 following together, the 2nd, which is generally longer than the 3rd, is in this case of the same length, joints 1—4 are naked, 5—11 pilose, increasing towards the tip gradually in size and thickness, taking at the same time a subquadratic and depressed shape. The mandibles are strong, much dilated and dentated from before the middle to the base, the right one having an additional subapical tooth. The maxillæ also are strong, but slightly bent at the apex, where they are also slightly excavated. The labial palpi have the last joint longer than the 3rd, elongated and elliptic. The thorax is oblong with the basal angles obliquely truncated. The elytra are oval, striated, granulated at the base, and have, as has also the thorax, a

narrow margin. The anterior tarsi are furnished externally with 5 teeth, the 2 last ones of which, however, are very small, the posterior legs are similarly provided, but the teeth are indistinct. The joints of the tarsi are slightly excavated below. The sides of the body below are rugose.

7. *Clivina rugosifrons*. N.

C. ferruginea, capite thorace abdomineque piceis. Long. corp.  $4\frac{1}{3}$  lin. lat.  $1\frac{1}{3}$  lin.

Caput rugosum, inter oculos elevatum, elevatione plana antice profunde 1-impressa. Mentum lobis subtiliter sulcatis. Antennæ robustæ, thoracis medium vix attingentes, art. ultimo elongato, penultimo—, art. 2<sup>o</sup> tertio sesqui longiore. Thorax subquadratus, antice parum angustatus, elytrorum latitudine, subtus parce punctatus, prosterno sulcato. Elytra striata, in striis punctata. Pedes tibiis anterioribus apice extus 4 dentatis, subtus excavatis, tibiis reliquis fortiter spinosis, tarsis articulis margine apicali setoso.

In prov. occid. sub vegetabilibus putrescentibus infrequentissime legi.

A large and distinguished species. The head is very rugose, the clypeus is contracted behind the apical angles and then produced again into another pair of angles. The labrum is transverse, slightly sinuate in front, with the angles rounded and setose. The mentum is quadrate, the lobes rounded at the apex and slightly sulcated, the tooth is strong, of equal length with the lobes and of the typical spear-headed form. The ligula has the apical angle much elongated, terminating in a membranaceous bristle which is bifurcate at the tip. The maxillary palpi have the last joint elongate, cylindrico-conic; that of the labial ones is still more elongate, elliptic. The antennæ have the basal joints elongate, those towards the tip rounded. They and the legs are hairy, otherwise the insect is of a bright polished surface.

8. *Clivina elongatula*. N.

C. elongata, subdepressa, supra nigro-picea, subtus picea, pedibus elytrorumque margine castaneis, antennis oreque dilutioribus. Long. corp. vix 3 lin. lat.  $\frac{3}{4}$  lin.

Caput triangulare, subtiliter punctato-rugosum. Palpi articulo ultimo apice leviter truncato. Thorax oblonge quadratus, ante



apicem leviter sinuosus, parce obsoleteque transversim strigosus. Elytra striata, in striis punctata, ad striam 3<sup>m</sup> utrinque 4 punctata. Subtus parce punctata.

Ubi præcedentem specimen singulum legi.

I have not dissected the labium of this species, which, however, is at once recognised by its depressed and, in proportion to its width, very long shape. The labrum, antennæ and legs are so much like those of the former that they need no further description. The bristle of the ligula appears simple.

9. *Olivina maculata*. N.

C. picea, elytris ferrugineis infra medium macula nigra indistincte ornatis, pedibus intermed. et post. oreque brunneo-testaceis, pedibus ant. antennisque obscurioribus. Long. corp. 2 lin.

Caput oblonge quadratum, rugosum, costis 5 magis minusve interruptis ad marginem anteriorem dentibus 4 productis munitum. Palpi art. ultimo basi intus incrassato. Antennæ art. 2-3 subæqualibus. Thorax subquadratus leviter rotundatus. Elytra striata in striis profunde punctata.

Ubi præcedentes specimen singulum legi.

As distinguished as the preceding two species. The palpi and the mentum appear to me of a somewhat extraordinary form. The last joint of the former is considerably more inflated at the base than in any other Ceylon species that has hitherto come under my notice, whilst the others are of a very curved appearance in both the maxillary and labial palpi. The emargination of the mentum would at first sight appear to be of simular shape. However, it is only the lower margin which has this form, the oblique truncature which forms the emargination being such as to give it that shape. The tooth is but of the typical shape standing on a level with the lower margin, it stands at a small angle with respect to the inclined plane formed by the rest of the truncature. The apical angles of the lobes are somewhat pyramidal, being formed by 3 sides. I have not dissected the labium, and therefore do not know whether the remaining parts exhibit any peculiarities. The insect is, however, easily distinguished by its general facies, which is rather like that of a *Dyschirius*, from which genus, however, the mentum alone is



sufficient to separate it. I may as well remark here that, although the Island is well supplied with Scarites and Clivinas, I have hitherto not discovered a single Dyschirius, a genus so well represented in Europe. Of the 3 Clivinas just described single specimens only have been in my possession for a considerable time. There are 3 or 4 more species met with about Colombo but these being of common occurrence I abstain from describing them here as they may possibly be amongst those described by Putzeys or others from the Indian continent.

FAM. RHIPIPHORIDES.

10. *Rhipiphorus tropicus*. N.

*R. niger*, nitidus, elytris albidis, nigro-maculatis, labro, palpis, antennis (pectine nigrescente excepto), unguibusque brunneis, impresso-punctatus, punctis magnis sed non profundis, subtus suborbicularibus piliferis, supra oblongis lævibus. Long. corp.  $2\frac{1}{3}$  lin. lat. ad humeros  $\frac{3}{4}$  lin.

Caput oblongum, latitudine paulo longius, parte frontis inferiore dense profundeque punctata, vertice obtuse obconico glabro, nitidissimo, occipite piloso. Thorax elevatus, ad basin 2-impressus, medio angulo obtuso, apice excavato, glabro, inter elytra producto. Elytra ad suturam utrinque stria lata brunnea punctata impressa, acuminata, apice dehiscentia, albida vel subhyalina, apicibus, medio utrinque et ad basin nigro-maculata. Alæ apice fuscae. Pedes tarsi anticis art. 2-4. unguibusque bifidis omnibus brunneis, tarsis subtus setosis, anticis, art. 2—3 primoque apice, subtiliter sericeopenicillatis.

Specimen singulum m. prope Colombo in floribus legi. De metamorphosi adhuc nihil constat.

The head is rather long in proportion to its width, the occiput is narrowed, short obconic. The hind part of the thorax is elevated above the elytra. The central part of its base is prolonged between the elytra in an obtuse angle, the apex of which is abruptly truncated, excavated and polished. The labrum is hairy and the ungues of the tarsi bifid as usual.

The tibiae of the interior legs are furnished at the apex with one, those of the 4 posterior legs with two spurs. The anterior tarsi

have joints 2-4 brown. The tarsi are setose below joints 2-3, the apex of the first of the anterior ones wearing fine yellowish silky brushes instead.

All over the island the Rhipiphorides and Mordellina appear to be very scarce, with the exception of 1 or 2 species of Anaspis which are not seldom taken in flowers. Still I recollect having met with about 7 species, including 2 large Mordellas, which, however, I have not been fortunate enough to catch as yet.

FAM. STAPHYLINID. TRIB. PINOPHILINI.

11. *Edichirus alatus*. N.

Æ. alatus, setosus, nitidus, rufo-testaceus, thorace dilutiore, capite, elytris abdominisque segmentis 3 ultimis nigris; elytris apice 2-maculatis, maculis rufo testaceis; pedibus flavis, femoribus apice tibiisque basi nigrescentibus; antennis palpisque maxill. basi obscuris, apice testaceis, reliquis oris partibus rufo-piceis. Long. corp. 3  $\frac{1}{6}$  lin.

Æ. Pæderino Er. simillimus, præter colorum distributionem differt tamen *alis*, elytrorum sculptura, antennarumque articulo ultimo. Antennæ art. ultimo penultimo æquali nisi paulo minore, apice fortiter *truncato* leviterque excavato. Thorax Æ. Pæderini, dorso punctis biseriatis impressus, serie interna vel centrali elliptica punctis minoribus magis inter se approximatis, externa vel submarginali punctis magnis distantibus. Elytra oblonge subquadrata, infra medium rotundata, thorace *longiora* et fere duplo ampliora (utrumque elytron thoracis fere magnitudine), basi parte thoracis adjacente *duplo*—infra medium illius latitudine antica plus tertia parte latiora. Os, pedes et abdomen Æ. Pæderimi.

Pæderorum more victitare videtur; in eorum societate in lacus Colombensis ripis infrequentissime legi; illis minus gracilis atque minus agilis.

I have not had an opportunity of examining specimens of either of the 3 Æ. dichiri hitherto described. However, I have before me Erichson's figure and description of the Sicilian Æ. Pæderinus with which I find my species strongly to agree.

It differs, however from the former materially in the following 3 points, viz. the wings, the sculpture of the wing-covers and the last

antennal joint.—The fact that this species has wings would render an alteration in Erichson's diagnosis of the genus necessary it being characterized therein as apterous. The elytra are not so much contracted and rounded at the base, and, being longer than the thorax, have therefore a more oblong, subquadratic appearance. As in the above typical species they are, however, rounded at the sides and broadest a little below the middle. They are about twice as broad at the base as the adjoining part of the thorax and in their broadest part rather more than a third wider than the broadest part of the thorax. The third point in which the two species differ is the last joint of the antennæ which in this case is strongly truncated at the tip and slightly excavated. They are further distinguished by the distribution of the colors, my species being of dark yellowish red, thorax lighter, head, elytra and 3 last abdominal segments black, elytra with 2 reddish spots at the apex, legs yellowish, at the apex of the femora and base of the tibiæ blackish, the mouth is brown, the maxill. palpi yellowish with the 3 first joints dark at the base, the antennæ have the 6 basal joints dark excepting at the apex, where they, as well as the 5 remaining ones, are yellowish. In all other points I find the insect to agree entirely with the typical *Æ. Pæderinus*: the palpi, legs and anal segment of the abdomen are of the same structure, the hairy vestiture is exactly the same in the different parts of the body of my species as it is in the corresponding ones of Erichson's.

It is perhaps wrong in me to describe an isolated species of this extensive and difficult family. However, the gen. *Ædichirus* is one so extraordinary that I am sure it will be noticed wherever the description of a new species of it may be found, be it by itself or amongst those of other Staphylinidæ. The case would be different if the object of the description were a *Homalota* or the like.

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*Correspondence relating to the Exploration of the ruins of Sarnath.*

—Communicated by the GOVERNMENT OF THE N. W. P.

*To R. C. OLDFIELD, Esquire,*

*Assistant Secretary to Government N. W. P. Agra.*

*Benares, the 28th June, 1856.*

SIR,—In reply to your letter No. 3227, dated 19th instant, calling for report on the further exploration of the ruins of Sarnath, I have the honor to submit a letter No. 1, of 25th idem, and its annexures from Dr. Butter, superintending Surgeon of the Division, on the subject.

I have called upon the Executive Officer, Captain Rigby, to report what is possible to be done to preserve the tope, and the approximate expense. A large portion of the carved stone facing, is quite detached from the brickwork body of the building, and is so much bulged out, that it *must* come down.

I have, &c.

(Signed) H. TUCKER, *Commissioner.*

(No. 1).

*To H. C. TUCKER, Esquire, Commissioner, 5th Division.*

*Benares, 25th June, 1856.*

SIR,—With reference to your docket, No. 61, dated yesterday, on a copy of letter No. 3227, dated the 9th instant, from the Assistant Secretary to Government, to your address, inquiring what had been done since the issue of the orders of 12th December last, No. 255 A., relative to the further exploration of the ruins of Sarnath, I have the honor to submit the following report.

I believe that Professor Hall reported generally regarding the nature of the constructions laid open by the prisoners working under his orders. The buildings appeared to me to possess very little interest, being characterized, in some parts, only by a singular disregard of the use of the plummet, square and level. These walls are built neither perpendicularly nor horizontally straight, nor at accurate right angles.

One of the structures laid open had been more carefully raised; a series of rectangular cells, without any lateral opening, possibly



intended for granaries, and at the same time so solidly built as to serve the purpose of solid foundations for the monastery of which they probably formed a part.

Another structure is a well, surrounded by a rectangular platform, edged with rough upright stones, probably the supporters of a heavy roof. There are indications of the well having been brought into use, after the destruction of the surrounding buildings, by laying a long stone across a portion of its broken edge. The masonry of the well is very irregular.

As I occupied the bungalow vacated by Mr. Hall before his departure from Benares, he left in the house all the objects, except a coin, that he had collected from his excavations, with a request that I should make a descriptive catalogue of them. This, when leisure served, I wrote, and sent to the Benares College Museum, along with all the objects described. A copy of the correspondence connected with this subject is annexed.

The coin abovementioned had previously been sent to me by Mr. Hall. It appeared a mass of verdigris, rubbed on one side until a figured white metallic surface appeared. By careful cleaning with dilute sulphuric acid, I removed the whole of the coating carbonate, which revealed a Greek profile, helmeted, with a peacock on the reverse; both early impressions, as the rough marks of the graving tool were distinctly transferred to the impression. It was sent to Mr. Thomas, who identified it as a coin of Buddha Gupta (circ. A. D. 400), and thence to the India House; it is not gold, as mentioned in the correspondence on the subject, but silver, with a considerable alloy of tin (judging from the colour,) and of copper (from its crust).

The burnt grain and masses of half-fused iron discovered by Mr. Hall, corroborate the conclusions drawn by previous explorers, that the monastery had been destroyed by fire.

Some of the small objects which I have particularly described, are interesting as relics of the useful arts of the period; especially the implements of the metal-workers, Nos. 42, 43, 45 to 50, 55 and 61. Some, again, look as if they had formed portions of the relic-casket and deposits of a great tope, small as the chances might be thought of recovering such minute objects from such an extensive

heap of ruins. This idea derives some countenance from Major Cunningham's statement (Preface to "*Bhilsa Topes*") of his belief that the principal object of his search, the relic-casket of the great tope of Sarnath, must have been discovered and destroyed by his workmen, during his absence on engineer-duty at Mirzapore.

This circumstance appears to show the necessity of constant personal supervision on the part of the officer charged with the explorations when any object of importance is expected to turn up. There is now no methodical searching for the axial deposit of an unexplored tope, as in Major Cunningham's Bhilsa undertakings. All that can be looked for, is an occasional deposit of interesting objects hid away at the time of the great political catastrophe, which stayed the sculptor's hand as he traced out and chiseled his designs on the smooth stone surface of the great tope, and which burnt down the monastery. Such a deposit may be lighted upon suddenly; and if including, as it probably may, some articles of intrinsic value, will be apt to disappear quickly, if discovered in the responsible officer's absence. It appears to me therefore, that the search can be prosecuted, with reasonable hope of success, in the cold weather only.

During the past cold season, I delayed from month to month the commencement of my own search, in the expectation that the improving health of the prisoners might enable the magistrate to afford me the aid of a small number of them in the work, which I hesitated to commence with hired labour only; and thus the favorable season passed away. At an early period of the ensuing cold weather it will be necessary to determine whether the Magistrate's aid is to be trusted to or not.

In the mean time, I beg strongly to recommend that measures be taken to avert the impending destruction of the tope itself. Large portions of the beautifully sculptured plinth, which rises to about three-fifths of the whole height of the building, have already shed their ornamented coating, which has been carried away and built, with dozens of statues, into the decaying foundations of the stone-bridge on the Burna. More of it now bulges out, detached from the central mass of the building, and ready to separate at the first shock of lightning or earthquake. If this be occasioned by

(besides the decay of the iron cramps) any unequal sinking of the foundation, as would appear from some vertical cracks, this evil is probably aggravated by the existence of two open galleries driven into the axis of the building, and by a well sunk in its centre, besides the shaft that is cut through the axis of the plinth and opens to the air near the summit of the plinth. These three openings should be walled up externally, so as to prevent the access of rain and drainage water. At present, the openings at the foundation are also a nursery for snakes. I saw a large cobra there this morning, and was informed that a man had died from the bite of one, two days before, and that they swarm round the tope. Trees, moreover, have grown on the summit, and will, in some severe storm, bring down part of it with them, and may throw down some of the ornamental casing in their fall. Some of the sculptured coat is already too much detached to admit any hope of its being successfully propped up; and the rest will follow its course, when its iron cramps shall have been corroded through. This mischief might perhaps be delayed by the application of a waterproof pointing to all the outer points, where they still appear sound. No cement had been used in the original construction; the stability of which had been entrusted to iron cramping and occasional string-courses of long projecting stones.

At all events, if the whole of the ornamental surface must scale off, its memory ought to be preserved by the photograph. All the designs are interesting; the geometrical form, their originality, and the flowered tracery from the boldness and beauty of its forms, and from the striking resemblance of its sun-flowers and foliage to the stems and raffles of the acanthus as treated by Grecian sculptors. The comparative flatness of large portions of the curved surface, from the greatness of its diameter, would render this an easy task. Photographs of the portions, where the workman had just traced or partially executed his work, will be highly prized, when Sarnath shall have become "heaps."

I have, &c.

(Sd.) D. BUTTER, *M. D. Superintending Surgeon.*



*To R. GRIFFITHS, Esquire,  
Offg. Secy. Local Committee of Public Instruction, Benares.  
Benares, 21st January, 1856.*

SIR,—At the request of the Commissioner of the Division, I beg the favor of your receiving charge of the articles enumerated in the accompanying list. They have been dug, under the superintendence of Professor Hall, from the ruins of Sarnath.

I have, &c.

(Sd.) D. BUTTER.

List of articles dug up at Sarnath, the ancient Buddhist holy ground near Benares, under the superintendence of Professor F. E. Hall, and left by him, on his departure for Ajmere in June, 1855, under my charge.

1. A disk of sandstone; 37 inches in diameter; sharp at the edge; convex on one face; slightly concave on the other, which has a raised ring  $1\frac{1}{2}$  inch high round its centre,  $9\frac{1}{2}$  inches in exterior and 4 inches in interior diameter, of rounded section: central thickness of the disk  $1\frac{1}{2}$  inch: a portion (chord 19 inches) of the edge is broken off. [Fixed as an umbrella over statues of Buddha.]

2. A nether hand millstone; diameter 11 inches, sandstone.

3. A ditto, broken into two pieces, sandstone.

4. An upper millstone of unusual size and weight; height 6 inches; diameter 11 inches; sandstone.

5. A female head and throat,  $3\frac{1}{2}$  inches high, broken off from a statuette, sandstone, of very marked character; hair parted in short bandeaux in the centre, ending in a series of short curls, with a short club of hair thrown back from the top of the head; high pencilled eyebrows; half closed eyelids; forehead and nose in one straight line; facial angle about  $80^{\circ}$ ; smiling expression of mouth; coloured part of the under lip marked in an exaggerated degree, almost like a protruded tongue; profile very Egyptian; throat marked with two folds; long earrings.

6. A torso; sandstone; 8 inches high; alto-relievo from throat to knee; proportions hermaphrodite; slightly draped; right hip thrown forward.

7. Alto-relievo fragment; sandstone; 5 inches long; a female right hand, holding a custard-apple; armlet bordered above with



kawris, and below with gems cut in facets, and with kawris alternately; phalanges of the fingers not marked, but running into curves; ring on the little finger.

8. Face, broken off, from upper lip to top of head;  $6\frac{1}{2}$  inches high, sandstone; hair curled all over the forehead; drooping eyelids; forehead and nose in one line.

$8\frac{1}{2}$ . Pinnade; 6 inches high, with small figure of Buddha, cross-legged, in niche; sandstone.

9. Female figure; 5 inches high; pierced alto-relievo; head and right arm wanting; draped closely; supported by two smaller figures with massive locks; steatite.

10. Hermaphrodite figure;  $3\frac{1}{2}$  inches high; head backed by a large disk; hair drawn up perpendicularly into a mass filleted across the centre horizontally; pendent ornament on the forehead; deficient below elbows and waist; creases of the throat strongly marked; earring touching the shoulders; detached relievo; greenstone.

11. Fragment of mica slate; 2 inches long; apparently a right hand holding a rounded object against the right side.

12. Terracotta; 3 inches high; female figure from waist to top of disk at back of head; two holes through the disk, above the ears, apparently for fastening the alto-relievo to a flat surface; grinning mouth; large earrings; prominent bust; pendent necklace.

13. Red sandstone; coarse basso-relievo; epicene figure from hip upwards; massive hair.

14. Mica-slate; coarse alto-relievo head, with attached disk and raised right hand 4 inches long; fillet across forehead, surmounted by a mass of hair.

15. A very clear impression, in red baked-clay, of a seal  $\frac{7}{10}$  inch in diameter, with five lines of Sanscrit; bears no mark of having been broken off from the protecting bell-shaped summit attached to Nos. 16 and 17.

16. A bell-shaped mass of burnt brick,  $2\frac{1}{2}$  inches high, square projection at top; supposed to contain an impression like No. 15.

17. A ditto;  $1\frac{3}{4}$  inches high.

18. An impression, in burnt brick, of a seal  $1\frac{1}{4}$  inch in diameter, two lines of Sanscrit, surmounted by a lozenge-shaped device,

with deer salient as supporters. (Sarnath is by the Chinese travellers, called the Deer-park.)

19. A disk of red sandstone, 4 inches in diameter,  $\frac{7}{10}$  inch high, attached to a portion of a broken slab.

20. A curry-stone (?); red sandstone;  $6\frac{1}{2}$  inches long by 3 inches in diameter.

21. A fragment of a similar cylinder; 4 inches long; broken diametrically; greenstone.

22. Six vertebræ of a snake; recent; found in the well.

23. A small gharaful of kawris.

24. A mass of burnt rice.

25. A large quantity of iron, much rusted—some of the pieces being ringbolts, having portions of the rings attached by partial fusion; all appear to have been taken from a building destroyed by fire.

26. A broken crucible of circular section, five inches high, and three inches in the interior diameter; has been used, and has absorbed some metallic slag.

27. A fragment of a similar crucible, 4 inches high, bearing no marks of having been used.

28. A cupel, 1 inch in diameter; used.

29. A ditto used.

30. A ditto, being a mere hollow in a lump of clay,  $1\frac{4}{10}$  inch high; not used.

31. A disk, 2 inches in diameter, of burnt clay, with five circular depressions, possibly intended for cupels.

32. A cupel of clay with a spout running horizontally from the bottom; length  $2\frac{1}{4}$  inches.

33. Six perforated cylinders of burnt clay, from 3 to 4 inches long, with each a projecting disk across its length; supposed by Mr. Thomas to have been intended for blow-pipes, the projecting disk to protect the face of the artisan from the fire.

34. A piece of brass,  $2 \times 2\frac{3}{4} \times \frac{1}{2}$  inch in measure, with a flange at one side, ornamented with beaded and flowered moulding.

35. Three earthen pots, 6 to 9 inches high, with mouths 3 to 5 inches in diameter; such as are now called gharas.

36. Nine ditto, 4 to 7 inches high, each provided, in addition to

the upper mouth, with a spout, an inch long, at one side. Similar vessels are still made at Benares. The spout of one is grotesquely moulded into the form of a non-descript animal's head.

37. Three spouts, 2 to  $2\frac{1}{2}$  inches long, with everted edges, broken off the sides of pottery vessels.

38. A globular ewer of black pottery,  $4\frac{1}{2}$  inches in diameter, with neck  $1\frac{1}{2}$  inch long; flat-bottomed.

39. A ditto,  $2\frac{1}{2}$  inches in diameter, bearing marks of having been heated over a fire.

40. Eight earthen cups, flat-bottomed, 3 to 5 inches in diameter.

$40\frac{1}{2}$ . One ditto with its two opposite edges doubled over; a lamp (?)

41. Four disks broken off, supposed blowpipes, like No. 33.

42. A flat disk-shaped shell, perforated in the centre, with its edges turned down, the exterior apparently turned in a lathe, the interior (or upper) surface bearing the original polish, and having an ovoid, not a circular, horizontal section. Apparently fossilized.

43. A Chinese relic; being a piece of blue enamelled pottery,  $2\frac{1}{4}$  inches long, ornamented on one side with straight and circular lines, and perforated with two holes, across one of which it is broken in two.

44. A cylinder,  $2\frac{1}{4}$  inches long by  $\frac{3}{10}$  inch in diameter, of greenish white steatite; can be used for writing with, on any dark stone.

45. A cylindroidal piece of onyx, black with white vein, 1 inch long,  $\frac{1}{2}$  inch mean diameter, perforated along the axis, polished in the lathe.

46. An ovoid fragment of lilac-grey steatite,  $3\frac{1}{4}$  inch in mean diameter,  $\frac{1}{4}$  inch in mean thickness; its two wider surfaces concentric, apparently a portion of a cup about 7 inches in diameter; the concave surface bearing striated marks of a turning chisel carelessly held; the convex surface carefully turned and ornamented with a double graved line. Perhaps a Chinese relic.

47. A polished hemispherical gem, resembling prehnite, or excessively flawed emerald; apple green; smooth all over;  $\frac{3}{10}$  inch in diameter.

48. A broccoli-brown agate bead,  $\frac{4}{10}$  inch in diameter, pierced by two conoidal perforations meeting at minute apices obliquely.

49. An opalescent, transparent, skimmed-milk-white disk;  $\frac{6}{10}$  inch in diameter;  $\frac{1}{20}$  inch thick; roughly ground at the edge, marked on one side with five projecting striæ, parallel, and either straight or portions of very large circles like those at the outside edge of a sheet of crown glass; the other side is irregularly flat, with minute polished dimples, quite unlike modern glass.

50. A bulbous bit of copper,  $1\frac{1}{4}$  inch long,  $\frac{1}{4}$  inch in mean diameter; clean on the surface, which is roughly finished with a file.

51. A cylinder of copper  $\frac{9}{10}$  inch long,  $\frac{8}{10}$  diameter, shaped with a hammer.

52. A ditto  $\frac{8}{10}$  inch diameter,  $\frac{1}{4}$  inch thick; its weight not any aliquot part of No. 51.

53. A rough bit of copper,  $\frac{6}{10}$  inch long.

54. Thirty smooth stones from the brook, red and grey sandstone, jasper, &c.

55. A disk of writing slate,  $1\frac{1}{4}$  inch diameter,  $\frac{8}{10}$  inch thick.

56. Fifty-five bits of rounded nodular kankur, apparently kept as curiosities.

57. Thirty-five earthen beads,  $\frac{8}{10}$  to  $1\frac{1}{10}$  inch in diameter.

58. Thirty-two ditto, about  $\frac{4}{10}$  inch in diameter.

59. Five lumps of burnt brick, moulded by the hand into cones from 3 to 4 inches in diameter; to be used as mullers?

60. A piece of black (pottery?)  $\frac{7}{10}$  inch square and  $\frac{1}{2}$  inch high, indented on one side with a central circular hollow  $\frac{7}{10}$  inch in diameter, and  $\frac{1}{10}$  inch deep; a mould for blanks of coins?

61. A cylinder of red jasper,  $\frac{8}{10}$  inch in diameter,  $\frac{1}{2}$  inch high.

62. A small iron spear-head.

63. A square iron head for a wooden mace.

64. An iron axe-head.

65. An iron adze, or hoe-head.

(Sd.) D. BUTTER.

To H. C. TUCKER, *Esquire, Commissioner of Benares.*

*Dated, Nynee Tal, the 18th July, 1856.*

SIR,—I am directed to acknowledge the receipt of your letter No. 30, of the 28th ult., forwarding a letter and its annexure from Dr. Butter, on the subject of the exploration of the ruins of Sarnath, conducted during the past season, under his supervision.



The Lieut.-Governor is glad to learn that so many of the interesting objects which have been hitherto discovered during the progress of the excavations, have been deposited, with a descriptive list in the Museum of the Benares College.

The silver coin, with the Greek profile, which is referred to as a coin of Buddha Gupta, and of about the era 400 A. D., has been properly transferred to the Museum of the E. India House.

The Lieut.-Governor quite agrees in the views of Dr. Butter, as regards the prosecution of future explorations under his own immediate and close personal supervision. The work need not however be dependent upon the prison labour which the Magistrate may be able to place at his disposal, as a moderate monthly contingent charge will readily be sanctioned for this object.

The Lieut.-Governor awaits the report which you have called for from the Executive Engineer as to the measures which it may be practicable to adopt for preserving the Tope from further dilapidation by decay.

The Lieut.-Governor would very much encourage the taking of photographic delineations of all parts of the remains in their present condition, so as to preserve a correct record of its general appearance, and of the details of the ornamental sculpture and tracery; and if Dr. Butter or yourself can suggest any plan for giving effect to this proposal, every aid in carrying it into execution will be afforded by Government.

A copy of this correspondence will be forwarded to the Secretary of the Asiatic Society, as it may perhaps be thought of sufficient interest to be published in the Journal of the Society.

The enclosure of your letter is returned, a copy having been retained for record.

I have, &c.

(Sd.) C. B. THORNHILL,

*Offg. Secy. to Government, N. W. P.*

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*Notes on the Herbarium of the Calcutta Botanic Garden, with especial reference to the completion of the Flora Indica.*—By THOMAS THOMSON, M. D., F. R. S., Supt. H. C. Bot. Garden.

It is probably known to all the members of the Asiatic Society who are interested in the science of Botany, that Dr. Hooker and myself have undertaken the publication of a complete work on Indian plants, the first volume of which, under the title of *Flora Indica*, was published last year. The continuation and completion of this work is of the utmost importance to the advancement of Indian Botany, which is much retarded by the want of a properly digested catalogue. The further progress of the work will, however, in a great measure depend on the co-operation of botanists throughout India, the materials here, though extensive, being too incomplete, to enable me to advance without further contributions.

I bring this subject before the Asiatic Society therefore with a double object. I wish in the first place to make known the nature and extent of the Herbarium belonging to the garden, and in the second, by means of the Society and the Journal, to bring to the knowledge of botanists in all parts of India, the assistance which it is in their power to render in furthering the progress of a work, the object of which is, to render available to the student of Indian plants information scattered over a thousand detached works, and therefore only accessible to the professional botanist.

The Calcutta Botanic Garden is associated almost with the commencement of modern Indian Botany. The classic work of old Rheede who, two centuries ago, illustrated a series of drawings, often remarkable for their fidelity, by a condensation of all the facts obtainable from the most intelligent Brahmins of Malabar, belongs to a former epoch, and stands alone. It was for many years almost the only source from which botanists could know Indian plants, and even now we have in many cases to refer to its plates instead of to nature for the types of the genera of the older botanists.

Modern Indian Botany began with the Danish missionaries of Southern India, who were attracted to the science, in the first instance, by the benevolent wish to combine the practice of the

healing art with the duties to which they had devoted themselves. This motive actuated the whole body, but a few continued to prosecute the science for its own sake, and some of the medical officers of the Madras Presidency formed with them a botanical association, by which plants were examined and named, and to which the discoveries made by members at a distance were reported. One of the most distinguished of these associates was William Roxburgh, who was appointed in 1794, on the death of Col. Kyd, the Superintendent of the Calcutta Botanic Garden, and commenced at once the labours which have gained for him a position at the head of Indian Botany, of which, indeed, as the author of the first *Flora*, he may, in one sense, be said to be the founder.

During a long series of years, Roxburgh examined, described and prepared drawings of the indigenous plants of India. In all possible cases, he cultivated them in the garden under his own eye, and examined them carefully in all stages of growth. The descriptions, which are remarkable for their accuracy, by degrees took the shape of a *Flora Indica*, comprising all the plants of the Northern Circars, in which Roxburgh resided before he came to Bengal, those of Bengal proper, and such of the plants of Silhet and Chittagong as were introduced by active Collectors into the gardens and flowered there. It is therefore a nearly complete flora of the plains of India from the base of the Himalaya to Cape Comorin, and contains descriptions of most of the plants which a botanist will meet with in the neighbourhood of the presidency towns or the large stations.

The drawings, more than 2,000 in number, were made in duplicate. One set is in the Garden Library, the other with corresponding numbers is in the India House. A selection of three hundred of the more remarkable forms was published in England by Sir Joseph Banks, at the expense of the Court of Directors, and outlines of many others have been introduced by Dr. Wight into his *Icones plantarum*. The species described by Dr. Roxburgh in the *Flora Indica* can, in general, be readily determined from these drawings, so that there is less occasion than might have been expected to regret the absence of dried specimens. Dr. Roxburgh probably collected largely. He certainly transmitted considerable collections

to scientific bodies in Europe, but most of these have been dispersed. There are, however, a considerable number of his specimens in the British Museum, at the Linnean Society and the University of Edinburgh.

Dr. Roxburgh was succeeded at the Botanic Garden by Dr. Francis Buchanan afterwards Hamilton, a man to whom extensive travel had given great knowledge of India. In the Peninsula he had explored the Carnatic, Mysore, Malabar and Canara, and in Bengal, the Rajmahal hills and the whole of the Northern and Eastern districts as far as Assam and Tippera. He had also visited Nipal. The Botanical results of these journeys have been unfortunately in a great measure lost, but many important facts are recorded in his commentaries on the Hortus Malabaricus of Rheede and the Herbarium Amboynense of Rumph, two memoirs in which Hamilton has embodied a great deal of valuable information on Indian Botany. His collections form part of the Herbarium of the University of Edinburgh.

In 1815, the Botanic Garden came into the hands of Dr. Wallich, an ardent and enthusiastic botanist, under whom Indian Botany continued to progress rapidly. The labours of Roxburgh had completed the flora of the plains of India, though the work remained still in MSS. Dr. Wallich took a wider range. Our recent war in Nipal having resulted in the appointment of a Resident at the Court of Katmandú, Wallich joined Mr. Gardner there and collected assiduously for more than a year in the vicinity of the capital. The interior was then as now jealously closed against European travellers, but by means of native collectors he added a fair knowledge of the alpine flora to the abundant information regarding that of the temperate and tropical regions which he obtained by his personal exertions.

Dr. Wallich's duties at the gardens not permitting him to prolong his residence at Katmandú indefinitely, he trained a number of collectors who continued during a long series of years to transmit dried specimens from Nipal. Mr. Blinkworth, an active collector, at the same time explored Kumaon, and Mr. Gomez contributed extensive collections from the rich province of Silhet and from the neighbouring Khasia hills, while Wallich himself visited Penang



and Singapore, thus adding a knowledge of the Malayan flora to that of the rest of India.

Abundant materials for the elucidation of the Botany of India having thus been brought together, it became a question in what manner they might be disposed of to most advantage. Dr. Wallich at one time entertained the idea of incorporating them into an Indian Flora, and with this object he commenced the publication of an edition of Roxburgh's Flora into which all his own discoveries were introduced. As his collections accumulated, this task became every day more difficult, and his other duties, and in particular the state of his health, rendered its progress extremely slow, and at last compelled him to stop, after publishing two volumes, which extend as far as the end of Pentandria Monogynia in the Linnean arrangement, and include therefore the 1st volume of the ordinary edition of Roxburgh, or less than  $\frac{1}{3}$  of the whole work.

Dr. Wallich then determined to return to England with all his collections, and with the consent of the Court of Directors, which was at once liberally accorded, to distribute amongst scientific men in all parts of Europe the materials which he had accumulated, but could not hope to have leisure to work into shape, in the hope that each recipient would be able to lend his aid to the study of some part, so that by the joint labour of all, the Indian Flora might be benefited and furthered. The result has been satisfactory. The dispersion of the Wallichian Herbarium over all parts of Europe enabled students of Botany every where to obtain access to a set of these specimens, and monographers have, in describing them, uniformly quoted the numbers attached to the specimens. The Wallichian Herbarium has, therefore, become one of the foundations of Indian Botany, and it is a source of regret to me that a set of its specimens does not form a part of our collection here. Steps have recently been taken which will, I hope, remedy the deficiency, as several duplicate sets still exist in the Linnean Society's collection.

Those only can appreciate the difficulties with which Dr. Wallich had to contend in this distribution, who have had much practice in the arrangement of dried plants, and are familiar with the irksome task of assorting the miscellaneous collections sent in by numerous

collectors, variously ticketed and often in great confusion. A quick eye and a ready hand bring the species together, but constant watchfulness is even more essential, in order to prevent errors in localities, the greatest evil to which we are exposed in arranging large collections. It is therefore not at all surprising that Dr. Wallich should have occupied four years in this task, and yet been compelled to return to India before it was completed.

Between 1815 and 1828 a large and valuable series of botanical drawings was prepared under Dr. Wallich's superintendence. These he took to England with him and they are deposited at the India House, but as no copies were made, we do not as in the case of the Roxburghian drawings possess a corresponding set. From among these drawings, Dr. Wallich selected three hundred of the most interesting, which were published under the title of *Plantæ Asiaticæ Rariores*, a superb work alike honorable to the court and to the author.

The commencement of the present Herbarium of the Calcutta Botanic Garden dates from Dr. Wallich's return to India in 1832. The separate collections of which it is made up having been incorporated together, the following list has been prepared to show the origin of the different parts thus combined into one.

#### I.—*Indian Collections.*

1. A few specimens from the Carnatic collected and named by Dr. Rottler and given by him to Dr. Wallich, who brought them with him from Denmark.

2. A complete series of specimens collected and dried in the Botanic Garden. Most of these are ticketed by Dr. Wallich, the collection having undergone careful revision by him after his return from Europe in 1833.

3. A portion of the collection made in Khasia and Assam by the Assam Tea Deputation in 1835-36, consisting chiefly of endogenous and acrogenous plants. The exogens of this collection were sent home by orders of the Hon'ble Court of Directors about four years ago.

4. A large collection from the Khasia hills made by collectors in garden employ. This collection contains many duplicates.

5. A very extensive collection made in Assam by the garden collectors under the able superintendence of Col. Jenkins, containing a very complete series of the plants of the plains and lower hill jungles of Assam, with many duplicates. It contains also a few specimens from the Bhotan mountains.

6. A very extensive collection made in the plains and hilly districts of Upper Assam and in the Naga mountains by Mr. J. W. Masters, and presented by him to the garden. This collection is remarkable for the very careful manner in which the localities are marked upon each specimen. It contains many rare and valuable plants and numerous duplicates.

7. Col. Vicary's Indian collections, made in the Saugor district, in Birbhum, Berhampur, Dinajpur, and in the districts of Garhwal, Simla and Kuaawar in the western Himalaya. This collection contains few duplicates, and many of the specimens are in a bad state of preservation, but it is very valuable, because the locality of every specimen is carefully marked on a ticket attached to the plant, or written on the sheet of paper in which it is enclosed. The Saugor and Himalayan collections are the best. Both contain many plants which were unknown to botanists at the time these collections were formed, but which have since been discovered by subsequent collectors and published in various works.

8. A small collection of Ceylon plants presented to the garden by Mr. J. Watson in 1836, contains no duplicates.

9. *Mr. Griffith's collections.*—Two complete sets of these most valuable collections were sent to England, and are (I believe) in the India House. The triplicates remained with Dr. McClelland during the time that he was occupied in the publication of Mr. Griffith's posthumous papers, and were transferred by him to my charge in 1856. A small collection chiefly of Afghan and Malacca plants has been in the garden Herbarium since 1848. Those received in 1856 consist partly of garden plants selected by Mr. Griffith for himself from the garden Herbarium, but mainly of more or less complete sets of the collections made by Mr. Griffith on his several journeys. The specimens retain in many cases the original tickets and are carefully numbered. The numbers correspond with those of Griffith's Itinerary notes, published by Dr. McClelland.



None of the series are complete, but the number of Afghan and Khasia plants is much greater than that of Bhotan or Mishmi ones. There are also a great many excellent specimens from Malacca and a few from the Coromandel Coast. The collection contains likewise a considerable number of specimens from Sambalpore collected by the late Major Kitto, some specimens from the Carnatic collected by Mr. Griffith soon after his arrival in India, and a few of the numbered specimens of the Wallichian herbarium which Mr. Griffith seems to have brought with him from England.

10. A small collection made by Lieut. Parish in the district of Mandi in the Punjab Himalaya during the cold season of 1847-48. The ferns of this collection are numerous and good.

11. A large collection made in the Tenasserim provinces by Dr. Falconer, while on deputation (in the year 1849.) The specimens are in general excellent, and there are a considerable number of duplicates. The localities are always carefully marked.

12. A collection made by Dr. McClelland in 1849 in the Birbhúm district. The localities are carefully marked and there are some duplicates.

13. An excellent collection of Assam and Khasia plants made by Mr. C. J. Simons, and presented to the garden by Sir W. J. Hooker, K. H. The specimens are very fine and are all carefully numbered and the localities marked.

14. A set of excellent specimens of Khasia plants collected by Mr. Oldham in 1851-52, and presented by him to the garden. Mr. Oldham most liberally allowed me to select from his collection as many specimens as I wished, so that we possess excellent illustrative series of specimens of many variable species.

15. A large collection of Pegu plants made by Mr. Scott, head gardener H. C. Bot. Garden, while on deputation in that country in 1855. The specimens are very good and the collection contains many interesting plants.

16. A small collection of rare and interesting Malacca plants presented by Captain Moxon.

17. A complete set of specimens from the Ceylon garden Herbarium presented by Mr. Thwaites, the Director. This is a numbered collection and contains all the known plants of the Island, so that it is of very great value.



18. A large Herbarium from the Bombay Presidency presented by Dr. Gibson, consisting partly of his own collections, and partly of those of Mr. Law from the Concan and Dekhan, and partly of Dr. Stock's Sindh and Beluchistan collections.

19. A good collection from the Northern Division of the Madras Presidency presented by Dr. Cleghorn.

20. A most interesting collection from the Punjab Himalaya and Western Tibet presented by Mr. M. P. Edgworth, C. S. The Himalayan specimens were collected by Mr. Edgworth himself, those from Lahul and Ladak by Capt. Hay.

21. A set of the Indian collections made by Doctors Hooker and Thomson between 1841 and 1851 which are now being distributed in England.

These collections illustrate more or less fully the plants of Western Tibet, of the Western Himalaya, of the Punjab and the upper Gangetic plain, of Sikkim and the Khasia hills, the Sôn valley, Silhet, Cachar and Chittagong.

22. Specimens of plants from different parts of India, not sufficiently numerous to be included as collections in this list, have been presented by Mrs. Burney from Ava, by Capt. Margrave from Arracan, by the Rev. J. Parry from Jessore, by the Rev. Mr. Schmid from the Nilgherry Hills, by Col. Madden from the Western Himalaya, by Dr. Fayer from Khasia and by Lieut. Beddome from Jabalpur.

## II.—*Non-Indian Collections.*

1. An excellent collection of British and other European plants selected from the Herbarium of the Royal Botanic Garden Kew and presented by Sir W. Hooker.

2. A good collection of Norwegian plants presented by Dr. Blytt, an eminent Norwegian botanist, to Mr. Griffith, and received from Dr. McClelland in 1856.

3. A large collection of European grasses, the source of which I have not yet been able to trace. The specimens have printed tickets attached and were probably purchased by Dr. Wallich.

4. A large collection of Swiss and French plants presented by M. DeCandolle to Dr. Wallich, but unfortunately for the most part in very bad preservation.

5. A good collection of British ferns presented by Mr. R. Scott.
6. A small collection of Scotch plants supposed to have been presented to Dr. Griffith by Dr. Balfour.
7. A small set of Siebers Egyptian plants, purchased by Dr. Wallich.
8. A considerable collection of Cape plants collected by Dr. Pappe.
9. A collection of Mauritius ferns presented by Mr. McMurray in 1856.
10. A small collection of the plants of the provinces of Dahuria in Asiatic Russia, presented by Dr. Fischer to Dr. Wallich.
11. Interesting collections of Aden plants presented by Dr. Boycott and Lieut. Playfair.
12. A large collection of New South Wales plants presented by Col. Vicary.
13. A smaller but excellently preserved collection of Australian and Tasmanian plants, the donor of which has not been recorded.
14. A small collection of Tasmanian plants presented by Capt. Margrave.
15. An extensive collection chiefly of New Holland plants selected from the Hookerian Herbarium and presented by Sir W. Hooker.
16. A few New Zealand ferns presented by Mr. Bedford.
17. A complete collection of the plants of the United States of North America chiefly from the states of New York presented by the Rev. S. Williams in 1844. This collection is carefully named and ticketed and is very valuable.
18. A small collection of North American plants presented by Mr. Joseph Carson in 1836.

An examination of this list will show that our Herbarium is still very imperfect, and that there is no part of India from which contributions would not be welcome. It is, however, sufficiently complete to form an excellent basis on which, with the assistance of contributors from all parts of India, a general Herbarium may be completed in the course of a few years, and it contains a sufficient number of authentically named specimens to enable me to name the collections with which I may be favoured, without much diffi-

culty on the spot, and thus to avoid the necessity of sending them to England for comparison.

In a country like India, where the distribution of plants is regulated so completely by the climate, it is most important that botanists wherever situated should devote themselves to the complete elaboration of the plants of the district in which they reside, and that they should, if possible, combine careful meteorological observations, especially of the humidity, with their botanical labours. It is only thus that the exceptional cases (if there be any) of plants whose distribution is independent of the climate, can be speedily eliminated.

To the philosophical botanist who is desirous of investigating the laws by which the distribution of plants is regulated, no flora in the world is more interesting than that of India, though it is in point of numbers of species a very poor flora, when compared with Australia, south Africa, or the continent of South America, to all of which nature has been liberal to profusion in richness and variety of vegetable forms. The interest of the Indian flora lies in the absence of new forms, in the identity of its plants with those of other countries, in the occurrence of European plants on our western mountains, of Japanese plants in the Eastern Himalaya, of Chinese plants in our dense eastern forests, of a purely Egyptian flora in Sindh, of a Polynesian flora in Malaya, and of numerous African types in the mountains of the Madras peninsula. It may interest Indian botanists, for whom especially this little paper is intended to give a slight sketch of the different floras which co-exist within the limits of British India.

Disregarding for a moment the Malayan Peninsula, British India may be described as an equilateral triangle with sides 1,500 miles in length, the apex advancing far within the tropics, the base in the hotter part of the temperate zone. The tropical portion of this triangle is traversed by ranges of hills of moderate elevation, most lofty toward the south, where they rise above 8,000 feet, less lofty in the north where the average height of the ridges is not more than 4,000 feet. Within the temperate zone, the level of the surface is much lower, and it is there occupied by the basins of two great rivers, the Indus on the west and the Ganges on the east. South of the tropic this large triangle is every where surrounded by

sea, but north of the tropic the boundaries of India are traced on land, and are more or less artificial.

The Indian Peninsula includes two distinct mountain systems. The meridional chain of the Ghats attains in Travancore and Malabar an elevation of 8,000 feet, but north of Nagar rarely more than 4000. It runs parallel to the western coast, and sends off transverse chains running east, which are flattened out into a table-land highest in the south, where the continent is narrow, lower to the north where the continent is wider and the rivers larger. North of the Godavery the transverse range of the Vindhya runs from sea to sea almost on the tropic, sending out on all sides table topped branches and connected by a low ridge with the ghats further south, and with the Himalaya by the curious oblique Arawali range, which forms a water-shed between the Indus and Ganges.

An extensive plain watered by the Indus on the one hand and by the Ganges on the other, separates the Indian Peninsula from the Himalaya, which rises on the north a stupendous barrier, constituting the Indian portion of the enormous mountain mass of Central Asia, which presents steep declivities in all directions.

After the configuration and elevation of the land, the most important element by which the distribution of vegetable forms is regulated, is climate. The climate of India depends mainly on the rain-fall. Situated entirely in the northern hemisphere, and with an enormous mass of land to the north, the summer winds blow strongly from the south, while the winter winds are northerly. The south wind commonly called the S. W. monsoon is always a sea wind and therefore brings rain. The summer is therefore the rainy season in India. The northern winter wind is generally a land wind, so that the winters are generally dry. To this, there are two exceptions, the coast of the Carnatic and the Malayan Peninsula, in both of which the N. E. monsoon is a sea-breeze and therefore a rain bringing wind.

The normal climate of India is divided into a cold, hot and rainy season, but the amount of rain depends on the position of each place. The west coast of the Peninsula, which presents to the S. W. wind a lofty range of mountains, is extremely rainy at one season, but the east coast, being sheltered by the higher hills to the westward, is much less so. On the Ghats the rain-fall diminishes as



we go north, and when we reach Gujerat has become very small indeed. In Sindh there is no rain at any season.

In the Himalaya, the rains are heaviest to the eastward, where the chain is nearest the sea, and they diminish gradually, as we proceed west, till they entirely disappear in the mountains of Afghanistan. In the Malayan Peninsula in which both monsoons blow over sea, all seasons of the year are rainy, the summer or South-West monsoon being rather drier from the intervention of the island of Sumatra, which condenses much of the rain at that season.

In consequence of differences of elevation, three different climates require to be studied in treating of the vegetation of India. These are the tropical, the temperate and the alpine. Rising out of the hottest part of the temperate zone into the regions of perpetual snow, the slopes of the Himalaya exhibit all these forms of vegetation at different elevations, but as none of the mountains of the Peninsula rise above the temperate zone, the alpine flora is found only in the Himalaya. This alpine flora is found at elevations above 13,000 feet, and varies with the degree of moisture. In the outer Himalaya, where the snow-fall is copious and the summer humid, but with bright sunshine, we have a flora closely resembling that of the Alps of Europe. A similar flora is found on the highest peaks of Afghanistan, of Persia and of Asia Minor, and beyond Europe extends into the Alps of Greenland and of temperate N. America. In the more arid mountains of the interior we find a purely Siberian Flora.

In Southern India the temperate flora begins about 7,000 feet of elevation, but as we advance northward, the requisite elevation gradually diminishes till in the most northern part of the Himalaya, it is not more than 4,000 feet. In Southern India therefore the temperate flora is found only in isolated patches on the mountain tops, but along the Himalaya it is continuous from one end of the chain to the other. Here it presents three distinct types, the first of which is the normal Himalayan type of forms which are adapted to a climate dry at one season, wet at another, occupying the Central Himalaya. To the west, we have the European type intruding upon and mingling with it, especially in the inner ranges where the climate is drier. To the east, the Japan or moist temperate flora is especially developed in Khasia and Sikkim where the climate,

throughout the year, or at least throughout the whole period of vegetation, is extremely moist.

The tropical flora is dependent in like manner upon the climate, and partially also on the nature of the surface. The open plain of the Indus and Ganges which stretches from sea to sea, has a gradually diminishing rain-fall as we ascend the Ganges and approach the Indus. The rain-fall is also greater everywhere near the base of the Himalaya and diminishes as we recede from it. In Sindh and the Western Panjab no rain falls, and there we find an arid flora identical with that of Egypt, with which in fact it is continuous across Arabia and Southern Persia. The characteristic plants of this arid flora extend at a distance from the mountains down the valley of the Ganges, but never approach the more humid Himalaya, in which we have a flora like that of Bengal, though they recur in the Deccan and Carnatic, which are sheltered from the moist wind of the S. W. monsoon by the higher ranges of the Ghats.

In the hilly districts of India where a dry hot season is succeeded by more or less heavy rain during the monsoon, we find in all parts of the empire a very similar flora. On the eastern slopes of the Ghats, in the valleys of Nagpore, on the slopes of the Arawali, and along the base of the Himalaya (except to the eastward and in the extreme west) we find the same monotonous forest consisting partly of evergreen and partly of deciduous leaved trees with many creepers. The trees are gay with flowers in spring, and after being scorched by the intense heat of May and June burst into life with renewed vigour at the commencement of the rains.

It is only when the humidity begins to linger in the damp and shady valleys throughout the year that the flora changes its character. This we find to be the case in many parts of the valley of the Nerbada, and in the deeper ravines of the Ghats of the Concan. The number of peculiar forms increases as we go southward, and is very great in the forests of Travancore and Ceylon. So in the Central Himalaya, humid forms appear as far west as Kumaon, increase in numbers in Nipal, predominate in Sikkin and are universal in Assam. In Malaya where the climate is humid at all seasons we have the flora of the Archipelago, the richest and most varied which is found in any part of India.

I might illustrate each of these floras at great length, but the object of this paper is not to bring forward examples of each, but to induce botanists to lend their assistance in establishing their limits on a sure basis of observation, by collecting as far as they can, and transmitting for examination and comparison, the plants of their respective neighbourhoods, so that the exact area inhabited by every species may be ascertained, and the main facts of the Geographical Botany of India be accurately determined.

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PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR AUGUST, 1856.

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At a monthly general meeting of the society, held on the 6th instant, at the usual hour,

Dr. G. G. Spilsbury, Vice-President, in the chair.

The proceedings of the last meeting were read and confirmed.

*Presentation received.*

From the Grant Medical College in Bombay, a copy of the report of the institution for the Session 1855-56.

A note from Mr. H. V. Bayley, announcing his withdrawal from the society, was recorded.

A. Roberts, Esq., C. S., Major W. C. Erskine, and Rajah Sutto-shurn Ghosal Bahadoor, proposed and seconded at the last meeting, were balloted for and elected members.

The following gentlemen were named for ballot at the next meeting :—

Lieut. H. S. Forbes, Artillery, supervisor of the Ganges, proposed by Major Ouseley, and seconded by Mr. Atkinson. Sultan Mohamed Busheerooddeen Saheb, proposed by Mr. Grote, and seconded by Mr. Atkinson. A. R. Young, Esq., B. C. S., and R. B. Chapman, Esq., B. C. S., proposed by Mr. Beadon, and seconded by Mr. Atkinson.

With reference to Mr. Greenough's Geological map of India, a copy of which was sent by the Bengal Government in September last, with a request that the society would express their opinion of its merits, the Council submitted the following report drawn up by a special Committee appointed for the purpose :—

TO THE COUNCIL OF THE ASIATIC SOCIETY OF BENGAL.

The Sub-committee appointed by the Council of the Asiatic Society under date the 28th September, 1855, to consider and report



upon the Geological and Physical map of India, prepared by Mr. Greenough, which had been forwarded by the Government of Bengal, with a request that the Asiatic Society should give effect to the wishes of the Court of Directors, returning the map with such information as they might possess bearing upon its accuracy, have considered the questions referred to them, and now beg to submit their report.

The despatch of the Court of Directors states, that this map has been "compiled by Mr. Greenough from such materials as he has been able to collect," and your Committee would most fully acknowledge the great labour of research and the careful compilation which this map evinces. They cannot but remark, however, that it is not only customary but very desirable that in such cases the principal sources of information which have been taken advantage of, the special authors or observers consulted, and the general character of the data so compiled, should be fully stated. They believe that this is even more largely requisite with regard to a country like India, concerning the geology of which so little is known, than with regard to the more closely investigated districts of Europe.

No memoir or report has accompanied the map. Your Committee is aware that an abstract of Mr. Greenough's communication to the British Association for the advancement of Science at their meeting in 1854, when this map was first presented, has been published in the reports of that association; and a reference to this short abstract has more fully convinced them of the important omission which has occurred in not supplying a copy even of these few words of explanation along with the map.

It appears obvious also, that the compiler has had the benefit of MS. reports and communications, inasmuch as several statements, sometimes of startling importance, have been embodied in this map, which your Committee is not aware have ever before been published and which, they believe, would never have remained uncontradicted had they been so. Your Committee is altogether unable to say what value should be attached to such statements, but were they to judge from the analogy of other similar geological statements in this country, they would be disposed to rank them as nothing better, if not something even worse, than conjecture.

Your Committee would also express their regret at finding that more care has not been taken in the preparation of the map with regard to the purely topographical or geographical portion. In these respects it is altogether behind the present state of our knowledge of this country. Mr. Greenough states it to be the result of twenty years' labour. It is therefore not improbable that an old map of that date originally used for the recording of geological facts has been continued as the basis of the present one. If a new compilation has been made, great want of care and attention appears to have been allowed in its preparation. Names of the same places are in some cases repeated at points differing by whole degrees in latitude, ranges of hills have been misplaced occasionally by some hundred miles. In brief, your Committee consider the map so wanting in accurate geographical information, that it never can become the basis of a careful geological map.

Your Committee have been unanimously impressed with the strong conviction, that the time which the Court of Directors have proposed for the collection and collation of more accurate information regarding the Geology of the country, is much too short, to admit of any really useful result being obtained. They have given below a list of isolated points in which corrections are required, but for any general improvement much more time will be needed.

Your Committee desire to acknowledge the value of this map, they look upon it as a most important contribution to the natural history of this country; they consider it will prove both a guide and an aid to the researches of many. It will shew, however imperfectly, the great desiderata in the geological history of the country, and will form an index to the present state of knowledge. But they conceive, that it should be allowed to remain in its present state, to form a memorial of the condition of our geological knowledge at the time of its publication. They think it too erroneous in many respects, to be capable of being used as the ground work of an accurate map; and they look forward with anxious expectation to the time when the more detailed investigations of the geological survey in this country will furnish data for such a compilation. They can refer to the proceedings of your Society for the present year in proof of these views. New light has been within

the last few months thrown upon the structure of immense areas, which will in reality affect the whole system of colouring adopted on the map under consideration. But the details of such researches are not as yet sufficiently extended to enable them to be made use of for the purposes of a general map.

Your Committee are the more deeply impressed with the inexpediency of any present attempt at the issue of a new edition (as the Court of Directors would appear to contemplate) of this map, by the fact that any corrections now made cannot have the benefit of the knowledge and research of the original compiler. Geology had to mourn the loss of Mr. Greenough even before the actual publication of this map. And while your Committee is persuaded that some of the errors they have alluded to, would never have escaped his careful revision, they think it would be scarcely possible for any other person now to take full advantage of such corrections as might be noted. If a new map be desired they conceive that a competent geologist should be requested to devote his energies to it for the ensuing two or three years, so that a map, brought up fully to the most recent state of knowledge on the subject, might then be published, while the present map would ever remain a monument of Mr. Greenough's zeal and labour.

Your Committee cannot avoid expressing their entire concurrence with the views of the Court of Directors in thinking, that such maps "may be made the means of procuring further, and more correct information" on the geology of the country, but they feel satisfied that this must be brought together by some one acquainted with Indian geology as well as European; and must shew a less exclusive adherence to European types and European nomenclature.

All which they would submit as their report on the questions referred to them.

THOMAS OLDHAM.

C. B. YOUNG, *Captain Engineers.*

H. L. THUILLIER, *Major.*

E. G. SPILSBURY, M. D.

A. GROTE.

H. PIDDINGTON, *Curator Museum Economic Geology.*

*July 1st, 1856.*



*Memorandum of corrections which ought to be made in Mr. Greenough's Geological Map of India.*

1.—The fossils found in the boring at Fort William, Calcutta, were all of recent species, and not of Sewalik age.

2.—In the neighbourhood of Silhet, the Cossia hills, &c. the words “nummulite bed” under the name Silhet, ought to be removed—none such exists there.

3.—“Silhet Coal field” placed on the map to the west of the town of Pondua, to be erased. No Coal near this.

4.—Jynhanpoor on the map ought to be Jynteapoor.

5.—The words “Coal many hundred feet thick” under Jynteapoor, contain an assertion totally unfounded.

6.—A peculiar colour is carried all along the base of the hills here, between the tint of green representing the Eocene, and the pink of the gneiss, &c. for which no representation is given in the index of colours. We presume this to be altogether a mistake of the colourers.

7.—The dotted lines for colour boundaries near the west of the Cossia and the Garrow hills have been altogether disregarded.

8.—The granite is not known to extend along the northern face or slope of the Cossia and Garrow hills—but is found in detached patches in the hills.

9.—At and near to the intersection of the parallels of  $25^{\circ}$  N. lat. and  $91^{\circ}$  East long., the country is entirely alluvial. The words “nummulite beds, and limestone” are therefore erroneously inserted.

10.—The “Cyrtoma, a new species of the fossil Ecchinida,” shewn as occurring in the gneiss is from the Eocene. The Cyrtoma, is a *genus* not *species*.

11.—The mode of representing the area covered by the coal-bearing rocks in Bengal gives a very erroneous idea of the geology of the country. They do not in any known case form a continuous band, but invariably occur in isolated basins or areas, included in the gneiss.

12.—“Patturghatta” near to Colgong is on the river Ganges. There is no “limestone” there.



13.—The Laterite from Balasore upwards forms only a very limited and broken band, and does not occur in the immense spread shewn here.

14.—There is no laterite in the flat country near Shahabad. It is all alluvial.

15.—In the districts marked “unknown” near Cuttack, the survey have mapped coal fields.

16.—There are on this map two words “Kuttack” inserted, there should be only one. That most to the south on the Mahanudi river is more nearly in the correct position than the other.

17.—In the Curruckpore Hills near Monghyr no limestone is known, the words “white marble,” &c. must therefore be removed.

18.—The *Curhurbalee coal field* is a whole degree of longitude out of its true position.

19.—There is no long line of coal-bearing rocks stretching by the Adji river in Beerbhoom.

20.—The Rajmahal Hills are not identical with the Goomah Ghauts as given. The Rajmahal hills are near to the town of Rajmahal, two degrees east of where they are shewn.

*In Central India, &c.*

21.—*Omercuntuc*, the source of the Nerbudda is placed on the Soan river, whereas it should be to south of Ajmeergurh when a pencil  $\times$  has been put.

22.—The *Maikel Pahar* on which is the table-land from whence the Nerbudda rises, is all trap capped with laterite.

23.—South of the Nerbudda from Ramgurh to Ajmeergurh (?) is coloured *syenite*, &c., while most of it is laterite, and to the north below the Maikel hills about Sohagpoor, it is sandstone.

24.—A large tract between Mundlah and Jubbulpore is coloured “*Coal of all ages*,” but should be trap on both sides of the river.

25.—Coal is found at Lemaita Ghat, South of Gurrah near Jubbulpore : not marked.

26.—*Goondwana* represented on the map as gneiss, is chiefly coal-bearing rocks covered with trap.

27.—“*Mahadeo Pahar*” or the Mahadewa range, is altogether out of position. The range on the map north of *Goondwana* is nearly their position.

28.—The Mahadewa Hills are all sandstone.

29.—The Mittoor range is trap.

30.—The sandstone represented on the map by the bright yellow colour is continuous down the valley of the Nerbudda considerably further to the west than Hindia, instead of ceasing at Hosingabad.

31.—The area coloured as “coal, &c.,” and which includes Bowergurh, Doregurh, &c., is in reality gneiss.

32.—Bhavergurh as here printed should be Bhower, or Bhora-gurh.

33.—Bhoradoorg and Bhoragurh are one and the same place.

34.—At *Oomrait*, *Coal* is printed and pits shewn, but it is coloured as gneiss.

35.—The whole of the Vindya and the Kymore ranges are of a totally different age from the coal rocks south of the Nerbudda.

36.—About six miles south of Ramteak Manganese said to be abundant.

37.—At *Koorraddee*, marble much used in building, is chiefly dolomitic.

38.—The whole course of the Wyne Gunga is in trap rocks.

39.—The Palamow and Sirgooja coal fields are not united.

40.—There is no ground whatever for colouring the great masses of the Himalayas as granite. In Sikkim for instance, Kunchinjunga is undoubtedly not granite as here shewn, and for many of the other great masses the same is true.

41.—At the foot of the Darjeeling Hills the band of colour representing the Eocene rocks, is more than twice as broad as it should be. It should not extend into the flats or terai.

42.—There is no ground for colouring such an area as granite in Shahabad. It occurs in detached points and masses.

43.—The *coal* in Cutch is not marked.

44.—There are no known reasons for connecting the cretacious rocks near Trichinopoly with those at Verdachellum near Pondicherry, so as to form a continuous band.

45.—What ground is there for saying that coal is found 400 feet deep, at or near Salagur in the Sunderbunds ?

46.—In Pegu and Arracan to the east of the Bay of Bengal. *Mynuoung*, which is shewn in Arracan to west of the hill range, is in reality on the banks of the Irrawaddi.

47.—*Sarawaddi* is equally on the river Irrawaddi.

48.—*Kyouktaran* is also on the river.

49.—From this point northward along the river, as far as the map extends, the greenish tint used for tertiary rocks may be continued.

50.—“*Silurian beds*” entered near *Patanago* to be erased; all tertiary.

51.—The words “transition limestone” near  $18\frac{1}{2}$  N. lat. to be erased, all is tertiary.

52.—Again “transition limestone” (at 19° N. lat.) ought to be removed, and the words “Silurian slate” under *Pukan-gyi* ought to be removed: none being there.

53.—In colouring in many cases there has been a great want of care. At N. lat.  $28\frac{1}{2}$  and East long.  $68^{\circ}$  to  $71^{\circ}$  a case of this kind may be seen, when the colours on the two different sheets do not join within 120 miles; and several other cases might be quoted.

The scale of colours appear to be altogether deficient in clearness and distinctness, the tints approaching each other too closely.

THOMAS OLDHAM,

C. B. YOUNG, *Capt., Engineers.*

H. L. THUILLIER, *Major.*

E. SPILSBURY, *M. D.*

A. GROTE.

H. PIDDINGTON, *Curator, M. E. G.*

The report was approved and adopted.

*Communications were received—*

1.—From Mr. Grey, Secretary to the Government of Bengal, forwarding Dr. McNamara’s report on the Iron Ores last sent from Assam by Col. Hannay.

The report is as follows:—

The iron is present in the form of the magnetic oxide, the masses of which are scattered through a large proportion of silicious matters. The ore contains on an average 40.2 per cent. of metallic iron.

By placing some of the ore in a basin, and washing it with a stream of water, I was able, very quickly and with very little trouble, to obtain an ore containing 65 per cent. of metallic iron, these specimens may therefore be considered very rich as regards the amount of iron in them.

2. From Mr. Secretary Grey forwarding for the information and guidance of the society extracts from a despatch No. 41, dated 18th May last, in reference to the proper application of the Government grant for the publication of Oriental works, and adding on behalf of the Lieut.-Governor that the Society's account of the Oriental Publication Fund for 1855, exhibited a larger amount of liabilities than that commented on by the Hon'ble Court. The following is the Court's despatch.

PUBLIC DEPARTMENT.

No. 41 of 1856.

Our Governor General of India in Council.

Para. 1.—These accounts exhibit a balance in hand on the 28th February, 1855, of Rs. 5,546-6-7, but

Narrative dated 13th July, No. 17, 1855, para. 41. Forwarding accounts of the expenditure of the allowances granted to the Asiatic Society of Bengal for the publication of works in the languages and literature of India for the years 1853-54.

with liabilities considerably exceeding that amount or Rs. 9,224-2. This will be partly met by the monthly grant during the current year, but it will involve the suspension of many of the works in progress. The difference is more than ought to have been incurred, and we

expect that in future the annual outlay will be limited to the amount of the annual receipts.

2.—The increase of liability arises no doubt from the greater activity given to the publication of the numbers of the *Bibliotheca Indica* by the arrangement adopted by the Asiatic Society of paying the editors for work actually performed, thus giving them an inducement to more diligent application. As, however, there is no particular object to be gained by accelerating the publication of the *Bibliotheca Indica*, and carefulness in editing is of more importance than rapidity of publication, we are of opinion that some restraint should be imposed upon the editors of works that are likely to be voluminous or that are of minor interest, and that they should be allowed to issue only a definite number of fascicules in the course of any one year.

3.—This augmented activity and enhanced expense arise especially from the great impulse given to publications in Mahommedan literature and the Arabic language. Of the 38 Nos. of the Biblio-



theca Indica issued in 1854, twenty-seven are Arabic, only ten are Sanscrit and one English, the cost of the former is Rs. 6,752 of the ten latter less than half, viz. Rs. 3,036. This is a disproportion which is inconsistent with the comparative claims of the two departments of literature whether the ratios of the population or the value of the individual works be considered, for on referring to the Mahommedan works we observe that they have no relation whatever to India, nor to any popular form even of the literature of the Indian Mahommedans; but they embrace to a very large extent abstruse Mahommedan Theology and Sufyism in works which none but a few of the most learned Moulavies can read, and which still fewer understand, works utterly worthless for the illustration of the past or present condition of India and of little utility to European scholars. When we authorized the appropriation of a special grant to the encouragement of Indian literature, we had in view especially the literature of the Hindus, although, we did not purpose to exclude Mahommedan literature of local origin or interest, such as the historical works epitomised by Sir Henry Elliott; but we certainly did not contemplate a voluminous and costly publication of the theology and tradition and spiritual mysticism of the Mussulmans, which is the literature of Arabia and not at all that of India.

4.—We therefore direct that the encouragement of such works be hereafter withheld. The publications that have been commenced may be completed, but upon their completion we expect that the Asiatic Society in applying part of the funds placed at its disposal to Arabic or Persian works will have due regard to the light which they are calculated to throw, not upon the literature or theology of Arabia, but upon the literature and history of India.

We are, &c.,

(Sd.) W. H. SYKES.

„ R. D. MANGLES.

And other directors.

*London, 13th May, 1856.*

The Secretary stated that the council had not yet drawn up any reply to this communication, but that they were of opinion that, whilst expressing their readiness to carry out the orders conveyed by it, the society should at the same time transmit for the informa-

tion of the court a copy of the recent correspondence with Professor H. H. Wilson on the same subject in explanation of the principles upon which the Bibliotheca Indica has of late been conducted. The draft of a reply would be submitted at the next meeting.

3.—From Mr. Secretary Beadon intimating the wish of Government to transfer to a Museum about to be established under the superintendence of Mr. Oldham the Geological collection of Government hitherto in charge of the Society, and the services of the Curator and his establishment, and inviting the Society to deposit its own collections in the new Museum. Also a letter on the same subject from Mr. Oldham.

The letters are as follows :—

FROM C. BEADON, ESQ.,

*Secy. to the Govt. of India.*

TO THE HON'BLE SIR JAMES W. COLVILLE, KT.

*President of the Asiatic Society.*

*Dated the 11th July, 1856.*

HON'BLE SIR,—The Government of India having resolved on forming in Calcutta a Museum of Geology, Home Department. with a library of reference in connexion with the Geological Survey of India, and under the direction of Mr. Oldham the Superintendent of that Survey, I am directed to request that the Society will place at Mr. Oldham's disposal the Museum of Economic Geology now in charge of the Society, and will permit Mr. Piddington, if he have no objection, to act as Curator of the new Museum on his present salary under the orders of Mr. Oldham, and subject also to such superintendence from the Professor of Geology in the Presidency College as Mr. Oldham may determine.

2. The grant of Rs. 314 now paid to the Society in connexion with the charge of the Museum of Economic Geology will cease from the date on which the collection is removed from the Society's premises.

3. The Governor General in council in thus relieving the Society of that which has long been a growing and unmanageable burden to their Institution, desires to express to its members the thanks of the Government for having so long permitted the collection to occupy a place in their house, and for the supervision they have exercised over the Curator's proceedings.

4. The liberal spirit in which the Society met a similar proposal from the Government in 1851-52, leaves no doubt in the mind of the Governor General in Council as to the readiness with which they will acquiesce in a new disposition of the Museum of Economic Geology which will increase its practical utility, and His Lordship in Council would fain hope that when the members of the Society are assured that the Government of India is earnestly determined to place the Museum of Geology on a liberal effective and permanent footing, and to make it contribute actively to the promotion of science and useful knowledge, they may be induced to give their aid to the cause by depositing in the new Museum under the charge of the highly competent and able officers who are appointed to manage it, and on such conditions as may seem good to the Society the valuable collection of Fossils and other Geological specimens of which they are in possession.

5. It is not too much to assume that if that collection should be placed in proximity with those in the Geological Museum, which will henceforward be rapidly increased, and effectively exhibited, it would acquire even greater interest, and be more generally instructive than in a separate establishment.

That the Museum would thereby receive a most valuable addition to its attractiveness and usefulness there can be no doubt.

I have, &c.,

(Sd.) C. BEADON,

*Secy. to the Govt. of India.*

*From the Superintendent of the Geological Survey.*

*To the Secretary Asiatic Society of Bengal, dated July 19th, 1836.*

SIR,—I have the honor to state for the information of the Asiatic Society, that I have been directed by the Governor General in Council to take immediate measures for the formation of an extensive Geological Museum, both Theoretical and Practical, in Calcutta, to be located for the present in a large house rented for the purpose, preparatory to, and in anticipation of proper and ample accommodation being provided in the contemplated new buildings for the University and College. In carrying out this intention, I have been directed to remove at once, into the house now provided “the



collections which now constitute the Museum of Economic Geology, and any other collections now in Calcutta belonging to Government."

I have therefore the honor to request that at the earliest convenience of the Society, arrangements may be made for handing over to me the collections of the Museum of Economic Geology now under their charge. A house, well adapted for the purpose, has been rented for a term of three years, and I am ready for the reception and arrangement of the collections.

In submitting this request I would beg to add, for the information of the Society, that the fully-expressed determination of Government is that the Museum shall contain collections sufficient for all purposes of reference and study, a collection of all the mineral products of the country, and a series exhibiting their applications, and as extensive a series of organic remains as it may be possible to bring together, special attention being directed to those from different parts of India, with such fossils of corresponding age from other countries as will tend to elucidate their history: in brief, to have the Museum as extensive, as useful, and as general, as it may be possible to make it, and also such as may be in some degree worthy of the capital of British India.

Success in carrying out this object can only be looked for from the hearty aid and co-operation of all those who may take an interest in such pursuits. I have already had promises of such co-operation from several in Europe, who feel how materially the advancement of Geology will depend on such establishments to aid in the study of the science, and I feel that it will need no argument to prove to the Asiatic Society of Bengal, the advantage which must result from such a Museum. It could only have been from a conviction of those advantages that the Society has so long, so steadily and so successfully devoted itself to the accomplishment of a similar end, and has brought together a collection of great value and importance. But no one can be more fully aware than the Society itself is how inadequate, for the exhibition of their collections, is the room which can now be devoted to them, and how impossible it is to render useful any collections which they possess, and how many valuable additions to their Museum still remain, and unavoidably



remain, packed away in boxes and quite inaccessible. Nor is there, as I believe, any prospect of such additional rooms being obtained as would suffice for the display even of the existing collections, without reference to the frequent additions received every year.

Abundant accommodation has been provided in the house which is at present intended for the reception of these collections, and ample provision will be made in the intended new buildings for such purposes.

The connexion of the Geological Museum finally with the University and the Presidency College, gives a full guarantee that there will always be a qualified staff to take charge of the collections. There must always be a professor of Geology attached to the College, who even if a Museum did not exist would be compelled to form one, and who would therefore be deeply interested in its success, while the union of this Museum with the great central establishments for education would extend its correspondents, and enable it to derive the full benefit of exchanges with and from kindred institutions in other places.

The Museum with all its collateral advantages is ordered to be made as fully available to all classes, as it possibly can be: it is to be open, under proper restriction, every day excepting Sundays, and is to be free, and every thing will be done to render it as permanently useful as possible.

Government have further sanctioned an expenditure sufficient to bring together a useful working library of books of reference on such subjects, and this also will, so far as practicable, be made freely available for all enquirers and students.

Under these circumstances I would express a confident hope that the Asiatic Society will entertain favorably the request conveyed to them through their President, and will aid in the advancement of Geology, (an end which I am sure they will acknowledge to be both useful and desirable,) by contributing the collections now in their possession.

In doing so I might add that they would only be following the example of other kindred societies at home, while, if so desired, their collections might readily, for purposes of reference, be kept distinct from others and thus be quite as useful to their members

and to others, as they now are; with the additional advantage of forming a portion of a more complete and more extended series.

I have, &c.

(Sd.) T. OLDHAM,

*Superintendent, Geological Survey.*

The Secretary stated that by the direction of the Council, he had replied to Mr. Beadon's letter to the effect that the Government collections would at once be placed at the disposal of Mr. Oldham, but that the question of depositing the Society's collections in the new Museum must be referred to the Society at large for their decision.

The Council were still deliberating upon the course which they should recommend the Society to adopt on this question and would report on a future occasion.

4. From Capt. W. E. Hay, Assistant Commissioner of Kangrah, giving an account of some new Greco-Bactrian and other coins in his possession accompanied by drawings.

The following are extracts from the letter :

"An interesting coin has lately been sent to me from the Punjab which (if genuine) would apparently disprove the identity of Theodotus with Diodotus, as I see conjectured by Prinsep and others. This coin, which is of silver weighing 201 grs., has on the obverse the head of the king Diodotus *Soter* filleted with the legend Diodotou Soteros. On the rev. Antimachou Theou *Basileontos* (being king). A few months ago I procured half of a coin with on one side ΔΙΟ and on the other ΑΝΤΙ. I naturally supposed the name would have been Antiochus, but this second and very perfect coin leaves no doubt on the subject. This is the reverse usually found on the Antiochus coins.

"I have a silver coin of Heliocles of large size, also a novelty ; on the obverse the head is helmeted like Eukratides, and on the reverse a seated figure of Jupiter. This coin was in bad condition until I applied nitric acid, when the legend came out very distinctly. Another beautiful brown coin, or I should say a Civic Medal, seems to be new ; the head on the obverse is that of a handsome young man, apparently intended to represent Apollo. If of Euthydemus,

it represents him much younger than on any of the silver coins of that king. On the rev. of this coin is a beautifully executed altar as seen in some of the Syrian coins with the legend *Basileos Euthydemou*. The monogram is similar to that on the copper coins of Demetrius, figured No. 4 in Cunningham's plate No. 2, to 160. I have also the same monogram on a double-headed Eukratides, which I was fortunate enough to procure, and which is an undoubted genuine coin. I have the pleasure to send you sketches of some other coins which I believe to be new and unpublished; one, a small drachma of silver of Euthydemus, is a beautiful coin, weighing 60 grains, with the same reverse as the large coins usually bear.

"Also a half drachma of Hippostratus, weighing 35 grains, similar exactly to one of his didrachmas. Also a Satrap's coin; I don't feel sure of the name, but I imagine it to be Zoilus.

"Also a beautiful new type of Myas in execution equal to the small square coins of Apollodotus.

"Likewise a round copper coin of Myas, on the rev. a figure in the act of moving, the head surrounded by a glory or disc. I have other coins which I believe to be quite new, but such numbers of novelties must have been brought to your notice within the last few years, that it may be irksome to publish so many plates, but as your journal was the first to begin, so it might wish to continue the series of Bactrian relics, which must be more or less interesting, serving as so many links to fill up gaps in the interrupted history of that very interesting period following on the Asiatic conquests of the great Macedonian.

"I have a variety of gems, intaglios, with very interesting devices; but as some bear, I am inclined to think, a decided stamp of Persian origin, it is possible that they may have been brought thence to the Punjab; some, however, are purely Grecian, others with heads of Sassanian kings, one or two with legends; and one has a perfect representation of Layard's Nineveh Bull king. Come from where they may, they are evidently antiquities of more than ordinary interest.

"I have a very good collection of Sassanian coins, but am unable to read the legends: could you assist me with the Zend alphabet?

“ One gem is interesting as having a small fire altar, and instead of the attendant Zoroastrian magi, on each side is a Pegasus or winged horse, emblematic I suppose of flight to heavens.”

Bábu Rájendralál Mittra thought Capt. Hay's Euthydemus to be no novelty, nor did his Antimachus appear to be uncommon. The only peculiarity noticed by Capt. Hay was the legend on the obverse Diodotus Soter; this, however, was far from being distinct on the drawings, and it would be venturing too much to found upon it an argument against the identity of Diodotus and Theodotus, even if the authenticity of the coin had not been questionable.

The two Myas, he believed to be new, and suggested that they should be figured in the journal.\*

5. From Bábu Rádhánáth Sikdár forwarding copy of a Meteorological Register kept at the Surveyor General's office, Calcutta, for the month of May last.

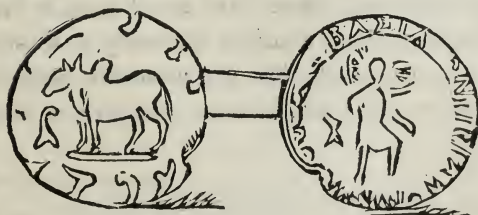
6. From Mr. Assistant Secretary Oldfield enclosing copies of Meteorological Registers kept at the Office of the Secretary to the

\* The following are copies of Capt. Hay's figures.

No. 1.



No. 2.





Government of N. W. P. Agra, for the months of May and June last.

7. From Col. Birch, Secretary to the Government of India in the Military Department, forwarding three reports from the Messrs. Schlagintweit on the progress of the Magnetic Survey.

Mr. Samuells, at the request of the Chairman, after giving a slight sketch of the Physical and Political Geography of the Tributary Mehals, proceeded to read the paper submitted at the last meeting on a singular forest tribe inhabiting these districts,\* and read the following letter from Lieut. Macdonald, Madras Army, Inspector of Schools in the Northern Circars, in reference to some other little known tribes of central India.

“The Coorumbas are a race of savages inhabiting the jungles of Wynaad in the district of Malwar, and also certain parts of Coorg. The men are black, of diminutive stature, and have woolly hair, but do not resemble negroes in any other respect. They are often employed in felling trees in the coffee estates, on which occasion they always have their women in the jungle. They act as shikaris and guides to elephant hunters. They are extremely active and climb trees like monkeys. In Wynaad they live in small huts mostly constructed of bamboos and grass. In Coorg they live in trees. The men are great shikaris and are very fond of spirits and tobacco. The women wear nothing round their waists but a few leaves. These details I have from McNeill and Penny, both of whom have often seen these people; most probably some account of them has been published, but I do not know where. Pharaoh does not, as far as I can see, give any account of them in his Gazetteer of Southern India. Perhaps an account may be found of them in the Madras Library Journal, but I cannot refer to it.

“There is also a race of savages who inhabit the jungles of Masulipatam and Guntoor, where they are known by the name of Chinchoo. My informant, a native (formerly a tehsildar in that part of the country) says that the women sometimes, but not always, wear leaves round their waists and on the upper part of their person.

\* This paper appeared in Journal No. 4.

“On looking through Pharaoh's Gazetteer, I have come across the following account of a somewhat similar race at page 546.

“Twenty years ago females of a degraded caste of Koliers used to come into Mangalore with no covering, other than some thick branches of a bush tied to their waist in front and the same behind; they have now substituted a cloth for the leaves in front.”

On the motion of the chairman, the thanks of the meeting were voted to Mr. Samuells for his very interesting account.

Dr. Spilsbury read the following note drawn up by Major Hogge, Artillery, and forwarded by the Superintending Surgeon, J. Row, Meerut.

“Parhelia were visible at about 5 p. m. and lasted for nearly an hour. The atmosphere was hazy and apparently surcharged with moisture, with several cumuli and nimbi floating about. A quarter of an inch of rain had fallen during the day.

The inner arc formed a complete circle with prismatic colours faintly marked. The Parhelia were in number two, North and South of the true sun in this inner arc.

The outer arc was not quite perfect, being broken by clouds; but in such portions as were visible, the prismatic colours were much clearer marked, than in the inner one.

The Parhelia were luminous spots about the size of the true sun, and resembled it, as if seen through a thick fog.

There were no tangential arcs or any other luminous spots than those described.

The Librarian and the Curator of the Zoological Department submitted their usual monthly reports.

Major Thuillier begged permission to make an announcement to the meeting which he was aware, ought properly to have been previously submitted through the Council, but he thought, that the importance of the subject, and the entire absence of any reference to matters of previous discussion, or on which a difference of opinion would be likely to arise, would justify a departure from the ordinary rule and if it was the pleasure of the meeting, he would proceed.

The fact he had it in his power through the kindness of his friend Colonel Waugh to announce, was the discovery of a mountain in the Himalayan Range, the measurement of which by the Great

Trigonometrical Survey of India under Colonel Waugh, Surveyor General of India, assigned it a place above that of any previously ascertained height in this range, already supposed to boast of the highest known mountain in the world.

It would be remembered that for many years the famous mountain of Dewalagiri in Nepal, in Latitude  $28^{\circ} 41' 48''$ , and Longitude  $83^{\circ} 32' 8''$  originally measured by the late Captain W. S. Webb, and described in the *Asiatic Researches*, Vol. XII., was considered to be the highest mountain in the world. This was found by the operations of the Great Trigonal Survey to be 26,826 feet above the sea level, but the further discoveries of Colonel Waugh, in 1847, proved Kanchinjunga in Sikkim, in Latitude  $27^{\circ} 42' - 8'$  and Longitude  $88^{\circ} 11' 26''$  to be much higher, viz. 28,156 feet, or 1,330 ft. above Dewalagiri.

Since that period the computations of the positions and elevations of all the principal peaks of the stupendous Himalayas from Assam to the Sufed Kho, comprising  $18\frac{3}{4}$  degrees of Longitude, have been provisionally completed, and Colonel Waugh purposes to make the subject one of special report for publication, as soon as all the computations have been scrupulously revised and every refinement of correction introduced. This revision which cannot materially modify the results, has proceeded to some extent, sufficient to assign the final values for the peak designated XV. of the Trig. Survey, and which place it in N. Latitude  $27^{\circ} 59' 16'' - 7$  and  $86^{\circ} 58' 5'' - 9$  Longitude E. of Greenwich, with an elevation of 29,002 feet above the sea level, or 846 feet above Kanchinjunga, and 2,176 in excess of the far famed Dewalagiri.

This position is almost due North East of Katmandoo, distant about 100 miles, and almost midway between Kanchinjunga and that place, *i. e.* Katmandoo, and within a few minutes of the same parallel as the former, and according to the latest and best map very nearly on the meridian of the town of Bhaugulpoor.

Colonel Waugh mentioned in his letter, that it was his rule and practice to assign to every Geographical object its true local or native appellation, but here was a mountain most probably the highest in the world without any local name, that he could discover; whose native appellation, if it has any, would not very likely be

ascertained before we are allowed to penetrate into Nepal, and to approach close to this stupendous snowy mass. Consequently, in the mean time the privilege as well as the duty devolved on him to assign to this lofty pinnacle of our globe a name whereby it may be known among geographers, and become a household word among civilised nations, and in virtue of this privilege and in testimony of his affectionate respect for a revered chief, in conformity with what he believed to be the wish of all the members of the Scientific Department over which he had the honor to preside, and to perpetuate the memory of that illustrious master of accurate geographical research, he had determined to name this noble peak of the Himalayas "*Mont Everest*."

Major Thuillier further briefly explained, the mode by which these snowy and distant peaks had been laid down by the operations of the Government Survey, from the base survey of Sonakhoda in the Purneah district, near the Darjeeling hills, along the principal triangulation of the Great N. West longitudinal series, traversing the Tirai Frontier and passing through Kumaon to the Dhera Doon Base, and shewed that the independent results of all the observations of *Mont Everest* were most satisfactorily accordant; in fact the accordance of the independent heights of this point is closer than could have been expected, because the mountain, though lofty and massive, is not a sharp well defined peak, and was observed from great distances.

Major Thuillier anticipated that when the memoir or account of all these snowy peaks, stated by Col. Waugh to be in preparation with special reference to publication, was received, the Society would derive no small pleasure and satisfaction from such an interesting subject, and he hoped to be able to lay it before a meeting with a map which would serve to illustrate and explain the whole subject. This being merely a preliminary announcement for which the Society were indebted entirely to Colonel Waugh, it was not perhaps necessary to enter into more minute details on this occasion.

The thanks of the meeting were voted to Major Thuillier.

*Curator's Report for the August Meeting, 1856.*

In my report for this evening, I record the donations which have accumulated for some months past.



1. Dr. J. R. Withecombe, B. Med. S. Three human skulls, respectively of a Limbu, Bhotiá, and Lepchá. "All are males," writes Dr. Withecombe, "and authentic; as I knew the individuals while living, and consider them good average specimens of the tribes to which they are referred."

2. Lt. F. P. Bailey, 7th N. I. Skin of a Hunumán Monkey (PRESBYTIS ENTELLUS).

3. Capt. S. R. Tickell, Moulmein. Skins of four species of Bat, viz. *DYSOPUS PLICATUS*, *RHINOLOPHUS MINOR* (?), *HIPPOSIDEROS DIADEMA* (?), and *H. LARVATUS*. Also a specimen of *DRACO MACULATUS*.

4. C. Hollings, Esq., Gya. Skull and greater portion of the skeleton of a Dingo, or Australian *variety* of Dog.

5. Arthur Grote, Esq. C. S. The skins and skeletons of a mature female, and male  $\frac{1}{3}$  grown, of the ordinary 'Wild Dog' (so called) of this country, from Chaibasa, Central India. These animals are specifically identical with a particularly fine living adult male in my own possession, sent down from Upper Asám; and this appears to be the ordinary species alike of the Himaláya and of Central and S. India,—*CANIS DUKHUNENSIS*, Sykes, and *C. primævus*, Hodgson; and a Malayan specimen in our museum, which I take to be *C. SUMATRENSIS*, Hardwicke, would appear to differ only in the considerably deeper tint of its rufous colouring.

6. Messrs. Cook & Co., Calcutta. Another fresh carcass of a 'wild Dog,' procured in the vicinity of Darjiling; and which, as I am assured, was considered by Mr. B. H. Hodgson as a peculiar species, quite new to him. I saw it many times alive: and certainly in its actions and general appearance, it differed very considerably from the living animal from Asám which I at this time possess, which latter is obviously identical in species with Mr. Grote's animals from Central India, now dead and added to the museum. This particular Darjiling individual (a female) had a considerably more *Vulpine* appearance; with longer and softer fur, having much wool at base; considerable ruff around the neck, and much lengthened fur about the *jowl*; the ears also densely clad both externally and within, and, in the living animal, often very closely approximated and directed forward; a remarkably full brush, with much less black than usual on the terminal half, but most of the tail having a slightly nigrescent appearance, not particularly noticeable at a little distance: all this may merely indicate the winter vesture, as assumed in a cold climate; but the actions of the animal were decidedly peculiar, and the general appearance as *Vulpine* as that of the ordinary 'Wild Dog' is Jackal-like. It was particularly light, agile, and graceful in its movements. Still I can

discover no distinction in the skull, or in the rest of the skeleton; excepting that the metacarpal bones of the Darjiling specimen are conspicuously shorter; whereas, compared with the Dingo skeleton, which in all respects is that of a domestic Dog, the distinctions are great and manifest. Upon present evidence, I can only regard it as a specimen of *C. DUKHUNENSIS*, in winter vesture, as developed in a cold climate; and the Malayan race appears also to be identically the same, only much deeper in colouring. In this case, the various names are unfortunate, *primævus* as implying it to be the origin of any domestic variety, and others as of restricted local application; and *CANIS* (or *CUON*) *RUTILANS* of Temminck is by far the most suitable appellation that has been suggested for the species, supposing it (as I believe it to be) identical in India at all elevations and in the Malayan peninsula and archipelago. In Burma it would appear to be particularly numerous.

7. Dr. David Scott, of Hansi. Three skins of Cats, sent as those of three species of wild Cats inhabiting that part of India. One is the ordinary *FELIS CHAUS*; another a *melanoid* variety of the same (doubtless that indicated by Mr. Theobald in XXII, 582); and the third is a little known species which I identify as

*FELIS ORNATA*, Gray (founded on an exceedingly bad coloured drawing, obviously by a native artist, published in Hardwicke's 'Illustrations of Indian Zoology'); *F. servalina* apud Jardine, *Nat. Libr., Felinæ* (nec *F. servalina*, Ogilby); *F. ad Oxam*, Pallas (apud Gray); *F. Huttoni*, nobis (founded on a skin from the Hazára hills); *Chaus servalina*, Gray, *Brit. Mus. Catal.* This wild species approximates very nearly to the domestic Cat. The ground-colour of the fur is a "Cat-grey," more or less fulvescent; or better described as pale greyish-fulvous in some specimens; with numerous roundish black spots, which tend to unite into transverse bands on the sides: on the head, nape and shoulders, the spots are smaller and less distinct, and tend to form longitudinal lines on the occiput and nape, but not upon the back: on the limbs there are distinct cross-bands, with one or two broad black streaks within the arm, as in the *Chaus* and commonly in domestic Cats; the paws blackish underneath: cheek-stripes as usual: breast spotted, but the belly almost free from spots: tail tapering more or less distinctly, and marked with a series of well defined rings and a black tip: ears externally dull rufous, with a slight but distinct duskyish pencil-tuft at tip,—not black-tipped as in the *Chaus*, nor is their rufous colour nearly so bright as in that animal, differing little from the general hue of the body: the fur, according to locality or perhaps season, is more or less dense or full; and the markings are much brighter and more distinct in some individuals than in others.

“If the *Chaus* is a wild species,” remarks Dr. Scott, “so also is this spotted Cat; and for one *Chaus* in this district [Hansi], probably you would find ten of the spotted kind. The *Chaus*, you will find in woods and jungle, and about stations; but the spotted Cat seems to be found invariably in open sandy plains, where the field Rat must be its principal food. I hardly ever remember seeing it in what could be called jungle or even in grass. One of these spotted Cats lived for a long time under my haystack, and I believe it to have been the produce of a tame Cat by a wild one.\* I have also lately seen two or three domestic Cats spotted precisely like the skin I sent you: they have generally some white about them; but doubtless there are some without white. The wild I have seen of half a dozen shades of colour; and you also frequently see in these spotted Cats a tendency to run to stripes, especially upon the limbs.”

On comparing the skin now sent with Gen. Hardwicke's figure, I feel quite satisfied that this is the species intended; although the figure is most misleading, and gives the idea of a totally different animal; indeed it might pass for a bad representation of the S. African Serval! The spots are too round and not sufficiently numerous; and the clavate form of the tail is wrong altogether. Nevertheless, I follow Sir W. Jardine in referring that exceedingly bad figure to the present species, in opposition to the more recently expressed opinion of Dr. Gray; and it is not at all probable that anything more like it remains to be discovered in this country. The figure in the ‘Naturalist's Library’ is better, and at once recognizable; but the tail is much too long, and the whole might bear a warmer colouring with advantage. It by no means represents a handsome example of the species.†

\* *Vide* XVII, 247 and 559, for notices of *F. CHAUS* and *F. RUBIGINOSA* interbreeding with domestic Cats.

† Of two supposed wild types of the domestic Cats of India, obtained by Mr. Theobald in the Punjab Salt Range (two specimens of each of them), neither can be referred to the *F. ORNATA*: they have much more the appearance of domestic Cats; and so they undoubtedly would have, were they really two aboriginal types which are still strongly indicated by the domestic Cats even of Bengal.

One is the streaked or spotted type, the colouring and markings of which are not much unlike those of the European wild Cat (*F. SYLVESTRIS*, Brisson); only more distinct, and the transverse streaks are more broken into spots, especially towards the hinder part of the body: the fur, however, is short, and the tail slender and of uniform apparent thickness to the end; shewing a series of rings and a black tip: ears slightly rufescent externally, but infuscated, passing to black at tip, where

To Dr. Scott I am further indebted for information regarding the small desert Fox with white-tipped brush (*VULPES LEUCOPUS*, nobis, XXIII, 729). This animal is common in the neighbourhood of Hansi during the cold weather only, and very rarely seen there at other seasons: whereas

there is a distinct small pencil-tuft of black hairs: paws deep sooty-black underneath. I lately saw, at Alláhábád, an exact counterpart of this alleged wild race in a domestic Grimalkin; but, in general, the domestic Cats of this type, about Calcutta at least, are greyer, with the spots smaller and more numerous.

The other type much resembles *F. CHAUS* in colouring, but does not at all approximate that animal in its proportions: it is much smaller than the Chaus, with proportionally shorter limbs, smaller ears, and much longer tail, which last distinctly tapers at the extremity. Consequently, it exhibits no tendency to the *Lynx* form and character, so conspicuously manifest in the Chaus. The body is uniformly grizzled "cat-grey," more or less rusty or fulvescent, without a trace of spot or stripe, such as may generally be discerned faintly in the Chaus: but the bands on the limbs are much more distinct than in that animal, those of the tail equally so; and there are the usual marks on the forehead and cheeks (much confused albeit on the former), and a dark band across the chest: lower-parts more or less whitish or tinged with fulvous, and marked with blackish or brown-black spots: ears dull rufous behind, with a slight blackish tip and no pencil-tuft of hairs: the paws more or less sooty underneath. Domestic Cats of this type abound in Bengal, if not generally over India: but such a coloration is utterly unknown among those of Europe: and the proper tabby markings (pale streaks on a black ground, peculiarly and symmetrically disposed), so very common in English Cats, are never seen in those of India! The tabby may be a modification (and a very remarkable one) of the markings of the wild *F. SYLVESTRIS* of Europe, a result of domestication: but most assuredly the Chaus-coloured cats of India would seem to indicate an aboriginally wild stock of that colour, no doubt inhabiting the country somewhere: but if a truly and aboriginally wild specimen were to turn up, it would merely be regarded as a stray member of the domestic race, and so an end to all enquiry.

The only guide to a probably correct result would be the fact, that such an animal might inhabit a vast range of country, away from human haunts, without exhibiting the variation of colour everywhere observable in the domestic races; unless in neighbourhoods where it might inter-breed with the latter, which would pass for nothing: though to such neighbourhoods it would doubtless be attracted, just as the Chaus is! The question then remains—Do two such Feline types exist, or either of them, in an aboriginally wild state, in any part of India, as have just been described, and both of which are said to be found wild in the Punjab Salt Range? The difficulty of tracing the origin of many of our domestic animals is well known. I have no doubt that several species have contributed to produce the



V. *BENGALENSIS* is equally abundant at all times of the year. I also learn that V. *LEUCOPUS* is plentiful on the line of march from Ludiána to Ferozepore; and in Cutch there would seem to be no other. Yet so common and widely distributed a species has only been quite recently

tame Cat, one or another predominating in different countries; as *F. SYLVESTRIS* in Europe, *F. MANICULATA* perhaps in N. E. Africa, and besides the two presumed types above mentioned, *F. CHAUS*, *F. ORNATA*, and *F. RUBIGINOSA* have been known to interbreed with domestic Cats in this country: probably also *F. MANUL* in middle Asia, *F. PLANICEPS* in the Malay countries, and *F. CAFRA* in S. Africa! Indeed, I find that examples of the hybrid from *F. CAFRA* are in the British Museum.

Mr. Hodgson, in the 1st Volume of the Society's Journal (p. 341), observes, of the domestic Cat in Nipál, that—"judging from its markings, I should conjecture that it is derived from the *Felis nipalensis*," i. e. *F. BENGALENSIS*; "if so, it has lost by domestication the fine ground-colour of that beautiful species." Now Pennant's original description of the *F. BENGALENSIS* was drawn up from a specimen which was taken alive to England, where "it coupled with the female Cats, which twice produced young: I saw," remarks Pennant, "one of the offspring, which was marked in the same manner as the male parent; but the ground-colour was cinereous." Such a hybrid or hybrid-race I believe to be represented by the *F. nipalensis* of Vigers, described in the 'Zoological Journal,' probably from a Nipalese domestic Cat; and perhaps by other of the very numerous synonymes which may be referred to *F. BENGALENSIS*.

The *F. MANICULATA* is stated by de Blainville to have the first deciduous inferior molar broader than in the European Cat, tame or wild, and attached to the socket by three roots or fangs; an extraordinary peculiarity throughout the genus!

In the Indian tame Cats of either type, it has two fangs only, as usual; and all the teeth are much smaller than in the European wild Cat (*F. SYLVESTRIS*). I believe the latter to have contributed to the formation of the tame race of Britain, but not to be the sole origin of the latter. But however this may be, nobody will suspect that *F. SYLVESTRIS* is a wild type to which the tame Cats of India can be referred in any degree! Then whence the origin of the latter? It would appear that several wild species intermingle with them even now; as does *F. SYLVESTRIS* with the tame Cats of the Scottish Highlands. Thus Sir W. Jardine, while supposing the domestic Cat to have derived from *F. MANICULATA*, remarks—"We have no doubt that since its introduction to this country, and more particularly to the north of Scotland, there has been occasional crossing with our own native species, and that the result of these crosses have been kept in our houses. We have seen many Cats very closely resembling the wild Cat, and one or two that were very tame, which could scarcely be distinguished from it." But such are never seen in the southern parts of England, where we may look in vain for the peculiar bold wavy streaks and the thick untapering tail of *F. SYLVESTRIS*. Still,

described; and its co-habitant the *FELIS ORNATA* is now fairly made known for the first time! No doubt there is yet much to learn respecting the smaller *Vertebrata* of the same region.

8. Capt. E. T. Dalton, Dibrughur, Asám. The skull of a fine male of the *BUDORCAS TAXICOLOR*, Hodgson.

9. Sir J. Barlow, Bart., C. S. Skull and horns of a fine male wild Buffalo.

10. Capt. P. Jenkins, Madras Service, Ságur. Series of caudal vertebræ of a cow Gaour (*BOS GAURUS*), required to complete a skeleton in the museum.

11. C. Brownlow, Esq. The half of a remarkable 'bezoar,' obtained from the stomach of a domestic bull, which had managed to munch down a couple of rough country blankets: no uncommon propensity on the part of domestic cattle. This bezoar, finely illustrative of the rotatory action of the stomach, is  $5\frac{1}{2}$  in. in diameter.

12. J. E. Bruce, Esq., Chittagong. Three entire specimens in spirit, and a skin, of *EURINORHYNCHUS PYGMÆUS*.

Here may be remarked, that, in a collection of bird-skins from Bombay, sent on inspection by Dr. G. Buist, on behalf of the Bombay branch of the Royal Asiatic Society, the only novelty I can find is the *PARUS XANTHOGENYS* of Dr. Jerdon's catalogue, for which I propose the name

*P. JERDONI*, *n. s.* It much resembles *P. XANTHOGENYS*, Vigors, of the N. W. Himalaya; but is conspicuously larger, having the back less tinged with yellow, the yellow portions of the plumage not so intense in hue, and the yellow sincipital streak is not continued forward over the eye, as in *P. XANTHOGENYS* (*verus*). Length of wing 3 in.; and of tail  $2\frac{3}{8}$  in.: in *P. XANTHOGENYS* the wing varies from  $2\frac{1}{2}$  to  $2\frac{3}{4}$  in., and the tail measures  $2\frac{1}{3}$  in. This is the third species which has now been discriminated apart from *P. XANTHOGENYS*, Vigors; the others being *P. SPILONOTUS*, nobis, from Nipál, Sikim, the Khásyas, &c.,—and *P. SUBVIRIDIS*, Tickell, nobis, from the mountainous interior of the Tenasserim provinces. I

as compared with any Indian tame Cat, the affinity of an ordinary British Cat to *F. SYLVESTRIS* is manifest; and due, I suspect, to frequent intermixture at a time when the tame Cat was first introduced into Britain and continued rare, while the wild species was far more abundant than at present; an indelible impress of the native stock having been then effected, which may have gradually diffused itself throughout the domestic race in Britain and neighbouring countries. This much, at least, appears to be quite clear, that several wild species have contributed to produce the domestic Cats of different regions.

have further distinguished *T. RUBIDIVENTRIS* of Nipal and Sikim from *P. MELANOLOPHUS*, Vigors, of the Simla and Masuri mountains; with which the *P. MELANOLOPHUS* of Jerdon's catalogue still requires to be critically compared.

Another bird-novelty is a strongly marked species of Parrakeet, which I procured and kept for some time alive; but the specimen is now added to the museum.

*PALEORNIS VIRIDIMYSTAX*, nobis. Size about that of *P. MALACCENSIS*; closed wing 6 in. Colour bright golden-green, the green deeper than usual in this genus, with light indigo-blue on the primaries and tail: axillaries, and fore-part of the wing underneath, bright yellow: a broad band of peach-blossom red below the eye, from bill to middle and lower portion of ear-coverts; rest of the latter green tinged with verditer; moustachial streak as in *P. MALACCENSIS* and others, but of a *darkish green* hue, contrasting with the more yellowish green of the body: a slight pale duskyish streak also from nostril to eye; and small red spot above the eye (conspicuous in the living bird). Bill duskyish in the individual, but with the upper mandible doubtless coral-red in the adult. Irides dark greenish-hazel, surrounded by a white ring. Feet pale greenish-grey. *Habitat* unknown.

As an interesting acquisition to our bird-collection, may also be mentioned a fine specimen of the great Black Cockatoo of N. Guinea (*MICROGLOSSUM ATERRIMUM*?\*), which was brought dead, affording the opportunity of examining it fresh. This bird is remarkable for its enormous beak, and the great 'tooth' or process on the upper mandible; but its tongue is not particularly small, as the generic name imports. The figure in Edwards's 'Birds' gives a better idea of the species than any other which I have seen.

Some recent observations lead to the opinion that the great Sulphur-crested White Cockatoo of N. Guinea is distinct from that of N. S. Wales. A fine living specimen of the latter (*CACATUA GALERITA vera*) entirely corresponds with Mr. Gould's figure of the species in the 'Birds of Australia,'† having the bare skin surrounding the eye pure white, or with an

\* I am aware that two species have been discriminated; but not of their distinctions.

† "If," remarks Mr. Gould, "we regard the White Cockatoo of Van Diemen's Land, that of the continent of Australia, and that of New Guinea as mere varieties of each other, this species has a more extensive range than most other birds. It is an inhabitant of all the Australian colonies, both on the southern and northern coasts, but has not yet been observed on the western.

exceedingly faint (barely perceptible) pink blush; and no naked space surrounding the base of bill. Closed wing measuring (in a specimen in our museum received from the Sydney Institution) 14 inches. This fine bird is not often to be seen on sale with the Calcutta dealers. Another, however, is commonly to be obtained here, which I have reason to believe is from N. Guinea or its neighbourhood: this is smaller, with a considerable circlet of bare skin of a blackish colour surrounding the bill, and the naked space around the eye is conspicuously of a *pale verditer* hue, more or less deep; a peculiarity which catches the eye at the first glance: the loral plumes being reduced to quite a narrow line. Closed wing (in a specimen in our museum) only 12 inches. If still unnamed, it may be designated *C. CYANOPIS*, nobis.\* A third, which I take to be *C. CITRINO-CRISTATA*, Fraser, is again smaller, with considerably smaller and more compressed beak, and particularly fine crest; closed wing, in a female specimen in our museum, only  $10\frac{1}{2}$  in.; but in a remarkably fine male, were its wings not mutilated, at least 1 in. more. The habitat of this species is unknown; and its beak is much more compressed than in the

“On a close examination of specimens from the three countries above mentioned, a decided difference is observable in the structure of the bill, but of too trivial a character, in my opinion, to warrant their being considered as distinct; in fact, it would seem to be merely a modification of the organ for the peculiar kind of food afforded by the respective countries [rather a bold Lamarckian suggestion!] The Van Diemen’s Land bird is the largest in every respect, and has the bill, particularly the upper mandible, less abruptly curved, exhibiting a tendency to the form of that organ in the genus *LIMICTIS*: the bill of the New Guinea bird is much rounder, and is, in fact, fitted to perform a totally different office from that of the White Cockatoo of Van Diemen’s Land, which I have ascertained, by dissection, subsists principally on the small tubers of the terrestrial *Orchidaceæ*, for procuring of which its lengthened upper mandible is admirably adapted; while it is more than probable that no food of this kind is to be obtained by the New Guinea bird, the structure of whose bill indicates that hard seeds, nuts, &c., constitute the principal portion of its diet. The crops and stomachs of those killed in Van Diemen’s Land were very muscular, and contained seeds, grain, native bread (a species of fungus), small tuberous and bulbous roots, and, in most instances, large stones.”

Surely the differences are not much greater upon which Mr. Gould founds several of his species of Black Cockatoo (*CALYPTORHYNCHUS*), &c. &c.

\* Behind the crest is a space bare of feathers in all Cockatoos; and the skin there is pale pinkish in *C. GALERITA*, and much darker and tinged with blue in *C. CYANOPIS*.



common *C. SULPHUREA* of Timor, the closed wing of which measures only 9 in.; and which is readily distinguished by its much shorter crest, and by the deep yellow spot on the cheeks. The last is by far the commonest species in the Calcutta bird-bazar, and sells at a much lower price than the others. I have seen an individual variety of it, having the crest of a bright flame-colour.

Here also I may notice a remarkable species of Pelican, which is now living in the menagerie of the Máharája of Burdwán, in company with specimens of *P. JAVANICUS* and *P. CRISPUS*. It is generally similar to *P. JAVANICUS*, but has the frontal skin curiously inflated, so as to present somewhat the appearance of a largely developed frontal knob of *ANSER CYGNOIDES*, only feathered; and a further difference consists in the naked skin of the cheeks and pouch being yellowish-white, whereas in *P. JAVANICUS* that of the cheeks is deep purplish or livid-carneous, and of the pouch intense yellow. If distinct and new, *P. INFLATIFRONS*, nobis.

Lastly, I may here notice that in the beginning of last April, I procured a fresh specimen (from the vicinity of Calcutta) of *CYORNIS BANYUMAS*, (Horsfield); a well known Javanese bird, only once known to have been procured before in India,—viz. by Mr. Jerdon in the Nilgiris, his specimen being also now in the Society's collection. The Calcutta specimen is a young male, that had just assumed the plumage of maturity; but still retaining some of the first or nestling wing-coverts.

13. Capt. Berdmore, Schwe Gye, Pegu. A number of living Tortoises, comprising several specimens of *TESTUDO ELONGATA*, nobis, remarkable for the yellowish-white colour of the head and neck.

14. T. C. Jerdon, Esq. Ságur. A bottle of reptiles, comprising one remarkable new species, which may be described as a *CALOTES*, with enormous head, short and thick body, the tail not exceeding the body in length, and the toes also short and strong; a slight nuchal crest, and medial dorsal ridge composed of a row of high-keeled scales; two detached tufts of sincipital spines, one contiguous to the tympanum, and each comprising one principal spine. Colour olive, with a row of large round dark spots, bordered and set off with white, along the back and anterior half of the tail, continued as simple indistinct dark spots to the end of the tail; the white broader and forming a kind of pale spot on each side of the neck; and anterior to this first large spot is a small one upon the crest: lower-parts yellowish-white, the throat regularly speckled with pale dusky: a conspicuous oblique white band passing from beneath the eye to the angle of the mouth. Scales of the body in transverse bands, the oblique tendency much less conspicuous than in *CALOTES*. I shall

describe this species more minutely by the name *BRACHYSAURA ORNATA*.

15. Dr. M'Connor. A bottle of scorpions and centipedes.

16. From the Madras museum. A few fine specimens of *CRUSTACEA*, comprising *OCYPODA BREVIROSTRIS*, *GELASIMUS ANNULIPES*, and one or two other Crabs new to the Society's collection.

E. BLYTH.

#### LIBRARY.

The Library has received the following additions during the month of July last.

The White Yajurveda, edited by Albrecht Weber, part III. No. 1, Berlin, 1856, 4to.—BY THE EDITOR.

Málavikâ und Agnimitra, Ein drama des Kâlidâsa in fünf Akten, zum ersten Male aus dem Sanskrit übersetzt von Albrecht Weber, *Berlin*, 1856, 12mo.—BY DR. A. WEBER.

Ueber den semitischen Ursprung des indischen Alphabetes von Dr. A. Weber.—BY THE SAME.

Selections from the Records of the Government of India, No. XII. Report shewing the relations of the British Government with the tribes, Independent and Dependent, on the North-West Frontier of the Punjaub, from 1849 to 1855.—District Memorandum, Derah Ishmael Khan. *Calcutta*, 1856.—BY THE GOVERNMENT OF INDIA.

Ditto ditto ditto, No. XIII. Progress Report of the Public Works Department, for 1854-55.—BY THE SAME.

Ditto ditto ditto, No. XIV. Minute of Lord Dalhousie.—BY THE SAME.

Report on the Survey Operations of the Lower Provinces, from 1st October 1853 to 30th September, 1854.—BY THE GOVT. OF BENGAL.

Ditto ditto of the ditto from 1st October, 1854 to 30th October, 1855.—BY THE SAME.

Selections from the Records of Government, N. W. P. Part XXVI. Saugor Code of Civil Judicature. BY THE GOVERNMENT OF THE N. W. P.

Annual Report of the Grant Medical College, Bombay, Tenth year Session, 1855-56.—BY THE PRINCIPAL OF THE GRANT MEDICAL COLLEGE.

Proceedings of the Royal Asiatic Society, Vol. VIII. Nos. 19 and 20, two copies.—BY THE SOCIETY.

Ditto of the Royal Geographical Society of London, from January to April, 1856.—BY THE SOCIETY.

Transactions of the Bombay Geographical Society, for 1856.—BY THE SOCIETY.

The Oriental Christian Spectator, for June, 1856.—BY THE EDITOR.

The Calcutta Christian Observer, for July, 1856.—BY THE EDITORS.

The Oriental Baptist, for July, 1856,—BY THE EDITOR.

Upádesák, for July, 1856, No. 115.—BY THE EDITOR.

The Durbin Newspaper.—BY THE EDITOR.

History of Asiatic Cholera Morbus: by Dr. F. Baleguer, Agra, a pamphlet.—BY MR. BLYTH.

*Exchanged.*

The Athenæum, for April, 1856.

The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science, No. 73, for May, 1856,

*Purchased.*

L'Athenæum Français, Nos. 13 to 17.

The Literary Gazette, Nos. 8 to 11.

Comptes Rendus, Nos. 12 to 16, Tome XLII.

Revue des Deux Mondes, for April and May, 1856, pt. I. Vol. I.

Revue et Magasin de Zoologie, No. 3, 1856.

Annales des Sciences Naturelles, Tome 4, No. 4.

The Annals and Magazine of Natural History, No. 101, Vol. 17.

The Edinburgh Review, No. 210, for March, 1856.

The Quarterly Review, No. 196.

GOUR DOSS BYSACK,

*Asst. Secy. and Librarian.*

FOR SEPTEMBER, 1856.

At a monthly general meeting of the Society held on the 3rd instant, at the usual hour.

Hon'ble Sir James Colville, Kt., President in the chair.

The proceedings of the last meeting were read and confirmed.

Presentations were received—

1.—From Lieut. R. Stewart, Cachar, a collection of arms, weapons, ornaments, and other articles manufactured and used by the tribe called Thadous or Kookies, a list of which is subjoined.

No. 1.—A dhao, or sword, with leather sheath, shoulder belt ornamented with cowries, and tassels of goat hair.

Nos. 2, 3 and 4.—Spears of three different kinds.

No. 5.—Spear used by the women.

No. 6.—Spear-head and case. This spear-head is poisoned, and

is fastened on a long shaft and used in hunting elephants.

No. 7.—Bow.

No. 8.—Arrows, poisoned and unpoisoned in quiver.

No. 9.—Hunting basket to contain quivers of arrows, with shoulder belt ornamented with cowries.

No. 10.—Panjies or spikes for planting in the ground to check an advancing enemy, in a basket or quiver.

No. 11.—Shield; leather with brass plates and red-dyed goat's hair tassels.

No. 12.—Powder-horn, of the methin or wild cow.

No. 13.—Leathern mail-coat.

No. 14.—Iron head-piece, to defend the head; round this is bound the turban, strap, and ribbon.

No. 15.—Turban, ornamented with a tuft of the feathers of the Holapakee bird. The tuft sticks out in front of the forehead.

No. 16.—Turban ribbon, of red-dyed goat's hairs. This is bound round the turban as ornament.

No. 17.—Turban strap, of leather ornamented with cowries, also bound round the turban and serving to keep it attached to the head.

Nos. 18, 19 and 20.—Plumes of feathers and goat's hairs stuck in the back-knot of the hair of the head.

No. 21.—A man's hair-pin, used also as a pipe-prick or tobacco stopper—a porcupine's quill is often substituted for the iron pin.

No. 22.—A woman's hair pin—brass.

No. 23.—Bracelet of massive ivory, worn on the wrist of the left hand, as a guard to prevent the bowstring hurting that hand, when released by the fingers of the right in shooting.

No. 24.—Bracelet for the same purpose as the above, in wood.

No. 25.—Bracelet of massive brass, with leaden bullet inside, causing a tinkling sound when shaken. This is used as a weapon also, being in default of other arms slipped over the wrist and held in the hand to add weight to a blow.

No. 26.—Woman's bracelet, brass spring.

No. 27.—Armlet—brass spring.

No. 28.—Armlet, massive brass.

No. 29.—Armlet, formed of two semicircular boar tusks, joined.

No. 30.—Armlet, of ivory from the root of the elephant's tusk.



No. 31.—Earrings of silver, inserted into a hole bored in the lobe of the ear, and stretched to the required dimensions.

No. 32.—Earrings of brass of the same kind.

No. 33.—Ear ornaments of red and blue stones suspended from the rings.

No. 34.—Single red stone ear ornament, of great value among the tribe, suspended as above.

No. 35.—Necklace of coral beads.

No. 36.—Necklace of blue stone beads.

No. 37.—Necklace of beads made from ground shells and worn by the women.

Nos. 38 and 39.—Seed necklaces of two kinds.

Nos. 40 and 41.—Tiger's tooth and wolf's tooth worn as talismans round the neck to keep off attacks from those animals.

No. 42.—Talismanic stone, enclosed in basket carried by hunters to ensure success in sport.

No. 43.—A small box containing a little of the Kookie poison with which they smear their weapons.

No. 44.—Kookie garter, made of the goat's beard, worn below the knee.

No. 45.—Kookie woman's petticoat.

No. 46.—White cotton cloth or sheet.

No. 47.—Cotton cloth, dyed with wild indigo.

No. 48.—Cotton rug.

No. 49.—Brass wire girdle or zone for the waist.

No. 50.—Kookie bagpipes (Ghoshem) hollowed gourd with bamboo pipes.

No. 51.—Kookie bell.

No. 52.—Vessel for holding tobacco water.

No. 53.—Drinking vessel.

Nos. 54, 55 and 56.—Three different kinds of brass tobacco pipes with mouth-pieces ; used by the men.

No. 57.—Bamboo tobacco pipe.

No. 58.—Hookah used by the women, with earthen bowl, bamboo water-piece, and brass mouth-piece, together with pricker and chain.

Nos. 59 and 60.—Two flint and steel cases, one of brass, and the other of mat-work.

No. 61.—Kookie haversack, with shoulder help, ornamented with cowries.

No. 62.—Purse, cotton, net-work.

No. 63.—Kookie basket for carriage on the back.

No. 64.—Collar and strap to suspend the above from the forehead and shoulders.

No. 65.—Woman's basket for carrying light goods.

No. 66.—Fan.

Nos. 67 and 68.—Boxes, hollowed from single pieces of wood with lids.

No. 69.—Wooden platter.

Nos. 70 and 71.—Baskets with lids.

The Secretary read an extract from Lieut. Stewart's letter.

"The Kookies ask great prices for all things made of metal; immense value is also attached to ornaments of stone. The little stone No. 34, cost Rs. 10; and similar stones are often valued as high as Rs. 3000. Wherein lies the virtue of these stones it is difficult to perceive, for they cannot be distinguished, save by the Kookies themselves, from either No. 34, or the red stones in the centre of No. 33, and yet the whole of the stones composing No. 33, only cost Rs. 2."

2.—From Syud Káramt Ali Motawalli of the Emambara at Hooghly, a piece of mineral, and some specimens of red sulphur which were said to have come from the mountain Dámawánd, found seven years ago after an earthquake.

The mineral was found in the Hindu Koosh, and obtained by the Syud in Cabul.

3.—From Capt. W. H. Lowther, some specimens of earths and lime formation from Oude; which he believed would be useful for pottery purposes.

The following is Capt. Lowther's letter accompanying them.

"Thinking that even the smallest contributions may be acceptable, I forward the three enclosed specimens of earths, and lime formation from Oude, a country which I have just left. The clays

and lime were employed in building the cantonment, and from a small experiment I made, I ascertained that the first were capable of burning for pottery purposes.

Nowhere in India have I seen such hard bricks, of so fine a colour, or so lasting, as in Oude. There are forts, scattered all over the district, built of baked blocks as sound and ruddy in hue as when first constructed, although a period of 700 or 800 years has elapsed:—some of these massive materials are several cubic feet in dimensions, and, on being fractured, exhibit a fine vermilion red, with a strong saline taste. The earths I now forward are from the new station Persuddpoor on the right bank of the small river ‘Sihi,’ Salone Pergunnah.”

4.—From Mr. J. N. Payter, a book entitled Culpeper’s Complete Herbal, &c., originally published in London, 1653, and illustrative of the state of Botanical science at that period.

5.—From Major H. L. Thuillier, 28 sheets of the Trigonometrical Survey maps for the India Atlas of the Society, completing the series up to the present date.

6.—From the Curators of the Calcutta Library, a copy of the last Catalogue of the Library.

7.—From Mr. J. Nietner, the first of a series of entomological papers on the Coleoptera of Ceylon.

The following gentlemen duly proposed and seconded at the last meeting, were balloted for and elected members.

Lieut. H. S. Forbes, Artillery,

Sultan Mohammed Busheerudeen Saheb,

A. R. Young, Esq., B. C. S., and

R. B. Chapman, Esq., B. C. S.,

The Council had the satisfaction to report, that a request which they had made to the Government of India, to allow the lithographic drawings required for the Society’s Journal to be printed free of cost in the office of the Surveyor General, had been complied with, under orders communicated by Mr. Under Secretary Chapman.

The following draft of a reply to the despatch of the Hon’ble Court of Directors, on the subject of the Oriental publications, was next read.

To W. GREY, Esq.,

*Secretary to the Govt. of Bengal.*

SIR,—In reply to your letter No. 1036, dated 21st July, 1856, forwarding the copy of a despatch dated 13th May last, from the Hon'ble the Court of Directors in reference to the management of the Bibliotheca Indica, together with some remarks of the Lieut.-Governor upon the heavy liabilities of the Oriental fund, I am directed to request you to inform H. H. the Lieut.-Governor of the readiness of the Society to carry out the orders conveyed by the Hon'ble Court's despatch, in reference to the future application of their grant for the encouragement of Oriental Literature; but at the same time to request that he will lay before them the enclosed copy of a correspondence which has lately passed between the Society and Professor H. H. Wilson, as explanatory of the principles on which the Bibliotheca Indica has, of late, been conducted.

I am further instructed to observe, in reference to the remarks of the Lieut.-Governor on the liabilities of the Oriental fund, that the progress of nearly all the works which were in course of publication was suspended some months ago, on its being found that the activity of the several Editors had pushed the publication of the series beyond prudent limits.

I have, &c.,

The letter was approved and adopted.

The Secretary made a communication on the part of the Council, in reference to the announcement made at the last meeting by Major Thuillier, of the discovery of a mountain in the Himalayan range, which the computations of Col. Waugh, the Surveyor General of India, had ascertained to be of greater altitude (29,002 feet) than Kanchinjinga or any other known height in this range, and therefore in the world.

Col. Waugh had stated in the letter by which this announcement had been made through Major Thuillier, that he had been quite unable to ascertain what was the local name, if any existed, of this mountain mass, (marked XV. in the diagrams of the Trigl. Survey) and that in the absence of such name, which he should of course have adopted, if it could had been ascertained, he assumed



the privilege, as first discoverer, of proposing a name for this the loftiest peak on the surface of the globe.

The name proposed by him was "Mont Everest."

Now it was the opinion of many gentlemen, in which the Council fully concurred, that it was very desirable, in accordance with the established practice of geographers, that the native appellation of this gigantic peak should be that, by which it is known to the civilized world, and that an endeavour should be made to ascertain this name—of the existence of which there can be little doubt—through the agency of the Nepal government or otherwise; but that in the mean time it would be in every way more appropriate and more consistent with usage, that the mountain should be called after the name of its distinguished and accomplished discoverer, Colonel Waugh, than by that of his predecessor Col. Everest, who, however great his merits and abilities, had no immediate connection with this discovery.

The Council therefore suggested to the meeting the propriety of addressing a letter to Col. Waugh, expressing a hope that he would acquiesce in this view of the subject, and allow the mountain to be called provisionally at least by his own name, instead of by that of his predecessor.

After some discussion this proposition was negatived, several members having expressed an opinion that it would not be complimentary to Col. Waugh to interfere in the matter.

Communications were received—

1.—From the Lieut.-Governor of the N. W. P. through Mr. Assistant Secretary Oldfield, copy of a correspondence on the subject of the exploration of the ruins of Sarnath, conducted during the past season under the supervision of Dr. Butler.

2.—From Babu Radhā Nāth Sikdār, forwarding copy of a Meteorological Register kept at the Surveyor General's Office, Calcutta, for the months of June and July last.

The Librarian submitted his usual monthly report.

Mr. Oldham begged to bring before the Society a coin of some interest. About a fortnight since, he had received from a friend, a silver coin, with a request that he would say what it was. Not being able to do so himself, he had applied to the best authority he

could command, and had sent the coin to the former Librarian of the Society, Bábu Rájendralál Mittra. From him he had received the note which he would read.

MY DEAR SIR,—Your coin is from Cooch Behar, and is an interesting specimen of an obscure type. On the obverse it has *Sri sri Siva charana kamala madhu karasya*, “of the bee of the lotus feet of the twice illustrious Siva;” and on the reverse *Sri sri man naranáráyana bhupálasya sáke* 1477; “of the doubly blessed King Naranáráyana, in the Saka year 1477” (*i. e.* 1555 of the Christian era.) The language of the inscription is Sanskrit, and the character Bengali. According to the genealogical tables consulted by Major (now Lieut.-Col.) Jenkins, (Bengal Selections, No. 5,) Naranáráyana was the son and successor of Biswa Singh, the founder of the Cooch dynasty.

The *era* of Naranáráyana is nowhere given: at a rough guess Lieut.-Col. Jenkins assumes Biswa Singh to have lived about 300 years ago. The coin enables us to settle this point definitively.\*

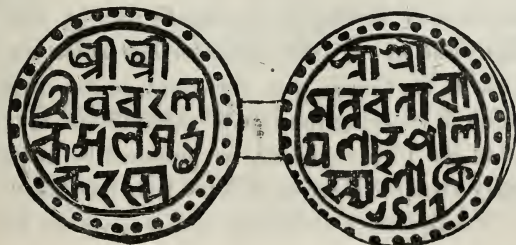
Two coins of this type have been figured by Marsden, but none of the reign of Naranáráyana; nor is his reading of the dates of his coins at all correct. He brings down Lakshmináráyana the immediate successor of Naranáráyana to the year 1727, and yet it is well known that no less than eight princes, some of very long and prosperous reigns, succeeded him, before the country came in contact with the British Government in 1772.

Yours very truly,

RÁJENDRALÁL MITTRA.

\* Buchanan Hamilton, in his History of Cooch Behar, (*ante* vol. vii. p. 16) questions the accuracy of Biswa Singh's era, and adverts to several circumstances which, he thinks, seem to be irreconcilable with facts recorded by Mohammedan historians. The anachronism, however, if there be any, must be trifling as the era of Naranáráyana given by him (*loc. cit.*) accords completely with the date of the coin under notice.

The coin is figured below.—R. M.



It would be seen from this that the coin he now handed to the Chairman for the cabinet of the Society, was one of considerable interest, and of new historical value. In giving the information he had thus acquired to Mr. Tuckerman, the proprietor of the coin, Mr. Oldham had suggested that if he were not himself a collector of such objects of curiosity and interest, it would be very desirable to place this coin in some collection where it would be available to the student of history and numismatics, and he had been most liberally requested by Mr. Tuckerman to do what appeared best with the coin; he therefore had now the pleasure of presenting this silver coin to the Society, in the name of N. C. Tuckerman, Esq.

In doing so, Mr. Oldham further begged to propose that the thanks of the Society be given to Mr. Tuckerman for this interesting addition to their collection.

Col. Baker having seconded the motion, it was carried unanimously.

Dr. Thomson, at the request of the President, read a paper entitled "notes on the Herbarium of the Calcutta Botanic Garden, with especial reference to the completion of the Flora Indica."

He stated that as he had undertaken, in conjunction with Dr. Hooker, to publish a Flora of British India, he was desirous of bringing to the notice of botanists in all parts of India, that he would gladly receive specimens of plants from those desirous of contributing to the progress of the work. Specimens from all parts of India would be acceptable, the illustration of the geographical distribution being one of his main objects, but for the purpose of indicating the least known districts he read a list of the contents of the Garden Herbarium.

The best thanks of the Society were voted to Dr. Thomson for his interesting communication.

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*At a Special General Meeting of the Asiatic Society, held according to announcement, on the 10th September last at the usual hour.*

Hon'ble Sir J. W. Colvile, Kt., President, in the chair.

The question of reducing the rate of subscription to the Society from Rs. 16 to Rs. 10 per quarter, as proposed by Major Thuillier at the ordinary General Meeting of June last, was taken into consideration. The Secretary announced that twenty-six non-resident



members only out of sixty-three had replied to the circular\* which was addressed to them, requesting their votes on the proposed alteration. Sixteen voted in favor of, and ten against, reduction. Such of their letters as contained remarks or suggestions, were then read, and after considerable discussion the question was put to the vote when there appeared—

|                          | FOR      | AGAINST  |
|--------------------------|----------|----------|
| Residents present, ..... | 9        | 13       |
| Non-residents, .....     | 16       | 10       |
|                          | <hr/> 25 | <hr/> 23 |

The proposition was therefore lost in accordance with bye law 45, which provides that three-fourths of the votes taken, shall be necessary to carry any proposed alteration or amendment of the rules.

*The following is the List of Voters :—*

## FOR

*Non-resident members.*

1. Capt. F. P. Layard, Berham-pore.
2. Dr. J. Fayrer, Lucknow.
3. Kabeeroodeen Ahmed Baha-door, Sasseram.
4. Rajah Issree Persaud, Benares.
5. W. Muir, Esq., Agra.
6. Lieut. R. Stewart, Cachar.
7. Major J. Abbott, Ishapore.
8. Major J. C. Haughton, Moulmein.
9. J. C. Middlecott, Esq., Jubbulpore.
10. Capt. H. S. Bivar, North Cachar.
11. Major R. R. N. Ellis, Bundelcund.

## AGAINST

*Non-resident members.*

1. G. H. Freeling, Esq., Orai.
  2. Dr. J. Row, Meerut.
  3. Lieut.-Col. M. E. Loftie, Almorah.
  4. R. Spankie, Esq., Mussorie.
  5. Captain R. Maclagan, Roorkee.
  6. Lieut. N. W. Elphinstone, Goorgooriah.
  7. Col. Sir A. Bogle, Moulmein.
  8. Major A. P. Phayre, Rangoon.
  9. Capt. S. S. Dalton, Assam.
  10. F. E. Hall, Esq., Ajmere.
- Resident members present at the meeting.*
11. Hon'ble Sir J. Colvile, Kt., President.

\* This circular was accompanied by a paper containing a resumé of the Proceedings of the Society in reference to the proposed reduction.



- |                                                     |                                              |
|-----------------------------------------------------|----------------------------------------------|
| 12. Major J. H. Hanyngton,<br>Chota Nagpore.        | 12. Rajah Pertáb Chunder Singh,<br>Bahádoor. |
| 13. Capt. H. C. James, Darjeeling.                  | 13. Babu Jádavá Krishná Singh.               |
| 14. R. H. Russell, Esq., Bogra.                     | 14. Babu Rajendra Lál Mittra.                |
| 15. J. J. Gray, Esq., Malda.                        | 15. C. Beadon, Esq.                          |
| 16. Col. Sir H. M. Lawrence,<br>Abboo.              | 16. Capt. C. B. Young.                       |
|                                                     | 17. Dr. T. Boycot.                           |
|                                                     | 18. Dr. T. Thomson.                          |
| <i>Resident members present at the<br/>meeting.</i> | 19. Dr. H. Walker.                           |
| 17. Major H. L. Thuillier.                          | 20. Lieut.-Col. W. E. Baker.                 |
| 18. Hon'ble E. Drummond.                            | 21. Capt. H. Yule.                           |
| 19. Capt. W. S. Sherwill.                           | 22. Dr. G. G. Spilsbury.                     |
| 20. D. Money, Esq.                                  | 23. W. S. Atkinson, Esq.                     |
| 21. Babu Radhá Náth Sikdár.                         |                                              |
| 22. Revd. K. M. Banerjee.                           |                                              |
| 23. T. Oldham, Esq.                                 |                                              |
| 24. E. A. Samuells, Esq.                            |                                              |
| 25. G. Young, Esq.                                  |                                              |

## LIBRARY.

The Library has received the following accessions during the month of August last.

*Presented.*

Culpeper's Complete Herbal, *London*, 1653, Royal 4to.—BY J. N. PAYTER, ESQ. ZEMINDAR, DINAGEPORE.

Catalogue of the Calcutta Public Library, *Calcutta*, 1855, 8vo.—BY THE CURATOR OF THE LIBRARY.

Report on the Revenue Administration of the Lower Provinces for the official years 1853-54 and 1854-55, 2 pamphlets.—BY THE GOVERNMENT OF BENGAL.

Selections from the Records of the Madras Government, No. XXV. 1856—Report on important Public Works, for 1854, 8vo.—BY THE SAME.

An Introductory Lecture delivered in the Grant Medical College, by R. Haines, M. B. *Bombay*, 1856, pamphlet.—BY THE LECTURER.

Mâhabhâshya, edited by Dr. Ballantine and Kashinauth Shastry, *Benares*.—BY THE EDITORS.

The Quarterly Journal of the Geological Society, Vol. XII, part 2, No. 46, *London*, 8vo.

The Journal of the Society of Arts, and of the Institutions in Union, Vol. IV. No. 188, *London*.—BY THE SOCIETY.

Proceedings of the Royal Geographical Society of London, No. III. April and May, 1856.—BY THE SOCIETY.

Journal Asiatique, Tome VII. No. 26, for February and March 1856.

Natuurkundig Tijdschrift voor Nederlandsch Indië, Deel I. Derde Serie Deel IX. Afl. I. II. og III.—BY THE NATURAL HISTORY SOCIETY OF NETHERLANDS' INDIA.

Twenty eight Sections of the Trigonometrical Survey Atlas.—BY MAJOR THUILLIER.

The Oriental Christian Spectator, for July, 1856, Bombay.—BY THE EDITOR.

The Calcutta Christian Observer, for August, 1856.—BY THE EDITORS.

The Oriental Baptist, for August, 1856.—BY THE EDITOR.

The Upadeshak, for August, 1856.—BY THE EDITOR.

The Tuttwabodhini Putrica, No. 157.—BY THE TATTWABODHINI SABH'A.

The Durbín Newspaper, for August, 1856.—BY THE EDITOR.

The Phoenix Newspaper, for August, 1856.—BY THE EDITOR.

*Exchanged.*

The Athenæum, for May, 1856.

The London, Edinburgh and Dublin Philosophical Magazine and Journal of Science, No. 74, for June, 1856.

*Purchased.*

Genealogische Tabellen der Arabischen stämme und familien. In zwei abtheilungen. Mit historischen und geographischen bemerkungen in einem alphabetischen Register. Von Dr. F. Wüstenfeld, 1st and 2nd parts, *Göttingen*, 1852.

Die Kaukasischen Glieder des Indoeuropäischen Sprachstamms von Franz Bopp. *Berlin*, 1847, pamphlet.

Was hat Mohammed Aus dem Judenthume, aufgenommen? von Abraham Geiger, *Bonn*, 1833, 8vo.

Revue et Magasin de Zoologie, No. 4, 1856.

Journal des Savants, for April and May, 1856.

The Literary Gazette, Nos. 12 to 16.

L'Athenæum Français, Nos. 18 to 20.

Revue des Deux Mondes, 15th May, 1856, and 1st June, 1856.

Annales des Sciences Naturelles, Tome 4th, No. 5.

GOUR DOSS BYSA'CK,

*Asst. Secy. and Librarian.*

1st September, 1856.

FOR OCTOBER, 1856.

At a monthly general meeting of the Society held on the 1st instant, at the usual hour,

Captain W. S. Sherwill, senior member present, in the chair.

The proceedings of the last meeting were read and confirmed.

A presentation was received from Mr. Moore of a glass tumbler melted by the electric fluid passing through a room. The following is his note.

"I send you a tumbler melted by a flash of lightning. Luckily the bolt passed through the room without doing any one any harm, though several were seated at table when the occurrence took place."

Letters from Mr. Huffnagle and Captain Hopkinson, announcing their withdrawal from the Society, were recorded.

Raja Gris Chundra Ráya Báhadur of Kishnaghur was proposed by A. Grote, Esq., and seconded by Dr. Spilsbury for ballot at the next meeting.

The council submitted reports—

1.—Announcing that Dr. Sprenger having gone to Europe, his place in the Council had been filled up by the election of Mr. Samuells, subject to the confirmation of the Society at the next meeting.

2.—Recommending that the suggestions contained in the sub-joined report from the Sub-Committee of Philology be adopted.

*Report of the Philological Sub-Committee to the Council of the Asiatic Society.*

With reference to the late Despatch from the Hon'ble Court of Directors on the Oriental publications of the Asiatic Society, and the expected departure of Dr. Sprenger from India the Sub-Committee of Philology submit the following suggestions for the consideration of the Council.

The Sub-Committee find that there are now sixteen works in course of publication in the Bibliotheca Indica. Of these five are Arabic and Persian, and the rest Sanskrit. The former include Ibn Koteyba's Handbook of History, the Sekandernamah of Nizámy, a

Dictionary of Persons who knew Mohammed, a Dictionary of Technical Terms and a History of the Conquest of Syria.

Of these the Handbook of History was undertaken in the year 1851. The Society then had at its disposal three very ancient MSS. while at that time in all Europe there were only four, and every one of them more recent than the most modern copy in the possession of Dr. Sprenger, who had kindly undertaken to edit the work. Under these circumstances there seemed to be no reason to expect that any one else would anticipate the Calcutta edition. But before 60 pages of the work had been printed, the Committee were informed that Professor Wüstenfeld of Berlin had lithographed the whole book, and there existed no further occasion to print it in this country. They, therefore, immediately put a stop to the Society's edition, and have now to recommend that it be dropped altogether.

2.—The Sekandernamah has been printed to the extent of nearly one half; the other half will fill about one fasciculus. The MSS. available for this portion are correct, and as soon as Dr. Sprenger has compared them with a printed copy lately brought by him from Bagdad, it should be carried through the press under the superintendence of a competent Mawlavi.

3.—Of the Dictionary of Persons who knew Mohammed thirteen fasciculi have been published. This portion includes nearly one fourth of the work, and has been printed at a cost of about Rs. 4000. To complete it, it will be necessary to incur an additional expense of at least Rs. 10,000. The MSS. from which the first portion of the work has been printed, belong to individuals to whom they must be immediately returned by Dr. Sprenger, having been already detained for more than three years, so that the work can no longer be continued. The committee therefore propose that the published portion be offered to any publisher, who will undertake under proper guarantee to complete the work and present to the Society 50 copies of the continuation.

4.—The remarks made with reference to the Biographical Dictionary apply equally to the Dictionary of Technical Terms, and for its completion the Sub-Committee would recommend a similar plan. But in as much as really one half of the work has been



already printed, the expense of completing it will be comparatively less, and as the work is likely to find a ready sale, the first portion may be sold to the publisher at the reduced price of 4 to 6 annas per copy, instead of being given away in exchange for 50 copies of the concluding portion.

5.—The last Arabic work, which remains incomplete is Lees' History of the Conquest of Syria. As no competent editor is at present available to undertake the task, the committee find the work must stand over until the return of Lieut. Lees from Europe, when they hope it will be brought to a completion.

The Sanskrita series includes three\* portions of the Vedas, two† works on Hindu Philosophy, one‡ on Astronomy, two§ on Indian Mythology, one|| on the Prakrit language and,¶ one on belles lettres. These works are all of considerable importance and well calculated to enhance the credit of the serial in which they are being published. The Committee are of opinion, therefore, that the printing of these works should be continued gradually, as the means at the disposal of the Society enable it to proceed; adequate provision being made in the first place for the speedy liquidation of the debt due by the Oriental Publication Fund.

The Bibliotheca Indica, as a series, has now attained to the 139th Fasciculus, comprehending a large number of works on various branches of Asiatic learning; it has established its reputation in Europe, where it has earned for the several editors engaged on it and for the Society which has conducted it, expressions of thanks that must be very grateful to both. The unfinished works will scarcely occupy less than 50 numbers, quite sufficient to make the contents of the series a compact and complete publication. Looking to the extent to which their resources have been anticipated, the Committee see little chance of their being in a condition to undertake a new work for the next three years, and they therefore

\* Black Yajur Bráhmaṇa, Black Yajur Sanhita, and Chhándogya Upanashads.

† Vedānta Sūtras and Sarvādarsana Sangraha.

‡ Surya Siddhānta.

§ Márkandeya Purāṇa and Lalita Vistara.

|| Krámādīs verax Prakritadhyā.

¶ Vasavadatta.

recommend that the Bibliotheca Indica be brought to a close. The recent orders of the Court, indeed, will render necessary a revision of the rules, which were introduced in 1852, and under the influence of which so many valuable books have been undertaken before any 2nd series of the Bibliotheca can be commenced with.

(SD.) A. GROTE.

„ J. LONG.

„ RAJENDRALAL MITTRA.

„ W. S. ATKINSON.

The recommendations were adopted.

Communications were received—

1.—From Major J. J. Bush, Peshawur, bringing to notice that a regular trade has sprung up at Peshawur and Ráwalpindeé by which large quantities of spurious Bactrian and Indo-Scythian coins are brought to sale.

“ The following is his letter—

“ Since the articles by Major A. Cunningham on spurious Bactrian and Indo-Scythian coins, published in the journal of the Asiatic Society of Bengal in 1840, there has not been apparently any further notice on the subject, and as the evil has alarmingly increased of late years, it may not perhaps be altogether out of place to call attention to the clever fabrications every where now procurable in the Punjab.

“ The forgeries exposed by Major Cunningham were described by him ‘ of the rudest kind, faint and indistinct in the outline of the figures, want of boldness in relief, utter barbarousness of execution, a full eye to a side face, Greek characters indistinct and corrupt, and the Bactro-Pali jumbled, transposed, imperfect and reversed ;’ but we now find them of extreme boldness in relief, the legends generally correct and sharply cut in both characters ; many of them of considerable excellence, as works of art, and with but little to denote their utter worthlessness of character as genuine ancient medals.

“ The Bactrian fabrications are now never reproduced in gold, the Indo-Scythian occasionally are in silver ; and the places where the trade chiefly flourishes, are Peshawur and Rawul Pindee. At the former, silver Bactrians can be obtained by bags-full, but these, gene-

rally of impure silver and cast, at once tell their own tale. It is at Rawul Pindee that the best spurious coins are made,—*paida kuhna* is the expression used by the men who bring them for sale—these are of good silver, and the dies so well executed that it is becoming every day more difficult to detect a struck forgery; sometimes the eye or the mouth of a face is faulty, very often the monogram, and now and then there is a break down in the Greek legend by the omission of the small omicrons, or the bottom loop of the letter B. I have seen hemidrachmas of Azas and Azilies so well got up as to be perplexing enough, but when they are offered for sale by twenties and thirties, and purchaseable for annas, there can be no question as to their origin. Nearly all the recent additions to Bactrian Numismatics, first made known to us, I believe, by Major Cunningham's *unpublished* plates, are common as forgeries: beside these, is the Lysias with Eucratides style of helmet, first published in the Numismatic Chronicle for October, 1853, and I have recently seen a forged Diodotus corresponding with Major Cunningham's supplementary Plate, Fig. 6,\* which affords a very convincing proof, it is to be feared, that a *white man* and his brethren are still at their dirty work.

“To commence a crusade up here against the trade, which it really has become, would be in vain, for there is not a money-changer or shroff, and very few jewellers, (many of them possibly in ignorance of the truth,) who have not laid in a supply of fabrications under the idea that the *Sahib logue* will be eager to purchase. The market being overstocked and the thing altogether overdone may in some measure check the evil, but nothing save the civil authorities setting their police at work to search the coining dens, and on their seizing the implements, well punishing the perpetrators of this *jal sazi*, will ever effectually stop it. In the meantime as it is beyond a doubt that the fabricators do obtain information from such sources, let me strongly advise collectors on no consideration whatsoever, to send plates or drawings of coins to their agents in the Punjab or ~~New~~ Provinces, for by doing so they very often unwittingly afford instruction and assistance of the very kind it is our interest to prevent.”

\* With the Greek { ΒΑΣΙΛΕΩΣ ΑΝΤΙΟΧΟΥ.  
legend altered to. { [*Basileos Antiochou*]

2.—From Mr. Hodgson the following papers—

1.—A Note on the native name of the peak of the Himalaya, the height of which has been lately determined by Col. Waugh.

2d.—Route of two Nepalese Embassies to Pekin, with remarks on the water shed and plateau of Tibet.

3d.—Systematic Summary of the Route from Kathmandu to Pekin as traversed by the Nepalese Ambassador to China, Káji Dalbhánjan Pánde, A. D. 1822-3, and set down by his Secretary at the close of each day's journey.

4th.—Abstracts of diary of Route from Kathmandu to Pekin as taken during the Embassy of Chountra Pushkar Sah, showing the number and position of the mountain passes.

The first paper, which was read to the meeting, is subjoined.

### NATIVE NAME OF MOUNT EVEREST.

TO THE SECRETARY, ASIATIC SOCIETY OF BENGAL.

SIR,—In the report which has just reached me of the last meeting of the Society, it is announced that a “nameless” peak situated North East of Kathmandu, and in East Longitude 87, had at length been definitely ascertained by our very able Surveyor General, Colonel Waugh, to be upwards of 29000 feet high, and consequently to be the loftiest yet known peak of the Himalaya.

The report goes on to say, that “Colonel Waugh mentioned in his letter that it was his rule and practice to assign to every geographic object its true local or native appellation. But here was a mountain, probably the loftiest in the world, without any local or native name that was either now ascertained or likely to become so, till Nepal could be entered and this stupendous mass of snow closely approached.” Consequently, Colonel Waugh had been obliged to coin a name, and had fixed on Mount Everest.

Agreeing as I do with Colonel Waugh in the propriety of his rule of adopting native names, and cordially sympathising with the sentiment which gave rise to the name Mount Everest, I trust I may be permitted, without offence, to state, in justice to my friends the Nepalese and to myself who have been so long connected with them, that the mountain in question does *not* lack a native and ascertained name; that that name is Déva-dhúngá, or holy hill,



Mons Sacer in Latin; and that it is expressly referred to under that name in our Journal. To the paper styled "Route from Kathmandu to Darjeeling" there is appended a "Memorandum relative to the seven Cosis." In the latter occur the following words: "The Bhotia Cosis," has its source at Déo-dhúnga a vast Himalayan peak situated 60 to 70 miles east of Gosainthán, and which Colonel Waugh conjectures may rival Kángchan-jhúnga in height. In the rude sketch map which accompanied that paper, Déo-dhúnga was set down, eo nomine, in the position indicated, and that that position tallies with the site of Mount Everest, is clear from the words above quoted, since "60 to 70 miles east of Gosainthán," answers precisely to east longitude 87, Gosainthán," being in 86 east longitude.

Other indications equally correspond, and at the same time show why such an object could not remain unnamed or unascertained.

Thus Déodhúnga and Mount Everest are both "about 100 miles N. E. of Kathmandu;" both are midway between Gosainthán and Kangchan and, lastly, both are by their position and by the absence of any like mass of snow in all the interval between those peaks, identifiable with the so called Kútighát, or the great *Gate*, which annually for half the year is closed by winter upon the eastern highway of Nepalese commerce and intercourse with Tibet and China.

A few words more may be given to this last point, as being the matter which chiefly fixed my attention, as a political officer in Nepal, on the site of Mount Everest, and enabled me at once, when I heard in after years surmises (from I think Col. Waugh himself or from some of his subordinates) of the great height of a peak in that direction, to fix on Déva-dhúnga vel Bháiravthán (both names are used) as being the "enormous snow mass" in question; and I have often of late repeated this here, very recently to Mr. Blandford. Round the shoulder of Déo-dhúnga runs, as above intimated, the great eastern highway (the western being round the shoulder of Gosainthán) of the merchants and envoys of Nepal proceeding to Lhása and Pekin; and this passage along the shoulder of the huge snowy mass Déo-dhúnga vel Bháiravthán is denominated the Kutighát by Hindusthanees and the people of the plains of India,

as the passage round the huge snowy mass of Gosainthán is denominated by them the Kérung, or western Ghát. But Kúti and Kérung are names of towns, the one situated considerably within, and the other considerably beyond, the respective gháts; and, moreover, the word ghát is never used by the highlander (Parbatias) of Nepal for a snow-pass. Their word is langúr, and the especial langúr in question is named Bhaírava langúr or the pass of Bhaírava, just as the mass above it is called Bhaíraváthán, or abode of Bhaírava, Bhaírava being the terrific form of the god Siva. Every merchant and statesman at Kathmandu talks familiarly of the Bhaírava langúr, owing to its formidable character, its obstructiveness (it bars the road to the north for half the year,) and its strange contrast with that very extensive and very level tract of country in Tibet, called the Tingrí Maidan, on which the Bhairav langúr immediately opens. And this marked character of the ghát, added to the unmarked character of the peak above it, may be one reason why the two are often confounded under the same appellation. But Déo-dhúnga and Bhaíraváthán are nevertheless sufficiently familiar, and correct names for this peak, or snowy mass rather; and it were indeed a strange circumstance if so remarkable a natural object had escaped the notice of the people of the country and thus remained unnamed. Nor would it have been very creditable to me after 20 years' residence in Nepal, had I been unable to identify that object. The two papers herewith submitted, together with those formerly submitted to the Society\* or to Government, will I trust show that I have given as much attention to the

\* 1. Military road throughout the centre of Nepal from Kamaonto Sikim. To Government.

2. Route from Kathmundu to Tazedo on Chinese frontier, to Society, and published in its Researches.

3. Route from Kathmundu to Darjeeling. To Society and published in its Journal.

4. Physical Geography of Himalaya, to Society and published in its Journal.

5. Visit to Nagakote with notice of the rivers flowing into it, printed in the Journal.

6. Various routes through Nepal from and to places specified. Sent to Government and deposited in its archives.

7 and 8. Two Journals of embassies from Nepal to China, now sent.

general subject of Nepalese Geography as my opportunities and training admitted and my duty required, whilst the foregoing remarks must satisfy every one that this special object, supposed to have been heretofore utterly unheeded, was one so situated and circumstanced that no reasonable excuse for ignorance of it on my part could be made, it being clear that personal approximation was no more a necessary condition of ascertaining the name, than it was of determining the height, of Déo-dhúnga.

The only doubt in my mind is the greater or less prevalence in Nepal Proper of the term Déo-dhúnga.

Having possibly obtained it from persons dwelling in the vicinity of Kúti, not at Kathmundu, I have written to Kathmundu to determine that question, and will here only add, that should the name prove to be more familiar to the people of the Cosian basin than to those of the valley and capital, it will not be one whit less a "true native name," just as Col. Waugh's own Powhanri is as true a native name as Dr. Hooker's Dónkia, in relation to a Sikim peak and ghát.

I am, sir, your obedient servant,

(Sd.) B. H. HODGSON.

P. S. I subjoin for reference a copy of the sketch map adverted to, taken from one of my extra copies of the memoir on the Seven Cósís.

The two papers herewith submitted are—

1.—Route of the Embassy of Káji Dalbhánjan Pánde to Pekin.

2.—Route of the Embassy of Chountra Pushker Sah to Pekin.

Both from Kathmundu of course.

On the proposition of the chairman, the thanks of the meeting were voted to Mr. Hodgson for his valuable papers.

3.—From Mr. Assistant Secretary Oldfield, enclosing copies of Meteorological Registers kept at the office of the Secretary to the Government of the N. W. P. Agra, for the months of July and August last.

4.—From Bábu Rádhá Náth Sikdár, copy of a Meteorological Register kept at the office of the Surveyor General for the month of August last.

The Librarian submitted his usual monthly report.

## LIBRARY.

The Library has received the following additions during the month of September last.

*Presented.*

Selections from the Records of the Government of India, No. XV. Papers regarding the Jubbulpore School of Industry, Flax operations in the Punjab, Survey Reports of the Central and Northern portions of Pegu.—BY THE BENGAL GOVERNMENT.

Ditto Ditto.—BY THE GOVERNMENT OF INDIA.

Ditto Ditto, No. XVI. Report on the operations connected with the Hindoostan and Thibet Road.—BY THE GOVERNMENT OF INDIA.

Report on the Coal and Iron districts of Bengal by Mr. D. Smith.—BY THE SAME.

Soie et Papier Tires de L'écorce aux fascines du mûrier par Frédéric Lotteri. *Malte*, Pamphlet.—BY THE AUTHOR.

Memoire sur Le Sarcophage et L'inscription Funéraire D'eschmounazur par M. L'Abbé J. J. L. Bargès. *Paris*, 1856.—BY THE AUTHOR.

Byākaran Chandricā, ব্যাকরণ চন্দ্রিকা, by Mothoornauth Turkoruthno, 12mo. pamphlet.—FROM THE AUTHOR.

The Oriental Baptist for September, 1856.—BY THE EDITOR.

The Calcutta Christian Observer for Sept., 1856.—BY THE EDITORS.

The Calcutta Christian Spectator for August, 1856, Bombay.—BY THE EDITOR.

The Upadeshak for September, 1856.—BY THE EDITOR.

The Durbin Newspaper for September, 1856.

The Phoenix Newspaper for ditto.

The Morning Chronicle ditto for ditto.

Journal Asiatique, Tome VII. No. 27, for Avril-Mai, 1856.—BY THE ASIATIC SOCIETY OF PARIS.

Proceedings of the Royal Geographical Society of London, No. 4, May and June, 1856.—BY THE SOCIETY.

Specimen e Literis Orientalibus, exhibens az-zamaksarii Lexicon Geographicum, cui titulus est كتاب الجبال والامكنة والسلا Ex cod. Leyd. nunc primum edidit Matthias Salverda de Grave. *Lugduni Batavorum*, 8vo, 1856.—BY THE CURATORS OF THE ACADEMY OF LEYDEN.



Journal of the Academy of Natural Sciences of Philadelphia, new series, Vol. II. part IV.—BY THE ACADEMY.

Journal of the Royal Geographical Society, Vol. 25.—BY THE SOCIETY.

*Exchanged.*

The Athenæum, for June and July, 1856.

The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science, Nos. 75 and 76 for July, and 77 for August, 1856.

The Calcutta Review, No. 53, for September, 1856.

*Purchased.*

Annales des Sciences Naturelles. Tome IV. No. 6, and Tome V. No. 1.

Revue et Magasin de Zoologie, Nos. 5 and 6, 1856.

Revue des Deux Mondes, 15th June, July, and 1st August, 1856.

Journal Des Savants, for June and July, 1856.

Comptes Rendus Nos. 20 to 21, for May, Nos. 22 to 26, for June, 1856, and Nos. 1 and 2, for July, 1856.

The Literary Gazette, Nos. 17 to 24.

L'Athenæum Français, Nos. 21 to 29, excepting No. 27.

The Quarterly Review, No. CXCVII. for June, 1856.

The Edinburgh Review, No. 211, for July, 1856.

The American Journal of Sciences and Arts, Nos. 63 and 64.

The Annals and Magazine of Natural History, for July and August, 1856.

The Westminster Review, No. XIX. for July, 1856.

The Natural History Review.

1st October, 1856.

GOUR DOSS BYSACK,

*Asst. Secy. and Librarian.*

# JOURNAL

OF THE

# ASIATIC SOCIETY.

No. VI. 1856.

*Route of two Nepalese Embassies to Peking with remarks on the water-shed and plateau of Tibet.—By B. H. HODGSON, Esq.*

The two following papers (it may be as well to state, in order to show their trustworthiness) were presented to me by the Maha Rájáh of Nepal in 1843, when I took my leave of him after having resided at his court for ten years in the capacity of British minister. His Highness was pleased to say he desired to give me something, which, not being of monied value, I should be permitted to retain, and which he knew I should set especial store by, and all the more because I was aware that the communicating of any such information to the “Feringé” (European) was contrary to the fixed policy of his government. And therewith His Highness gave me these two documents as well as several others of equal interest. The papers now in question comprise official summaries of the routes of two of those embassies of tribute and dependance, which, since the war of '92 with Tibet (aided by China), Nepal has been bound by treaty to send to Peking once every five years. It is customary for these embassies always to keep nearly or quite to the same track, they being conducted through Tibet and China at the expense of the celestial empire and under the guidance of officers appointed by it.

The time of departure from Kathmandu is determined by the opening of the passes over the Himalaya, which takes place usually during the first half of June by the melting of the snows; and that accordingly is the regular period for the setting out of the

ambassador, who usually reaches Peking about the middle of the following January. The ambassador's suit is rigidly fixed as to number and as to every other detail; and, well or ill, tired or not, his excellency is obliged by his pragmatistical Chinese conductor (perhaps we should add in candour, by the character also of the country to be traversed) to push on towards his destination with only one halt of about a month and half at Lhása, where, luckily for him, there is always some necessary business to transact, the Nepalese having long had commercial establishments in that city. The ambassador, who is always a man of high rank (Hindu of course) and rather advanced in life, can take his own time, and cook and eat his own food, and use his own comfortable sedan chair or more comfortable litter (*dándi*, hammock) as far as Tingri. But there the inexorable Chinese *Mehmandár* (honorary conductor) meets him with the assigned set of ponies for himself and suit, and his excellency must now mount and unceasingly as inflexibly pursue his journey through a country lamentably deficient in food, fuel, and water, by pretty long stages and without a halt save that above named, on horse-back, over a very rough country, for some one thousand seven hundred miles, and then only exchange his pony for the still worse conveyance of a Chinese carriage (more properly, cart) which is to convey him with like persistency some seven hundred miles further, fatigue and bad weather notwithstanding, and the high caste Hindu's cuisine (*horresco referens*) all the while entirely in the hands of filthy *Bhótias* and as filthy Chinese! Of course there is a grand lustration after each embassy's return home, which usually happens about two years from the time of its departure for Peking; and many a sad and moving story (but all reserved for friends) the several members of these embassies then have to tell of poisonous compounds of so-called tea\* and rancid lard or suet, given them for drink in lieu of their accustomed pure lymph or milk; of heaps of sun-dried flesh incessantly substituted for the farinaceous and vegetable food of all decent Pagans; nay, of puppies served up to them for kids, and cats for hares, by stolid beastly cooks of *Bhôt* (Tibet) under the orders of a seemingly insouciant and

\* The so-called brick tea which is composed of the sweepings of the tea manufactories cemented by some coarse kind of gluten.

really pragmatical Chinaman, who answers all objections with 'Orders of the emperor,' 'Food of the country,' 'You nicer than us, forsooth,' 'Fed or unfed you start at such an hour.' It is singular to observe the celestial empire treating Asiatics with like impertinence as Europeans, and it is satisfactory to think that the recent treaty of Nepal with Tibet, has put an end to these and other impertinences.

I proceed now to a few remarks on the form and substance of the papers. The form is such as might be expected from men, of a nation of soldiers and statesmen, scant of words and having an eye to business in the survey of a country. Blucher regarded London merely as a huge store-house of valuables, fit, and haply destined, to make spoil for a conquering army. And a Nepalese regards Tibet and China, not from a picturesque or scientific point of view, but with reference to the obstacles their natural features oppose to a daring invader having an eye to business in Blucher's line. The chief item therefore of both itineraries and the only one of the shorter, is an enumeration of the mountain ridges or ranges intersecting the way (a most valuable piece of information, as we shall soon see); and to this the longer paper adds a similar enumeration of the intervening rivers, with the means of passing them, or the ferries and bridges; the forts occurring all along the route, and, lastly, the lakes and tanks where drinking-water can be had—a commodity most scarce in those regions where half the lakes are brackish. These several items, together with the stages, and the distances (computed by marching-time as well as by reference to the Nepalese kos of  $2\frac{1}{3}$  miles each) comprise the whole information conveyed. But it will nevertheless be allowed that so authentic an enumeration of so many important particulars relating to so vast an extent of country so little known, is of no small value; and, though here packed into the smallest compass, that information might in the hands of a skilful book-maker suffice to furnish forth a goodly volume. But book-making is in no repute with the gentry of Nepal. It belongs solely to pandits, whilst on the class of official scribes is devolved the task of recording all useful information, which they are strictly required to embody in the fewest possible words and smallest space. I will only add on this head of the form of the papers.

1st. That the records of the two embassies having been made



at the several times of those missions, and quite independently of each other, the statements of one may be used to correct and explain those of the other; and that, where discrepancies occur, the longer paper, which is complete in its details, is probably, on the whole, more correct than the one which is not complete in its details, though I confess a strong leaning to the Chountra statement, because of its sound discrimination of interesting facts.

2nd. That the assigned distances, though not measured, but computed, yet, having a double basis of computation\* by marching time under given assigned circumstances, and by kos according also to a given standard in use in Nepal, ought, I should think, to be capable of very definite determination in competent hands.

3rd. That both papers are literal translations, and that the additional information procured by myself and embodied for convenience in the documents, is carefully distinguished by the use of brackets; the rest of such information being thrown into foot notes.

The Chountra's embassy, as I learnt before I left Kathmandu, set out in 1817. That of the Kaji, in 1822, as appears on the face of the document. Chountra and Kaji are titles of ministers of state in Nepal. I proceed now to the substance of the documents, and here, in imitation of my friends, I shall be as curt as possible, and endeavour, in a few words, to bring together the most generally interesting items of information furnished by the two papers. The total distance from Kathmandu to Peking, according to the Kájí, is  $1268\frac{1}{2}$  kos; according to the Chountra, 1250 kos; and in that space, occur, according to the former authority, 106 mountain ranges which are crossed; according to the latter, 104. The Kájí's paper gives us the further information, that 150 lakes and tanks occur in the route; 652 rivers,† crossed by 607 bridges and 23 ferries; and lastly, 100 forts.

It would be very desirable in dividing the whole space into the

\* I have heard, that the whole road is measured and marked by the Chinese, and if so, the Nepalese could never be much out, the only thing required of them being the conversion of li into kos.

† Say rather, rivers and river-crossings, for the same mountain locked stream is here and there crossed 20 or 30 times in a very moderate distance. When I pointed out this at Kathmandu I got the explanation, and was referred to the crossings of the Ráputi river between Hitounda and Bhimphédy on the road to Kathmandu from the plains of India for a sample.

political and natural limits of the several countries traversed, to make the Chountra's and Káji's papers coincide. But I have attempted this in vain, owing to the different names cited in the two papers and the different methods of citation. In regard to political limits they concur sufficiently, but not in regard to natural limits. I therefore give the former according to both papers; the latter according to the Chountra's only, it being quite clear on that head. I annex the langúrs or mountain ranges to both statements.

|                                                            | <i>Political limits</i><br><i>according to Chountra, Káji</i> |       | <i>Mountain ranges</i><br><i>Chountra, Káji.</i> |       |
|------------------------------------------------------------|---------------------------------------------------------------|-------|--------------------------------------------------|-------|
|                                                            | <i>kos.</i>                                                   |       |                                                  |       |
| I. Nepal (from Kathmandu to Khása), . . . . .              | 29                                                            | 34½   | 6                                                | 5     |
| II. Tibet (from Khása to iron bridge of Tachindo), . . . . | 636                                                           | 649½  | 63                                               | 71    |
| III. China (Tachindo iron bridge to Peking), . . . . .     | 585                                                           | 584½  | 35                                               | 30    |
|                                                            | <hr/>                                                         | <hr/> | <hr/>                                            | <hr/> |
|                                                            | 1250                                                          | 1268½ | 104                                              | 106   |

*Remarks.*

I.—From Kathmandu to Khása there is a difference of 5½ kos, obviously caused by the Káji's detour viâ Sankhú, instead of keeping the direct road as the Chountra did.

II.—From Khása to the iron bridge of Tachindo the difference is 13½ kos. It is pretty clearly caused, partly by a small detour, as before, and partly by a slightly different use of terms. In the Chountra's paper the specification in the body of the document is "on this side of Tachindo;" in the remarks appended to it, "beyond Tachindo," whereas the Káji's paper specifies Tachindo itself.

III.—From the iron bridge of Tachindo to Peking the difference is only half a kos, which is not worth mentioning.

*Natural limits from the Chountra's paper.*

|                                                                                                                  | <i>Kos.</i> | <i>Mountain ridges.</i> |
|------------------------------------------------------------------------------------------------------------------|-------------|-------------------------|
| 1. Cis-himalayan region (Kathmandu to Bhairav langúr), . . . . .                                                 | 50          | 7                       |
| 2. Trans-himálayan region (Bhairav langúr to 4 kos beyond Chinchí Shan, where the <i>great</i> mountains cease), | 635         | 65                      |
| 3. Chinchí Shán to Pouchin (where <i>all</i> mountains cease), . . . . .                                         | 212         | 30                      |
| 4. Plains of China (Pouchin to Peking),                                                                          | 353         | 2                       |
|                                                                                                                  | <hr/>       | <hr/>                   |
|                                                                                                                  | 1250        | 104                     |

To these distributions I subjoin, though it be a repetition, the excellent concluding remarks of the Chountra's paper :

" Thus there are 104 langúrs (or mountain passes) between Kathmandu and Peking, and of these 102 occur in the non-carriageable part of the way, or the first 897 kos ; and the last 2 langúrs only, in the remaining 353 kos, or the carriageable part. The last named part of the way may be said to be wholly through plains, for, of the two hills occurring, only one is at all noticeable, and both are traversed in carriages. From Kathmandu to the boundary bridge beyond Tachindo (China frontier) is 665 kos, and thence to Cinchi Shán is 20 kos. Throughout these 685 kos from Kathmandu mountains covered (perpetually ?) with snow occur. In the remaining 565 kos, no snowy mountains occur."

In the way of provincial boundaries we have the following. From Gnáksá, the 37th stage of the Káji's paper, to Súngwá, the 51st stage of the same paper, is the province of U, which contains the metropolis of Tibet or Lhása. At Súngwá, or, in full, Kwómbo gyámnda Súngwá, commences the Tibetan province of Khám, which extends to Tachindo or Tazhi-deu which is the common frontier of China and Tibet. It occurs at the 104th stage of the Káji's paper. The native name of Tibet is Pót vel Bód. The Sanskrit name is Bhót. This is Tibet proper or the country between the Himalaya and the Nyenchhen-thánglá, which latter name means (and the meaning is worth quoting for its significance) pass of (to and from) the plains of the great Nyen or Ovis Ammon, or rather, great Ammon pass of the plains. That portion of Tibet which lies north of the Nyenchhen-thánglá (as far as the Kwanleun) is denominated by the Tibetans—the western half, Hóryeul, and the eastern half, Sókyeul, after the Hór and Sók tribes respectively. The great lake Namtso demarks Northern Tibet in the same way that the great lake Yamdotso denotes Southern.

A word more about the Bhairav langúr which is equivalent to Mount Everest as recently explained to the Society. The Chountra's paper makes it 50 kos from Kathmandu ; the Káji's, 52½ kos. But to obtain the latter result, you must not blindly follow the entry in the itinerary but remember that this " huge snow mass"\*

\* This great mass is visible alike from the confines of Nepal proper (the valley) and from those of Sikim and all the more unmistakeably because it has no compe-

covers a large space of the road which must be understood as *commencing* soon after leaving the 14th stage or Thólung and not after leaving the 15th stage or Tíngri Langkót.

The documents now submitted themselves suffice to prove the meaning of langúr, since they show it to be equivalent to the lá of Tibetan and the Shán of Chinese; consequently also (as we know from other sources) to the Turkic tágh and the Mongolic úlá. It may therefore be rendered "mountain" as well as "mountain pass," and this is the reason, perhaps, why the Nepalese often do not discriminate between the name of the pass and of the peak of Bhairava but blend them both under the name Bhairav langúr, which is equivalent to the Gnálhám thánglá of the Tibetans. Col. Waugh therefore may be assured that his Mount Everest is far from lacking native names, and, I will add that I would venture in *any* case of a signal natural object occurring in Nepal to furnish the Colonel with its true native name (nay, several, for the country is very polyglottic) upon his furnishing me with the distance and bearings of that object, although neither I nor any European had gone near it.\* For the rest, I cannot withhold my congratulations upon this second splendid result of Col. W.'s labours though alack! it would seem fatal to my pet theory of sub-himalayan water-sheds,—a term carefully to be discriminated from *the Himalayan* water-shed to which I now purpose briefly to advert.

Since I presented to the Society in 1849 my paper on the physical geography of the Himalaya a good deal of new information has been published, mixed with the inevitable quantum of speculation, touching the true character of that chain, and the true position of its water-shed, with their inseparable concomitants, the general elevation and surface character of the plateau of Tibet.

titor for notice in the whole intervening space. It is precisely\* half way between Gosain-than which overlooks Nepal proper and Kangchan which overlooks Sikim.

\* It is obvious to remark, that no European has ever approached Dhavalagiri which yet lacks not a native name known to Europeans and in fact I myself have been twice as near to Déva dhúnga, vel Bhairav thán, vel Bhairav langúr, vel Gnálhám thánglá, as any European ever was to Dhavalagiri. The Bhotias often call the Bhairav langúr, Thánglá or "pass of the plain," viz. of Tingri, omitting the more specific designation Gnálhám, which also might alone designate the object, nay, which is *the* name of the snowy mass as opposed to the pass over it and the plain beyond it.



After an attentive perusal of these interesting speculations I must, however, confess that I retain my priorly expressed opinion that the great points in question are inextricably involved with, and consequently can never be settled independently of, the larger question of the true physical features of the whole of the *bám-i-dúnya* of Asiatics and *Asie Centrale* of Humboldt. It *may be* that the Himalaya is not a chain at all, but an exemplification of the truth of Elie de Beaumont's theory that so-called mountain chains are only parallel dispositions of a series of geological *nœuds* which, if laid side by side, constitute the semblance of a chain of longitude, and, if laid one over the other, constitute the semblance of a chain of latitude or a meridional range.

It *may be* that the Himalaya is not a longitudinal but a meridional chain, and that the geological back-bone of the whole continent of Asia does not run parallel to the greatest development of that continent or east and west, but transversely to that development or north and south, and that the *Khin gan úla* is an indication of the northern extremity of this back-bone; the *Gángri* or water-shed of the Indus and *Brámaputra*, an indication of its southern extremity.

It *may be* that the question of the water-shed is not to be regarded with reference to the adjacent countries only, but, as Guyot and others affirm, with reference to the whole eastern half of the continent of Asia; and that the southern part of Tibet, inclusive of the Himalaya, is to be regarded as shedding the waters of Eastern Asia from the Arctic to the Indian Ocean. Such things, or some one of them, I repeat, *may be*, and one of the theories just enumerated *may* involve the true solution of questions for some time past investigated and debated on the frontier of India, though without any sufficiently distinct reference to those theories, prior though they all be in date. But the mere statement of them suffices, I should say, to show that they will not find their solution on that frontier, but only when the whole *bám-i-dúnya* (dome of the world, a fine orientalism) has become accessible to science.

In the meanwhile, without seeking to deny that many facts\*

\* Per contra, the numerous determinations of the height of the *gháts* at far distant points seem to warrant our assuming 17000 feet for the mean elevation of

seem to indicate that the axial line of the Himalaya lies beyond the ghát line, it is obvious to remark that this assumed line is still parallel to the ghát line, though beyond it, and consequently *cannot be reconciled* with an essentially meridional axis, such as the Gángri range presents. And, upon the whole, and with reference to organic phænomena especially, the ghát line still presents itself to me as the best divisor of the Indian and trans-Indian regions and climates, though I am not unaware that bráhmanic geography has, from remote times, carried the Indian frontier up to Mansaróvar and Rávanhrád, to the Brahmápútra and Indus line in Tibet. And, again, though I do not, nor ever did, doubt that Tibet is a very mountainous country, yet I conceive that there are good reasons for admitting the propriety of Humboldt's general designation for it. He calls it a plateau or elevated plain, and all those I have conversed with who have passed from various parts of the Himalayan countries into those of Tibet have expressed themselves in terms implying a strong distinction at least between the physiognomy of the former and the latter regions. I would add, that nothing can be juster or finer than Turner's original contrast of the two.

No one acquainted, as I have long been, with the native descriptions of Tibet,\* or with the general and special delineations of the country by Danville, based entirely upon native materials, or with such enumerations of mountain ranges occurring between the Nepalese and Chinese frontiers, as the accompanying documents contain, could for a moment question that mountains abound in Tibet. On the other hand, there are several reasons of a general nature, besides the specific allegations of the fact by the people, to prove that wide spread plains also abound there. It may be worth while to enumerate these reasons. They are as follows:

1st.—One language only prevails throughout all the provinces of Southern Tibet, that is to say, throughout Balti, Ladák, Nári,

the ghát line; and it may well be questioned if any line of equal height and extent exist north of that line. It is the closing of the *gháts* that annually stops all access to Tibet, not any obstacle beyond them.

\* Journal No. IV. for April, 1832, Article I.

Utsáng and Khám,\* or, in other words, from the Bolór nearly to the Yúnling, whilst in the same extent of country in the Himalaya very many languages are found.

2nd.—The language of Tibet has express and familiar terms for plain and valley which are respectively called tháng and lúng in Tibetan, whereas the Himalayan tongues have no word at all for a plain, no distinct one for a valley.†

3rd.—It is well known, that there are very many lakes in Tibet and several of them of great size—a fact which involves the existence of large level tracts also, as the contrary fact in the Himalaya involves (what is notorious) the absence of wide spread levels.

4th.—Tibet is the permanent habitat of wild animals of the true ox, deer, and antelope types—all creatures of the plain and not of the mountain, and none therefore found in the Himalaya.

5th.—Tibet is annually the seasonal resort of vast numbers of the wading and swimming tribes of birds which pass from the plains of India to those of Tibet every spring, and stay in the latter till the setting in of winter, whilst the whole of these birds entirely avoid the Himalaya. “The storks know their appointed seasons in the heavens,” and their skilfully disposed phalanxes periodically afford one of the finest sights we have.

There are few of the Tibetan plains more noticeable than that which occurs immediately on passing the Himalaya by the Bhairav langúr—few contrasts more palpable than that of the cis and trans-himalayan regions at this well known and central point; and when I lately requested Major Ramsay, the Resident in Nepal, to get for me a confirmation or refutation of my opinion, he answered “Dr. Hooker must be in error, when he says there are no extensive plains in Tibet, because Tingri maidan (plain) for example, is fully 60 miles in length and 15 to 20 in breadth. Til bikram Thássa assures me that, in the recent war, he marched along that plain for several days and passed a lake three days in circumference and

\* Journal No. IV. for April, 1832, Article I.

† The numerous names of places in Tibet which are compounded with the word Tháng, a plain, as Chantháng in Nári, would alone suffice to prove that the general surface of Tibet is very different from that of the Himalaya.



which he estimated to be as large as the valley of Nepal.\* When asked if Tingri maidan was any thing like the valley of Nepal, he said, 'No! Horsemen could not gallop about Nepal. They would have to keep to the roads and pathways. But numerous regiments of cavalry could gallop at large over the plain of Tingri.' In a like spirit the Tibetans themselves compare the vast province of Khám to a "field," and that of U'tsáng to "four channels"†—both expressions plainly implying abundance of flat land and the latter also indicating those ranges parallel to, and north of the Himalaya which all native authorities attest the existence of in Tibet, not only in Nári but also in U'tsang and Khám. The most remarkable of these parallel chains, and that which divides settled from nomadic, and north from south, Tibet, is the Nyénchhén thánglá, of which I spoke in my paper on the Hórsók‡ and of which I am now enabled pretty confidently to assert that the Karakorum is merely the western prolongation, but tending gradually towards the Kwanleum to the westward. But these parallel ranges imply extensive level tracts between them, which is the meaning of the "four channels" of U'tsáng, whilst the east and west direction of these ranges sustain Humboldt's conception of the direction of all the greater chains of Asie Centrale, or the Himalaya, Kwánleúm, Thián and Altaí, as also of that of the back-bone of the whole Asiatic continent which he supposes to be a continuation westward of the second of these four chains.

Upon the whole, I conceive, there can be no doubt that Tibet proper, that is, Tibet south of the Nyénchhén thánglá range, is, as compared with the Himalaya, a level country. It may be very well defined by saying it comprises the basins of the Indus (cum Satluj) and Brahmaputra.

In this limited sense of Tibet—which the native geographers divide into Western, Central, and Eastern Tibet, called by themselves Nári, U'tsáng, and Khám, or, when they would be more precise, Balti, Máryúl, vel Ladák, Nári, Tsáng, U, and Khám—Gángri is the water-shed of Tibet.

\* The valley of Nepal is about 16 miles in diameter or 50 in circuit.

† Journal at supra cit.

‡ Journal No. II. of 1853.



The region of the lakes, Mapham and Lanag, equal to the Man-saróvar and Rávanhrád of Sanskrit geography, is situated around Gángri, where the elevation of the plateau is 15,250 feet. From this region the fall of the plateau to the points where the rivers (Indus and Brahmaputra, or Singkhá-báb and Erú) quit the plateau, is great, as we sufficiently know from the productions of Balti and of Khám at and around those points. In lower Balti snow never falls: there are two crops of grain each year, and many excellent fruits, as we learn from native writers;\* whilst my own information received vivâ voce from natives of those parts, assures me that the country towards the gorge of the Erú or Brahmaputra is, like Balti, free of snow and yields two crops a year; that rice is produced and silk and cotton; and that these last articles form the ordinary materials of the people's dress. These points cannot therefore exceed 4—5000 feet in elevation, which gives a fall of above 10,000 feet from the water-shed, both ways.

I will conclude these hurried remarks suggested by the ambassadorial routes from Kathmandu to Pekin, now submitted to the Society, with a statement, which I think the Society will perceive the high interest of, with reference to those recent ethnological researches, the whole tendency of which is more and more completely to identify the Turánians of India and Indo-China with those of the trans-himalayan countries.

It is this, Erú-tsángpo is the name of *the* river of Tibet: Erú-wádi, that of *the* river of Western Indo-China or Ava: Erú vel Árú, that of *a* river in the Tamil and Telugu languages. Now, when we remember that Tsángpo is a mere local appendage, to the Tibetan word,† and wádi vel váti, a mere prakritic appendage to the Burmese word; and further, that the Turánians of Tibet, the Himalaya, and Indo-China, are still constantly wont to denominate their chief river by the general term for river in their respective

\* Journal for April, 1832.

† Tsángpo, of or belonging to Tsáng, the province of which Digarcha is the capital and by which place the river (Erú) flows. Even the prefixing of a Y, (Yéru-Yáru) is equally Tibetan (in speech) and Dhavirian! Turner's is the first and correctest writing of the word, Erú-chámbu to wit, for chámbu is the soft spoken sound of Tsángpo.

languages (testè Meinám, Líkhu, &c), we shall hardly be disposed to hesitate in admitting that the Northmen as they moved Southwards into the tropical swamps of India and Indo-China, clung to, and perpetuated, even amid various changes of language, that name of the river of their northern home (viz. *the river*, kat' héxokín) with which was associated in their minds the memory of their father-land.

“By the waters of Babylon they sat down and wept.”

P. S.—Before I went to England in 1853, I had been so fortunate as to gain access to some Gyárungs and Tákpas or inhabitants of Sífán and of the south-eastern confines of Tibet. In my paper on the Hórsók I gave the substance of their information about Sífán. I will here add a few scattered particulars about the country lying above Asám, and the rather, because from the date of my return to India up to this hour, I have never again been able to get access to these people. The Tibetans and Sífánese are wholly unacquainted with the terms Daphla, Abor, Bor, Aka, Miri, Mishmi, Khamti, by which we denominate the tribes lying east of Bhútán. They recognise Cháng vel Sáng (Changlo of Robinson) as the name of a Bhútánese tribe or rather profession. They say that above Pal yeul or Nepal (easternmost part—alone known to my informants) is Tingri: above Deunjong or Sikim is Trinsam (the Dingcham of Hooker and Damsen of myself): above Lhó or Bhútán is Nyéro: above Towáng is Chóna or Jháng chóna: above Lhokhapta is Khwómbo: above Chárung is Chozogon. These are said to be the respective Cis and Trans-himalayan districts occurring from the position of Kúti in Nepal eastwards to beyond that of Saddia in Asám. It is added that the river Erú vel Yérú (Brahmaputra) passes, from Kwómbo into Lhokhapta, beneath the great snowy mountain called Kwómbochári, and that a great mela or mart is held there every twelve years. Lhokhápta, or Lhó of the cut lips, is so called to distinguish it from Lhó proper, because the people have the habit of making a permanent cleft in their lip.

Tsáng province is said to be bounded on the south by the Ghúngra ridge; on the west by Mount Ghúndalá; on the north and east by the Kámbala range; the province of Ú to be bounded east by Súngwa gyámda, west by the river Tamchokhamba, south by the

Kámbalá range, and north by the Nyénchhén thán-glá. Beyond the last named great snowy range is situated the immense lake of Nám tsó which is said to bear the same relation to Northern Tibet that the Yámdo tsó (Paltè or Yárbrokyú) lake does to Southern. The former is the Terkiri and Téngri núr\* of our maps, as to which maps we have the following further identifications. Ghámda = Gyámda. Batang = Pátháng. Rywadzé = Réwúché. Lári = Lhá-ríngo. Kiáng, added to great rivers, = Gyárung. River Takin = Gyámo gnúlchu, and river Yang-tse = Nyá chú. Pampou of Huc = Phémba: river and valley both so called. Galdeso river = Gal-den, and is the east boundary of Phémba and Lhása vallies as the Tolong river is their western boundary.

*Abstract of Diary of Route from Kathmandu to Peking, as taken during the Embassy of Chountra Púshker Sáh, showing the number and position of the mountains passed.*

| Position of the mountain passes with the names of some of them. | No. of passes (called <i>lan-gurs</i> .) | Distance in kos. |
|-----------------------------------------------------------------|------------------------------------------|------------------|
| From Kathmandu to Dévapúr, . . . . .                            | One                                      | Six.             |
| Dévapúr to Bhót Sípa, . . . . .                                 | One                                      | Four.            |
| Bhót Sípa to Choútára, . . . . .                                | One                                      | Three.           |
| Choutára to Bísambhara, . . . . .                               | One                                      | Six.             |
| Bísambhara to Lísti, . . . . .                                  | One                                      | Three.           |
| Lísti to Khása,†. . . . .                                       | One                                      | Seven.           |
| Beyond Kúti, called Bhaírava Langúr,‡. .                        | One                                      | Twenty-one.      |
| Beyond Shikar jeung, called Tánya chólá,                        | One                                      | Thirty-four.     |
| Within the Digarché limits, . . . . .                           | One                                      | Thirty-seven.    |
| Beyond Digarché limits, . . . . .                               | One                                      | Ten.             |
| On this side of Lake Khádu painti, . . .                        | One                                      | Thirty-nine.     |
| Beyond Kapila painti, . . . . .                                 | One                                      | Thirteen.        |
| Beyond Lhássa circuit, . . . . .                                | One                                      | Sixty-six.       |
| Beyond Chhánju gyánda of Kham, . . . .                          | One                                      | Twenty-nine.     |

\* Núr is Turkic for lake as tsó is Tibetan. Téngri núr, or celestial lake of the former tongue, is an exact translation of Nám tsó of the latter. The general prevalence of Turkic words in the geography of Northern Tibet more especially sufficiently evinces the presence of that wide spread tribe in Tibet.

† Boundary of Nepal and Tibet.

‡ Mount Everest of Waugh. § Tánya chóla = Thólá of the Kaji's paper?

| Position of the mountain passes with the names<br>of some of them. | No. of passes<br>(called <i>lan-<br/>gurs</i> .) | Distance in kos. |
|--------------------------------------------------------------------|--------------------------------------------------|------------------|
| Beyond Achar jeung, . . . . .                                      | One                                              | Eleven.          |
| At Chhésu Kham, . . . . .                                          | One                                              | Seven.           |
| At Namgye-kúng, . . . . .                                          | One                                              | Thirty-six.      |
| At Tángtasáng, . . . . .                                           | One                                              | Six.             |
| At Láché, . . . . .                                                | One                                              | Twelve.          |
| At a nameless spot, . . . . .                                      | One                                              | Three.           |
| At a nameless spot, . . . . .                                      | One                                              | One.             |
| At a nameless spot, . . . . .                                      | One                                              | Four.            |
| At a nameless spot, . . . . .                                      | One                                              | Four.            |
| On this side of Lhóju, . . . . .                                   | One                                              | Sixteen.         |
| At Sáyan-á mócha, . . . . .                                        | One                                              | Eight.           |
| At a nameless spot, . . . . .                                      | One                                              | One.             |
| At a nameless spot, . . . . .                                      | One                                              | Two.             |
| At a nameless spot, . . . . .                                      | One                                              | Three.           |
| At a nameless spot, . . . . .                                      | One                                              | Four.            |
| At a nameless spot, . . . . .                                      | One                                              | Two.             |
| At a nameless spot, . . . . .                                      | One                                              | Two.             |
| At a nameless spot, . . . . .                                      | One                                              | Two.             |
| At a nameless spot, . . . . .                                      | One                                              | One.             |
| On this side of Chhámdo, . . . . .                                 | One                                              | Fifteen.         |
| At Páng-do, . . . . .                                              | One                                              | Twenty-two.      |
| At Hyá phélá, . . . . .                                            | One                                              | Five.            |
| At Thúmélá, . . . . .                                              | One                                              | Three.           |
| At a nameless spot, . . . . .                                      | One                                              | Nine.            |
| At a nameless spot, . . . . .                                      | One                                              | Nine.            |
| At a nameless spot, . . . . .                                      | One                                              | Fourteen.        |
| At a nameless spot, . . . . .                                      | One                                              | Three.           |
| At Névá, . . . . .                                                 | One                                              | Seven.           |
| Beyond Lángurikhúde, . . . . .                                     | One                                              | Four.            |
| At a nameless spot, . . . . .                                      | One                                              | One.             |
| At a nameless spot, . . . . .                                      | One                                              | Two.             |
| At Kólósáng, . . . . .                                             | One                                              | Twelve.          |
| At Phúla, . . . . .                                                | One                                              | Ten.             |
| At Gólá, . . . . .                                                 | One                                              | Four.            |
| At Phúnza dé, . . . . .                                            | One                                              | Nine.            |



| Position of the mountain passes with the names<br>of some of them.                 | No. of passes<br>(called <i>lan-<br/>gurs.</i> ) | Distance in kos. |
|------------------------------------------------------------------------------------|--------------------------------------------------|------------------|
| At a nameless spot, . . . . .                                                      | One                                              | Two.             |
| On this side of Pátháng, . . . . .                                                 | One                                              | Seven.           |
| At Tásó, . . . . .                                                                 | One                                              | Nine.            |
| At Sámáthúm, . . . . .                                                             | One                                              | Eleven.          |
| At a nameless spot, . . . . .                                                      | One                                              | Six.             |
| At a nameless spot, . . . . .                                                      | One                                              | Two.             |
| At a nameless spot, . . . . .                                                      | One                                              | Three.           |
| At Lámáyá, . . . . .                                                               | One                                              | One.             |
| At a nameless spot, . . . . .                                                      | One                                              | Two.             |
| At a nameless spot, . . . . .                                                      | One                                              | Three.           |
| At a nameless spot, . . . . .                                                      | One                                              | One.             |
| Beyond Litháng, . . . . .                                                          | One                                              | Ten.             |
| At a nameless spot, . . . . .                                                      | One                                              | One.             |
| At a nameless spot, . . . . .                                                      | One                                              | Seven.           |
| At a nameless spot, . . . . .                                                      | One                                              | Two.             |
| At a nameless spot, . . . . .                                                      | One                                              | Two.             |
| At a nameless spot, . . . . .                                                      | One                                              | Seven.           |
| At a nameless spot, . . . . .                                                      | One                                              | Two.             |
| At Góló, . . . . .                                                                 | One                                              | Nineteen.        |
| On this side of Táchindó* or Tazhideu or<br>Tazedo, . . . . .                      | One                                              | Thirteen.        |
| At the military post of Khwálechín, . . .                                          | One                                              | Twenty-eight.    |
| On this side of Chhinchí Syán (Shán, or<br>Syán, = mountain in Chinese,) . . . . . | One                                              | Fifteen.         |
| At a nameless spot, . . . . .                                                      | One                                              | Four.            |

Thus far the mountain ridges passed are generally large. Henceforward they are small.

|                                         |     |              |
|-----------------------------------------|-----|--------------|
| At a nameless spot, . . . . .           | One | Three.       |
| On this side of Yáto, . . . . .         | One | Fourteen.    |
| On this side of Paitán, . . . . .       | One | Ten.         |
| Beyond Thinda phú and Kháto, . . . . .  | One | Thirty-five. |
| On this side of Locháng syán, . . . . . | One | Two.         |

\* The iron bridge beyond Tachindo is the boundary of Tibet and China. See Diary of a journey from Kathmandu to Tachindo printed in our Researches.

| Position of the mountain passes with the names<br>of some of them. | No. of passes<br>(called <i>lan-<br/>gúrs</i> ). | Distance in kos. |
|--------------------------------------------------------------------|--------------------------------------------------|------------------|
| On this side of Míngtòu, . . . . .                                 | One                                              | Seven.           |
| At a nameless spot, . . . . .                                      | One                                              | Four.            |
| At a nameless spot, . . . . .                                      | One                                              | Three.           |
| On this side of Chatoú, . . . . .                                  | One                                              | Two.             |
| On this side of Úlingnái, . . . . .                                | One                                              | Ten.             |
| At a nameless spot, . . . . .                                      | One                                              | Six              |
| On this side of Chantou, . . . . .                                 | One                                              | Three.           |
| At a nameless spot, . . . . .                                      | One                                              | Two.             |
| At a nameless spot, . . . . .                                      | One                                              | One.             |
| On this side of Gamsú, . . . . .                                   | One                                              | Three.           |
| At a nameless spot, . . . . .                                      | One                                              | Six.             |
| On this side of Kwángsyán, . . . . .                               | One                                              | Three.           |
| Beyond Kwángsyán, . . . . .                                        | One                                              | Six.             |
| On this side of Saichháng, . . . . .                               | One                                              | Four.            |
| At Saichháng, . . . . .                                            | One                                              | Two.             |
| Beyond Saichháng, . . . . .                                        | One                                              | Five.            |
| At a nameless spot, . . . . .                                      | One                                              | Three.           |
| At a nameless spot, . . . . .                                      | One                                              | Two.             |
| On this side of Níchhángtoú, . . . . .                             | One                                              | Seven.           |
| On this side of Tángákü, . . . . .                                 | One                                              | Six.             |
| Beyond Mínsyán, . . . . .                                          | One                                              | Three.           |
| Beyond Póuthín syán, . . . . .                                     | One                                              | Sixteen.         |
| Beyond Lúpa syán, . . . . .                                        | One                                              | Nine.            |
| On this side of Phúng syán, . . . . .                              | One                                              | Twelve.          |
| On this side of Póuching syán, . . . . .                           | One                                              | Nineteen.        |
| Not carriageable thus far. Hence forward carriages may be used.*   |                                                  |                  |
| At Chhálúng, . . . . .                                             | One                                              | Caret.           |
| At Sínghá syán, . . . . .                                          | One                                              | Caret.           |
| [Distance of both, as cited below, . . .                           | ..                                               | 353              |
| <hr/>                                                              |                                                  |                  |
| Langúrs, . . .                                                     | 104                                              | 1,250 kos.       |

\* This remark, as well as the prior one in the body of the paper, belongs to the original. The bracketed entry of distance is mine, taken from the remarks below of the original.

Thus there are 104 langúrs or mountain ridges and passes between Kathmandu and Peking, and of these 102 occur in the noncarriageable part of the way or in the first 897 kos; and the last two only in the remaining 353 kos or the carriageable part. This latter may be said to be entirely through plains, for of the two hills occurring only one is at all noticeable, and both are traversed in carriages. From Kathmandu to the iron boundary bridge beyond Tachindo (China frontier) is 665 kos; and thence to Chinchí Shán or Mount Chinchí is 20 kos. Throughout these limits, or 685 kos from Kathmandu, mountains covered with snow occur. In the remaining 565 no snowy mountains occur.

Horses are used for the first 894 [query 897] and carriages for the last 356 [query 353]. Total 1250 kos.

| No. of stages. | Halting place.         | Distance in kós. | Time in ghadis and pals. | Mountain ridges or ranges crossed. | Lakes and tanks. | Rivers or river-crossings. | Boat ferries. | Bridges. | Forts. |
|----------------|------------------------|------------------|--------------------------|------------------------------------|------------------|----------------------------|---------------|----------|--------|
| 1              | Gourighát              | One              | 1-5                      | None                               | One              | Two                        | None          | Two      | None   |
| 2              | Sankhú                 | Three            | 9-0                      | None                               | None             | Two                        | None          | None     | None   |
| 3              | Devápúr                | Four             | 15-0                     | One                                | None             | Three                      | None          | Three    | None   |
| 4              | Sipá                   | Three and half   | 11-0                     | One                                | None             | Two                        | None          | None     | None   |
| 5              | Choutará               | Four             | 10-0                     | One                                | None             | One                        | None          | One      | None   |
| 6              | Pairyá                 | Four             | 13-0                     | One                                | None             | Three                      | None          | Three    | None   |
| 7              | Thama gáon             | Five             | 17-0                     | None                               | None             | None                       | None          | None     | None   |
| 8              | Listi                  | Two and half     | 13-0                     | One                                | None             | Two                        | None          | Four     | None   |
| 9              | Túguná                 | Two and half     | 10-0                     | None                               | None             | One                        | None          | One      | None   |
| 10             | Khasá*                 | Five             | 19-0                     | None                               | None             | Five                       | None          | Four     | None   |
| 11             | Chósýáng               | Five             | 21-0                     | None                               | None             | Three                      | None          | Seven    | None   |
| 12             | Kútí                   | Four             | 17-0                     | None                               | None             | Three                      | None          | Three    | None   |
| 13             | Cháchéling             | Five             | 15-0                     | None                               | None             | Three                      | None          | Three    | None   |
| 14             | Thó-lung               | Four             | 12-0                     | None                               | None             | Three                      | None          | None     | None   |
| 15             | Tigri langkót          | Ten              | 20-0                     | One                                | Bhairav langúr   | Two                        | None          | None     | None   |
| 16             | Tigri or Tingri        | Three            | 9-0                      | None                               | [or Thang lá]†   | One                        | None          | One      | One    |
| 17             | Mimo                   | Six              | 13-0                     | None                               | None             | One                        | None          | None     | None   |
| 18             | Sikár jeung            | Six              | 15-0                     | One (Khyumrila)                    | Two              | Two                        | None          | Two      | One    |
| 19             | Lólah                  | Three            | 8-0                      | One (Gyachila)                     | None             | One                        | None          | None     | None   |
| 20             | Chyáchópé or Gyá chopé | Four and half    | 11-0                     | One (Thóla)‡                       | None             | One                        | None          | None     | None   |
| 21             | Thang bú               | Nine             | 17-0                     | One (Dhangso thou-)                | Two              | Two                        | None          | Two      | One    |
| 22             | Lalit jeung            | Five             | 11-0                     | None                               | None             | Two                        | None          | None     | One    |

\* Boundary of Nepal and Tibet since 1792.

† Bhairav langúr is the name in the Khas language. Thánglá, in full Gná-lhám thánglá, in that of Tibet. These names of the mountain ridges crossing the route are not in the original, but obtained by me from other sources and therefore bracketed. This famous pass, the heights above which and constituting with the pass one immense snow mass, which mass is equivalent to the Mount Everest of Waugh, commences (see Choun-tra paper) 3 kos beyond Tholung, or 55 kos from Kathmandu, 50 by the Chountra's more direct route.

‡ Thóla = Chóla or Tasya chóla of Chountra's paper.



| No. of stages. | Halting place.             | Distance in kós.           | Time in ghásis and pals. | Mountain ridges or ranges crossed. | Lakes and tanks. | Rivers or river-crossings. | Boat ferries. | Bridges. | Forts. |
|----------------|----------------------------|----------------------------|--------------------------|------------------------------------|------------------|----------------------------|---------------|----------|--------|
| 23             | Chyá táng                  | Four and half              | 12-0                     | None                               | None             | None                       | None          | None     | One    |
| 24             | Phancholyang               | Five                       | 12-30                    | None                               | None             | One                        | None          | One      | One    |
| 25             | Tási quáng                 | Four                       | 9-0                      | None                               | None             | One                        | None          | None     | None   |
| 26             | Girí                       | Five                       | 11-30                    | One (Khyong'la)                    | None             | One                        | None          | None     | None   |
| 27             | Káti gumba                 | Nine                       | 16-0                     | None                               | None             | One                        | None          | One      | None   |
| 28             | Digarcha* or Zhikatsé      | Three                      | 5-30                     | None                               | None             | None                       | None          | None     | One    |
| 29             | Pená                       | Eight and half             | 17-0                     | One (Jikla)                        | None             | One                        | None          | One      | One    |
| 30             | Táka chyá                  | Seven                      | 14-0                     | None                               | None             | None                       | None          | None     | None   |
| 31             | Gyang chí or Gyang-tse     | Five and half              | 11-0                     | None                               | One              | One                        | None          | One      | One    |
| 32             | Kú-nashi or Kub-zhi        | Seven                      | 13-0                     | None                               | One              | One                        | None          | Two      | One    |
| 33             | Thung toi or Ralung        | Five and half              | 11-0                     | None                               | None             | Four                       | None          | Three    | None   |
| 34             | Nícláng-u or Záro          | Five                       | 11-0                     | One (Chapla)                       | None             | Two                        | None          | One      | None   |
| 35             | Nágakhu jeung or Nan-gache | Five (Yamdo lake on right) | 10-0                     | None                               | One              | Two                        | None          | Two      | One    |
| 36             | Pai khú jeung or Peité     | Six [Yaru]                 | 11-0                     | None                               | One              | One                        | None          | One      | One    |
| 37             | Gná ksá                    | Six (cross the             | 12-0                     | One (Kambala)                      | None             | None                       | None          | None     | One    |
| 38             | Chúsung jeung              | Six                        | 12-30                    | None                               | None             | Two                        | One           | One      | One    |
| 39             | Gne táng                   | Nine                       | 17-0                     | None                               | None             | Three                      | None          | Two      | Two    |
| 40             | Lhasá                      | Six                        | 14-0                     | None                               | One              | Three                      | None          | Two      | One    |
| 41             | Tai-chhin                  | Six                        | 14-0                     | None                               | None             | One                        | One           | None     | One    |
| 42             | Miton ghúngá               | Thirteen                   | 24-0                     | One                                | None             | Three                      | None          | Two      | One    |
| 43             | Ringché lang               | Five and half              | 11-30                    | None                               | One              | Three                      | None          | Two      | One    |
| 44             | Usu cháng or Usir gyáng    | Five                       | 10-0                     | None                               | None             | Four                       | None          | Four     | None   |
| 45             | Töi ta                     | Five                       | 10-0                     | None                               | None             | Five                       | One           | Five     | None   |
| 46             | Nú gári or Nú mári         | Nine                       | 17-0                     | One (Gyánda thóla)†                | Two              | One                        | None          | Seven    | None   |
| 47             | Sú sung tá                 | Nine                       | 17-0                     | None                               | None             | Six                        | None          | Five     | None   |
| 48             | Chyang táng                | Six                        | 11-0                     | None                               | None             | Two                        | None          | Two      | None   |
| 49             | Ling ta                    | Six                        | 11-30                    | None                               | None             | Five                       | None          | Five     | None   |
| 50             | Syang-tá                   | Five and half              | 10-0                     | None                               | None             | Three                      | None          | Three    | One    |

\* Zhi-khá-chhén of Newari, Capital of province of Tsáng, = Zhí-kát-sé of Tibetan and Digarcha of Khas.

† Gyánda-thóla and the seven next named mountains are said to be vast masses of perpetual snow.



| No. of stages. | Halting place.      | Distance in kós. | Time in ghadis and pals. | Mountain ridges or ranges crossed. | Lakes and tanks. | Rivers or river-crossings. | Boat ferries. | Bridges.               | Forts. |
|----------------|---------------------|------------------|--------------------------|------------------------------------|------------------|----------------------------|---------------|------------------------|--------|
| 85             | Kútú                | Eight            | 17-0                     | One                                | None             | Two                        | None          | Two                    | None   |
| 86             | Mángali             | Nine             | 18-0                     | Two                                | None             | Two                        | None          | None                   | None   |
| 87             | Khanchi khá         | Three            | 6-0                      | One                                | None             | None                       | None          | None                   | None   |
| 88             | Túngpá lóng         | Eight            | 15-0                     | None                               | None             | Two                        | One           | None                   | None   |
| 89             | Pá tháng            | Eight            | 16-0                     | One                                | None             | Three                      | None          | One                    | None   |
| 90             | Pá púng             | Three and half   | 7-0                      | None                               | None             | One                        | None          | One                    | None   |
| 91             | Tá só               | Nine             | 18-30                    | One                                | Seven            | Two                        | None          | One                    | None   |
| 92             | Tsáng-pá            | Seven and half   | 14-30                    | One                                | One              | Three                      | None          | Three                  | None   |
| 93             | Láma yá             | Twelve           | 23-30                    | Four                               | None             | Nine                       | None          | Eight }<br>*<br>None } | None   |
| 94             | Tháng thúng         | Ten              | 17-30                    | Two                                | Two              | Four                       | None          | Four                   | None   |
| 95             | Lí than             | Five             | 9-0                      | None                               | None             | Two                        | None          | Two                    | None   |
| 96             | Kh Wong takhá       | Seven            | 11-0                     | One                                | None             | One                        | None          | One                    | None   |
| 97             | Kúmó-li             | Twelve           | 21-0                     | Three                              | None             | Three                      | One           | One                    | None   |
| 98             | Mákai tóng          | Nine             | 17-0                     | Two                                | None             | Three                      | None          | One                    | None   |
| 99             | Khó khou            | Four             | 8-0                      | None                               | None             | Three                      | One           | Six                    | None   |
| 100            | Wó lési             | Nine and half    | 16-30                    | None                               | None             | Four                       | None          | Eight                  | None   |
| 101            | Tángwá li           | Seven            | 15-0                     | Two                                | None             | Two                        | None          | One                    | None   |
| 102            | Anyáng yá           | Five             | 10-0                     | None                               | None             | Three                      | None          | Two                    | None   |
| 103            | Chéchain-to         | Nine             | 20-0                     | One                                | None             | Four                       | None          | Four                   | None   |
| 104            | Táchindó or Tází-do | Four             | 7-30                     | None                               | None             | Two                        | None          | Five                   | None   |
| 105            | Thou-tháng-sung     | Five and half    | 10-0                     | None                               | None             | Three                      | None          | Four                   | None   |
| 106            | Luting chung        | Eight            | 15-30                    | None                               | None             | Two                        | None          | Two                    | None   |
| 107            | Phi syáng           | Ten              | 19-0                     | None                               | None             | Three                      | None          | Four                   | None   |
| 108            | Ní thýáng           | Seven            | 17-0                     | One                                | None             | Seven                      | None          | Nine                   | None   |
| 109            | Chhyá chhú-syáng    | Eight            | 18-0                     | One                                | None             | Two                        | None          | Three                  | None   |
| 110            | Pai-phou            | Seven            | 17-0                     | One                                | None             | Six                        | Six           | Ten                    | None   |
| 111            | Lách'yang syáng     | Four and half    | 7-0                      | None                               | None             | Three                      | None          | Four                   | None   |

\* Figure for eight perhaps a cypher.

+ Boundary of Tibet and China proper.

from Sanywa or 51st stage to this point.

See Diary of a Cashmerian journeying on the route thus far in our Researches. Kham extends

|     |                     |       |                          |       |       |             |      |      |
|-----|---------------------|-------|--------------------------|-------|-------|-------------|------|------|
| 113 | Pai taná            | One   | Five                     | One   | One   | Nine        | One  | One  |
| 114 | Chi-tou             | One   | Five                     | One   | One   | Eight       | None | None |
| 115 | Syang chang-shen    | None  | Seven                    | One   | One   | Six         | One  | One  |
| 116 | Chhin-pól           | None  | Twelve                   | One   | One   | Eleven      | None | None |
|     |                     | 28-0  | Thirty-nine* (crossings) | Three | Three | Sixteen     | One  | One  |
| 117 | Sídhú syá           | 10-0  | Fourteen                 | None  | None  | Fourteen    | None | None |
| 118 | Tayáng              | 19-0  | Forty-seven              | None  | None  | Forty-seven | Two  | Two  |
| 119 | Lyóchang-syang      | 9-0   | Nine                     | One   | One   | Nine        | One  | One  |
| 120 | Myáng tou           | 15-0  | Six                      | None  | None  | Six         | One  | One  |
| 121 | Chathung syang      | 17-0  | Fourteen                 | Two   | One   | Three       | One  | One  |
| 122 | U-liáng-i           | 16-0  | Four                     | None  | None  | Two         | None | None |
| 123 | Chyá tang           | 17-0  | Two                      | One   | One   | Four        | One  | One  |
| 124 | Tású sú             | 23-0  | Six                      | One   | One   | Seven       | None | None |
| 125 | Kwá yá syáng        | 21-0  | Three                    | One   | One   | Two         | Two  | Two  |
| 126 | Syásyú-yan-i        | 28-0  | One                      | None  | None  | Two         | One  | One  |
| 127 | Khwáng pá-i         | 12-0  | Three                    | None  | None  | One         | None | None |
| 128 | Nichi-tou           | 10-0  | One                      | None  | None  | One         | One  | One  |
| 129 | Tá gnái             | 16-30 | Three                    | One   | One   | One         | One  | One  |
| 130 | Myá syang           | 16-30 | Three                    | None  | None  | One         | None | None |
| 131 | Pán tyang           | 12-0  | Four                     | None  | None  | One         | None | None |
| 132 | Mátá wei            | 18-0  | Three                    | None  | None  | Two         | None | None |
| 133 | Talyó-pá            | 16-0  | Six                      | None  | None  | Seven       | One  | One  |
| 134 | Láng syang          | 15-0  | Seven                    | None  | None  | Seven       | One  | One  |
| 135 | Phrasyang           | 16-0  | Seven                    | None  | None  | Seven       | One  | One  |
| 136 | Khwa nyou-phú       | 20-0  | Six                      | None  | None  | Four        | None | None |
| 137 | Pau ching syang     | 18-0  | Nine                     | None  | None  | Thirteen    | One  | One  |
| 138 | Phráng syang-phra   | 17-0  | Four                     | None  | None  | Three       | One  | One  |
| 139 | Chhi syang syan     | 10-0  | Three                    | One   | None  | Three       | One  | One  |
| 140 | U kúm syang         | 21-0  | Four                     | Four  | None  | Three       | Two  | Two  |
| 141 | Syang phuráng-syang | 15-0  | One                      | Four  | None  | One         | One  | One  |

\* These and the next two noted are crossings of one mountain-lockt river, not separate rivers. The 14 of stage 121 is another instance of the same kind.



| No. of stages | Halting place.         | Distance in kós. | Time in gháras and pals. | Mountain ridges or ranges crossed. | Lakes and tanks. | Rivers or river crossings. | Boat ferries. | Bridges.   | Forts. |
|---------------|------------------------|------------------|--------------------------|------------------------------------|------------------|----------------------------|---------------|------------|--------|
| 142           | Sing-há-phú            | Ten              | 19-0                     | None                               | Two              | Two                        | None          | Two        | Two    |
| 143           | Lét-náng-shán          | Six              | 13-0                     | None                               | Two              | Four                       | None          | Four       | One    |
| 144           | Pai-lán-syan           | Eight            | 19-0                     | None                               | Two              | Four                       | None          | Three      | One    |
| 145           | Khwáng myú             | Twelve           | 25-0                     | None                               | Eleven           | Fifteen                    | None          | Fourteen   | Three  |
| 146           | Pháng thou ten         | Ten              | 23-0                     | None                               | Two              | Five                       | None          | Two        | Two    |
| 147           | Lyáng pyáng-syang      | Ten              | 23-0                     | None                               | None             | Two                        | None          | Two        | Four   |
| 148           | Sá-tou                 | Six              | 11-0                     | None                               | One              | Five                       | None          | Two        | Two    |
| 149           | L-páng-sý              | Seven            | 14-0                     | None                               | None             | Three                      | None          | Three      | Three  |
| 150           | Myá-thung-syang        | Seven            | 13-0                     | One                                | None             | Seven                      | None          | Six        | One    |
| 151           | Syáng lyáng-syang      | Nine             | 20-0                     | None                               | One              | Fourteen                   | None          | Twenty-two | One    |
| 152           | Khó lyáng syang        | Seven            | 13-0                     | None                               | None             | Seven                      | None          | Seven      | One    |
| 153           | Múng syáng             | Nine             | 20-0                     | None                               | Three            | Two                        | One           | One        | One    |
| 154           | Phai-chhen phú         | Six              | 13-0                     | None                               | One              | Four                       | None          | Four       | One    |
| 155           | Yé khwá-i              | Seven            | 13-0                     | None                               | None             | Six                        | None          | Six        | One    |
| 156           | Khw ó-khou-chang-syang | Ten              | 21-0                     | None                               | Two              | Five                       | None          | Four       | Two    |
| 157           | Wei-khai-phú           | Twelve           | 18-0                     | None                               | Twenty-two       | Four                       | None          | Four       | Two    |
| 158           | Chhí syáng             | Six              | 12-0                     | None                               | Four             | Five                       | None          | Four       | Three  |
| 159           | L-ka-i                 | Six              | 12-0                     | None                               | Two              | Six                        | None          | Five       | One    |
| 160           | Tá-tai-phú             | Seven            | 3-0                      | None                               | Two              | Seven                      | None          | Six        | Two    |
| 161           | Sá-tou                 | Seven            | 13-0                     | None                               | None             | Three                      | None          | Three      | One    |
| 162           | Kháng-táng-syang       | Seven            | 13-0                     | None                               | None             | Six                        | None          | Six        | One    |
| 163           | Sung-tou-phú           | Twelve           | 12-0                     | None                               | One              | Seven                      | None          | Seven      | Two    |
| 164           | Lóí chhí-syang         | Six              | 11-0                     | None                               | None             | Three                      | None          | Three      | One    |
| 165           | Pai-syang-syang        | Six              | 12-0                     | None                               | None             | Two                        | None          | Two        | One    |
| 166           | Twá-tou                | Six              | 11-0                     | None                               | One              | Four                       | None          | Four       | One    |
| 167           | Lou thyang-syang       | Four and half    | 7-30                     | None                               | Two              | Three                      | None          | Three      | One    |
| 168           | Dyang-dyang-phú        | Six and half     | 13-0                     | None                               | One              | Three                      | None          | Three      | One    |
| 169           | Shi to syáng           | Nine             | 18-0                     | None                               | None             | Three                      | None          | Three      | One    |
| 170           | Chhípú syáng           | Nine             | 20-0                     | None                               | Two              | Two                        | None          | Two        | One    |
| 171           | Phá khú syáng          | Seven            | 16-0                     | None                               | Two              | Two                        | None          | Two        | One    |

|     |                      |                |       |           |       |       |      |       |       |
|-----|----------------------|----------------|-------|-----------|-------|-------|------|-------|-------|
| 172 | Pou tyán phú         | One            | 11-0  | None      | One   | Three | None | Three | One   |
| 173 | Pai-khwó             | Eleven         | 20-0  | None      | Six   | Eight | None | Eight | None  |
| 174 | Tá-tou               | Eight          | 16-0  | None      | Seven | Six   | None | Six   | One   |
| 175 | Lóng syán            | Eight and half | 18-0  | None      | None  | Five  | None | Five  | Two   |
| 176 | Pai-chín or (Peking) | Seven          | 16-0  | None      | None  | Five  | None | Six   | Three |
| 176 | 176                  | 1,267 (1,268½) | 2,576 | 102 (106) | 150   | 652   | 23   | 607   | 100   |

(True translation from Khas,)

(Signed) B. H. HODGSON.

REMARKS.—The above paper like that which accompanies it is deserving of implicit reliance, from the circumstances under which it was prepared and transcribed for me. The kos, according to which the computation of distance is made throughout, is that of Nepal, equal to two and a third miles; and the time in ghaḍis and pals is the same, according to which sixty pals make a ghaḍi, and two and half ghaḍis an hour. The embassy set off on 7th of Asar (June) and arrived at Peking on 12th of Mágh (January), halting 47 days which are included.

In the fifth column of the original the names of the passes, (langúr in Khas and lá in Tibetan) are not given. I have, however, set down in brackets such as I was enabled to procure before I left Nepal.

B. H. HODGSON.

*Darjiling, September 25th, 1856.*

*Aborigines of the Nilgiris, with Remarks on their Affinities.*—By  
B. H. HODGSON, B. C. S.

In the autumn of last year I forwarded to the Society a series of Nilgirian vocabularies. This paper was printed soon after in the Journal, but without the accompanying prefatory remarks, which seem to have been accidentally mislaid and omitted.

I now forward some corrections and additions to that paper and shall take the opportunity to mention what, in substance, those prefatory remarks contained.

The Nilgirian vocabularies were prepared for me by the German Missionaries at Kaity, particularly Mr. Metz, and were then examined and approved by the venerable Schmid, who is now residing at Uttakamund, and who added some remarks, partly referring to his own valuable labours in Indian Ethnology, and partly consisting of corrections of my Ceylonese series of vocables. The latter are appended to the present paper.

When the Nilgirian vocabularies reached me, I immediately perceived that the verbs were not uniformly given in the imperative mood as required; and I therefore wrote again to Uttakamund desiring that this anomaly might be rectified, and also supplying some further forms, the filling up of which might furnish me with some few essentials of the grammar of the tongues in question.

The subjoined paper exhibits the result, and from it and from some further remarks furnished by Mr. Metz and others, I derive the following particulars relative to the people and to the grammar and affinities of their speech.

The form and countenance of the Nilgirians and especially of the Todas have now been spoken of for years as though these people differed essentially in type from the neighbouring races and had nothing of the Tartar in their appearance. The like has been said also of the Hó or Lerka of Singhbhum. I have always been inclined to doubt both these assertions and I have lately had opportunity to confirm my doubt. My friend, Sir J. Colville, our Society's able President, having lately visited the Nilgiris I requested his atten-



*T. Black, Litho Cal.*

*From a photograph.*

A TODA WOMAN.





tion to the point, desiring him to procure me, if he could, some skulls\* and photographic portraits. Of the latter he obtained for me two, which are herewith transmitted, and which Sir James sent me with the following remarks. "I am not much versed in these matters, and I confess I was at first insensible (like others) of the Tartaric traits you speak of, the roman nose and long beard of the Todas more especially making me fancy there was something Semitic in their lineage. But when I showed the passage in your letter to Dr. McCosh, he said you were right, and that in spite of the high nose, there were strong Tartaric marks, particularly in the women. The Badagas who are considered to be of as old date in the hills as the Todas, have a very uniform cast of countenance, not easily distinguishable from the ordinary inhabitants of the plains below the hills." These last are of course Dravirian or Tamulian, and the comparison drawn is therefore instructive, and doubly so when we advert to the indubitable evidence of language, which leaves no doubt as to the common origin of the highland and lowland, the uncultivated and the cultivated, races of Southern India, as we shall presently see.

Upon the origin and affinity of the highlanders Sir James observes, "People who know a good deal of the Todas say, that wherever they may have originally come from, they have less claim to be considered aborigines of these hills than the Kotas, not more than the Badagas, and are thought not to date higher than some 400 years in their present abode." Mr. Metz, the resident Missionary, who furnished the vocabularies, observes on this head, "The Kotas have so much intercourse with the Badagas that they are often not conscious whether they speak Badaga or their own language. Their original home was Kollimale, a mountainous tract in Mysore. The Kotas understand the Todas perfectly, when they speak in the Toda tongue, but answer them always in the Kota dialect, which the Todas perfectly understand.

A Toda tradition states that the Todas, Kotas and Kurumbas had lived a long time together on the hills before the Badagas came. I know places on the hills where formerly Kurumba villages existed

\* Neither Sir James nor any of the other parties, I applied to, could obtain for me any skulls.

but where none are now found. It is well known that the Kurumbas were driven down from the healthful summit to the malarious slopes of the hills, and I have strong reasons for believing that the Cromlechs and Cairns of the hills were made by the ancestors of the Kurumbas and not by those of the Todas, as is generally supposed by Europeans." In entire conformity with these views of the aspect and origin of the Nilgirians is the evidence of language which palpably demonstrates the relationship of the highland races to the lowland races around them. The amply-experienced and well informed Schmid has no doubt of that relationship, which indeed he who runs may read on the face of the vocabularies formerly and now submitted :\* And it is well deserving of note that whilst that vocabular evidence bears equally upon the question of the affinity of the cultivated tribes around the Nilgiris, this latter affinity is now maintained as an unquestionable fact by the united voices of Ellis, Campbell, Westergaard, Schmid, Elliot—in short of all the highest authorities.

We may thus perceive the value of the evidence in question with reference to the uncultivated tribes, as to whose affinity to each other, and to the cultivated tribes, Mr. Metz writes thus, "When I came up to the hills, the Badagas told me that the language I used, which was Canarese, was the Kurumba language." This reminds us of what we are told by another of that valuable class of ethnological pioneers, the Missionaries, who reports that "Speaking Tamulian of the extreme South, he was understood by the Gonds beyond the Nerbudda:" Nor can one fail to remark how this latter observation points to the great fact that Turánian affinities are not to be circumscribed by the Deccan, nor by the Deccan and Central India, nor, I may here add, by the whole continent of India but spread beyond it into Indo-China, Himálaya, and the Northern regions beyond Himálaya, irrespectively of any of those specially marked barriers and lines of separation which Logan and Muller have attempted to establish—the former, on physical and lingual grounds—the latter, on lingual only. My own conviction is, that we find *every where* throughout the regions now tenanted by the progeny of Tur, a large range of variation, physical and lingual, but one not

\* See the Tamulian proper, the Ceylonese and the Nilgirian series.

inconsistent with essential unity of type, though the unity is liable, nay almost certain, to be overlooked, whether our point of view be anatomical, physiological, or philological, unless we carefully eschew confined observation such as misled Capt. Harkness about the appearance of the Todas, and not less Capt. Tickell about the appearance of the Hó. I have adverted to Harkness' mistake above. I will now add a few words as to my brother-in-law Tickell's. Last season Capt. Ogilvie, Tickell's successor, in the charge of that very district wherein the latter studied the Hó physical and lingual characteristics, came to Darjiling. I questioned him regarding the alleged fairness and beauty of the Hó, and well knowing that without samples before him, Capt. Ogilvie must be unable to give a definite answer, I produced from among the many always here, four no doubt unusually fair, well made, and well-featured *Uráon* and *Múnda* men, but still all in the service of one gentleman, and I then interrogated him. Capt. Ogilvie's answer was distinct, that the men before him were nearly or quite as fair and as handsome as the Hó of *Singhbhúm*, and not either in feature or in form essentially distinguishable from the Hó, whose lingual characteristics, again, we now know are so far from being peculiar that they are completely shared by the wide-spread tribe of *Sontal*, and almost as completely by the *Múnda*, *Bhúmij*, *Uráon* and *Gónd*, not to speak of other and remoter tribes of *Himálaya* and *Indo-China* having the widely-diffused pronomenalized verb type of the *Turánian* tongues.\* Not that I would lay the same stress upon these nicer characteristics of language, as seems at present to be so much the fashion in high quarters. But on the contrary I would choose, as a *Turánian* philologist, to rely rather upon extent than depth of observation, still remembering that by far the greatest number of *Turánian* tribes are not merely unlettered, but too many of them also, for ages past, broken and dispersed, barbarously ignorant and miserably segregated, like the *Nilgirians*.

The niceties of such men's languages can never be accurately reached by us, unless we would devote a whole life to the research ;

\* Viz. the *Nága*, *Dhimáli*, *Háyu*, *Kuswár*, *Kiránti*, *Límbu*, *Chepáng* and *Bhrámu*, of all which I hope soon to speak. All these tongues, of which the 1st is Indo-Chinese and the rest are *Himálayan*, belong to the pronomenalized class.



and, moreover, these niceties are certain to exhibit a great many anomalies, and to be now present, now absent, under circumstances, which, whether the absence were originally caused by impatient rejection, by casual nondevelopment, or by spontaneous or factitious decomposition, must detract greatly from the value and certainty of any inferences founded thereon; whilst in regard to the more civilized tribes, we often positively know and may always prudently suspect that *their* lingual refinements, when they differ from those of the ruder tribes, are so far from being special illustrations of the true *norma loquendi* of the Tartars that they are exotic and borrowed traits. From this digression (which has reference to Müller's remarks on the relative value of vocabular and grammatical evidence) I return to my subject by giving the following observation of Mr. Metz upon the affinity of the several Nilgirian tongues now before us, merely premising upon the interesting subject of the character and habits of these tribes what Sir James Colville in his recent visit heard and observed. "They are idle, dirty, intemperate and unchaste. Polyandry has always existed among them, and their women are now addicted to general prostitution with men of other races, so that they must soon die out, and, in fact I think the population is scantier than it was when I was last here, though so few years back." Upon this, I may remark that the traits observed in the Nilgiris are thoroughly Tartar, and as such are widely prevalent in the Himálaya and Tibet. Even the civilized tribe of the Névárs, who, by the way, have a recorded tradition uniting them with the Malabár Náirs—a name identical, they say, with Náyár or Névár (y and w being intercalary letters) were once polyandrists and are still regardless of female chastity, whilst the Tibetans were and are notoriously both.

Mr. Metz on the subject of the dialectic differences of the Nilgirian tongues observes:—

"The differences of the several languages of the hill tribes consist, not so much in idiom as in mere pronunciation. But that is so great that the same or nearly the same word in the mouth of a Toda with his pectoral pronunciation can scarcely be recognized as the same in the mouth of a Kota, with his dental pronunciation. The Badaga and Kurumba dialects are midway between the former

two with regard to pronunciation, only the Badaga is a little more guttural than the Kurumba.

“There is some difference even in the speech of the several branches, or remotely located groups, of any one tribe. For instance, those of the Badaga tribe who, like the Kangaru or Lingaits, emigrated from Targuru and came to the hills at a later period than the others, speak a purer Canarese than the common Badagas. So also the Todas among themselves have differences of pronunciation according to the different districts they inhabit; for instance, some pronounce the *s* quite pure, others like *z* and others again like the English *th*. And in like manner the Kurumbas round the slopes of the hills have so many little variations in their speech according to the situation of their villages (Motta) on the south, east, or west side of the hills, that it is difficult to say what the real Kurumba tongue is. In Malli, the chief Kurumba place on the south slope, the language is much mixed with Tamil.”

I will now conclude with a few remarks on the grammatical traits exhibited by the subjoined papers.

### *Phonology.*

As much as is forthcoming on this head, has been expressed in the vocabular part of this paper and the remarks appended to it. It may be advisable, however, to repeat here that the presence of the English *th*, and its frequent substitution for *s* and *z*, and the equivalence of the two latter, are so far from being exclusively Toda, as Schmid supposed, that they are common in Indo-China, Himálaya and Tibet. Tibetan abounds in sibilants, having, besides the *s*, *ch*, series, an equivalent *z*, *zy*, *dz*, series. The former is possibly borrowed. At all events *z*, *zy*, *dz*, and *ts*, *tch*, are very much commoner in use than the Arian *s*, *ch*, series. The second *z*, represented by me by *zy*, and equal to the French *j* in *jeu*, is the same with the Tamil *zh* of Ellis and Elliot. It is a very prevalent sound and equally prevalent is the French *u*, or *eu* in *jeu* aforesaid. Neither is ever heard from an Arian mouth; but the Himálayans most infected with Arian ways and habits are now gradually substituting Arian *j* for their own *z* and Arian *u* for their own *eu*. *D* is also taking the place of their hard and aspirated *z*, (*dz* and *zh*) and thus

the Tibetan word *zhí-ká-tsén* and Newari *zhí-khá-chhén*,\* the name of the capital of Tsáng, has become *Dígarché* with those who use the popular and spreading Khas language, which language we hereby perceive also preferring sonants to surds (g for k), whereas the written Tibetan and Newari, like the Tamil and Toda, have a preference for surds.

But Tibetan is spoken with all the variety of hard and soft pronunciation noticed by Mr. Metz as characterizing spoken Toda and indeed the whole of the Nilgiri dialects; and, as there are few things more normally Turánian than the wide extent of legitimate, habitual commutability between the consonants and vowels of the languages of the family, so I consider that to lay so much stress as is often done on merely phonetic peculiarities is a great mistake on the part of Turánian ethnologists and one apt to lead them much astray when in search of ethnic affinities. For example, the Myamma is unquestionless one language notwithstanding that its phonetic peculiarities in Ava and in Arakan are very marked; and a particular friend of mine who is "genuinely Saxon, by the soul of Hengist" can by no means deal fairly by r, sh, or th, but calls hash, has; shoes soes or toes or thoes; brilliant, bwilliant; there, dere; thought, tought, &c. A Londoner is not less Saxon surely because he is wont to "wow that weal, wine and winegar are very good wittals."

\* The etymology of this word is curious and important with reference to the evident identity of the term in Tibetan. And it is hardly too much to say that the family identity of the two tongues (Newári and Tibetan) might be rested on it.

It means in Newári "the four-housed," zhi or zyi, being four; *khá* the generic sign for houses; and *chhén* being house. De Coros has said nothing about that most fundamental sign of the Turánian tongues, the generic or segregative signs; but I have good reason to assume that this is one of the several serious defects of his grammar and that *Tibetán ká* is = Newári *khá*, as *zhi* = *zhi*, and *tsén* = *chén*, though *khyim* be now the commoner form of the word in written Tibetan. *Zhi-kha-chhén* or *zhí-ká-tsén* Turanice, = *Dígarchén* Arianice, is the name of the capital of Tsáng—why styled "the four-housed" I cannot learn. But three *such* elements composing one word identical in form and in sense in two separate languages involves the family oneness of those languages.

*Article.*

Mr. Metz says, there is none whatever, but I feel pretty sure that the usual equivalents are recognized; viz. the numeral *one*, or the indefinite pronoun, *some, any*, in lieu of the indefinite article; and the demonstratives in lieu of the definite, as also the segregatives *van, val, and du* for the three genders, or *ál* and *pé* for the major and minor of gender, used as suffixes and widely applicable to nouns (qualitives)—less widely and uniformly to verbs. We should always remember that the so-called segregatives or generic signs are essentially articles, definite or indefinite according to the context.

*Adjective.*

All qualitives, which seem to embrace, as usual, the nominal (genitive), pronominal, participial, numeral and adjectival, appear to be used both substantivally and adjectivally, and, when employed in the former way, to add to their crude, as a suffix, the appropriate generic sign, which in the case of the participle, gives it a relative sense or an agentive, just as in English, *the* or *a striker*, or *the* or *a striking person (or thing)*, and *the* or *a hard thing*, are equivalent respectively to *the person who strikes* and *the thing which is hard*. But the latter form of speech is quite Anti-Turánian.

Qualitives are always prefixed when not used affirmatively or substantivally. If placed after the noun they become affirmative including in their sense the substantive verb. *Man (is) mortal. That (is) mine. This the striker = this is the person who strikes.\* He (is) loving one or lover, = one who loves. That one (is) the black = that is the black one. Give me the black = the black being or thing*—a difference which must be expressed and with the sign of gender too (an *ál*) in the former event. *This person two person = this one is the second person (rend-ál),† &c.* Gender is fully marked in qualitives by the use of the suffixes *van, val, du = hic*,

\* In Newári it would be, *ú-hma dáya-hma*, which is in every particular of idiom Dravirian, *hma* being the *van* or *ál* suffix of the above tongues and its affixing to the verbal form rendering that a relative participle.

† Here final *ál* is not the contracted sign of the feminine suffix *aval*, but is the name for man, used as a suffix.



hæc, hoc. But these forms are very imperfectly reproduced in the verb, indeed can hardly be traced except in Badaga and Kurumba where the following is unmistakeable evidence of them.

|              | <i>Badaga.</i> | <i>Kurumba.</i> |
|--------------|----------------|-----------------|
| He strikes.  | Hui-d-an.      | Hui-t-an.       |
| She strikes. | Hui-d-al.      | Huiyu-t-al.     |
| It strikes.  | Hui-d-ad.      | Huiyu-t-ad.     |

The major and minor of gender in beings, not things, seem to be denoted by ál and pé suffixes—words having still the independent signification of man and woman. In Toda, moreover, adum marks the common gender, as a separate pronoun, and tan, as a conjunct prefix. I am not sure as to the major and minor of gender, because the verb does not exhibit them in the peculiar manner of the cultivated Dravirian tongues, or otherwise.

#### *Noun.*

The papers furnish no sample of declension, but it may be safely inferred that it is simply postpositional with cases ad libitum, or none at all, according to the view taken of declension. Gender is marked either by separate words, such as *man*, *woman*; *cock*, *hen*; or, by sexual prefixes like our *he-goat* and *she-goat*; or, lastly, the generic word bears also a male or female sense, when the feminine or masculine gender, as the case may be, is distinguished by the fitting sign prefixed. So Burmese *sa* means *child* and *boy*, and *mí-sá*, or *female child*, means *girl*. I know not whether the suffixes *van*, *val* and *du*, or ál and pé (*pen*, *pem*—the latter equal major and minor of gender) are added to substantives as well as to qualities, but I think not. Instances occur in Telegu but not generally in the Dravirian tongues, nor in the northern.

The major and minor of gender (quasi, *hic et hæc facilis*; *hoc, facile*) are common in the Himálaya, Indo-China and Tibet, but I have no where in the north found the fully developed masculine, feminine, and neuter of the south.

In regard to number, the Nilgirian nouns are very defective, having no distinct and uniformly employed dual or plural inflexion or sign. But they seem to follow the cultivated Dravirian in so far as having no dual, but having the double, or exclusive and inclusive, plural, at

least in the separate pronouns and in the personal endings of the verb. Irula has not even the latter. In the Himálayan tongues it is often difficult to make out distinct dual and plural forms of the substantive, even when the distinct and conjunct pronouns exhibit an exclusive and inclusive form both of the dual and of the plural of the first person, with correspondent verb forms as is the case in the Kiranti language. The source of the defective plural sign of nouns is to be sought in the fact that Turanian vocables generally in their crude state bear the largest and specific or generic meaning—a peculiarity well exemplified by the English word, *sheep*. In the Nilgiri tongues neuter nouns always lack, says Mr. Metz, a plural form. Masculine nouns form it occasionally by changing final *n* into *r* in Toda (*Kullan*, *a thief*; *kullar*, *thieves*) or by adding the plural sign *kal vel gal* in Badaga and Irula.

#### *Pronouns.*

Pronouns and pronominal forms are greatly developed in the Nilgirian languages, as in all the Turanian tongues, reminding us, when viewed in connexion with the paucity of true conjugational forms, of the fine remark that “rude people think much more of the actors than of the action.” We have in the Nilgiris, 1st, personal and possessive forms; 2nd, among the former, forms excluding and including the person addressed (*we—not you*; and *we—including you*); 3rd, among the latter or possessives, two complete series according as the pronouns are used conjunctively or disjunctively. I have given all these; and their forms, changes of form and uses, would alone suffice to prove the perfect identity of the Nilgirian tongues with those of the cultivated Dravirian class. The conjunct pronouns are prefixed to nouns, suffixed to verbs. But those which denote genders (proper to the 3rd person only) are used suffixally with all qualitative nouns, which thus pass from the adjectival to the substantival category. This latter peculiarity is common to the Himálaya and Tibet, and is found even among the nonpronomenalized tongues, such as written Tibetan and Newári, and likewise among the Indo-Chinese tongues, whose *wong*, *pong* is clearly the Dravirian *van*. The former also is found in the Himálaya, but of course among the pronomenalized languages only. But among them we have samples of the conjunct pronoun being used prefixally with

nouns and suffixually with verbs as in the Dravirian tongues,\* and others of the use of both suffixually, as in the West Altaic and Ugrofinnic groups of languages.\* Separate words meaning two and all can be added to pronouns (and to nouns) to form duals and

\* Two Forms.

|         |                                                                                                                  |                                                                                                      |                                                                                       |        |                                                                                                                                                          |                                                                                                                |
|---------|------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| Háyu    | $\left\{ \begin{array}{l} \text{am-pa} \\ \text{um-pa} \\ \text{wa} \\ \text{u} \end{array} \right\} \text{-pa}$ | $\left\{ \begin{array}{l} \text{ang-upa} \\ \text{ung-upa} \\ \text{wathim-pa} \end{array} \right\}$ | $\left\{ \begin{array}{l} \text{My} \\ \text{Thy} \\ \text{His} \end{array} \right\}$ | father | $\left\{ \begin{array}{l} \text{To'-p-mum} \\ \text{To'-p-num} \\ \text{To'-p-t-um or} \\ \text{To'-p-un} \end{array} \right\}$                          | $\left\{ \begin{array}{l} \text{struck me.} \\ \text{struck thee.} \\ \text{struck him.} \end{array} \right\}$ |
| Kiránti | $\left\{ \begin{array}{l} \text{a-pa} \\ \text{i-po} \\ \text{a-po} \end{array} \right\}$                        | $\left\{ \begin{array}{l} \text{''} \\ \text{''} \\ \text{''} \end{array} \right\}$                  | $\left\{ \begin{array}{l} \text{My} \\ \text{Thy} \\ \text{His} \end{array} \right\}$ | father | $\left\{ \begin{array}{l} \text{Tip-t-óng} \\ \text{Tip-t-ú} \\ \text{Tip-t-á} \end{array} \right\}$                                                     | $\left\{ \begin{array}{l} \text{I} \\ \text{Thou} \\ \text{He} \end{array} \right\}$ struck.                   |
| Kiránti | $\left\{ \begin{array}{l} \text{ung-pa} \\ \text{am-pa} \\ \text{eu-pa} \end{array} \right\}$                    | $\left\{ \begin{array}{l} \text{''} \\ \text{''} \\ \text{''} \end{array} \right\}$                  | $\left\{ \begin{array}{l} \text{My} \\ \text{Thy} \\ \text{His} \end{array} \right\}$ | father | $\left\{ \begin{array}{l} \text{Mo-v-úng} \\ \text{Tá mó-v-ú} \\ \text{Mó-v-eú} \end{array} \right\}$                                                    | $\left\{ \begin{array}{l} \text{I} \\ \text{Thou} \\ \text{He} \end{array} \right\}$ struck.                   |
| Bontáva |                                                                                                                  |                                                                                                      |                                                                                       |        |                                                                                                                                                          |                                                                                                                |
| Kuswar  | $\left\{ \begin{array}{l} \text{baba-im} \\ \text{baba-ir} \\ \text{baba-ik} \end{array} \right\}$               | $\left\{ \begin{array}{l} \text{''} \\ \text{''} \\ \text{''} \end{array} \right\}$                  | $\left\{ \begin{array}{l} \text{My} \\ \text{Thy} \\ \text{His} \end{array} \right\}$ | father | $\left\{ \begin{array}{l} \text{Thatha-im} \\ \text{-ik-an} \\ \text{Thatha-ir-} \\ \text{ik-an} \\ \text{Thatha-ik-} \\ \text{an} \end{array} \right\}$ | $\left\{ \begin{array}{l} \text{I} \\ \text{Thou} \\ \text{He} \end{array} \right\}$ struck.                   |

REMARKS.—The Háyu conjunct pronoun (see 1st form) is falling out of use. Form 2nd gives the full possessive before u-pa used for father though it be literally a father, any father, his father, pater illius vel istius vel ejus vel cujusvis præter me et te. The verb is given in the objective or agento-objective form = the passive, the active voice no longer showing clearly the pronominalization. There is now used instead of this form and perhaps ever was (it is a question of decomposition *versus* non-development) in the *active* voice the form seen in the sequel in Khwa-chammi, I, thou, he, feed (self.) Here it would be to'-p-ummi, or top-t-ummi, (p = Bontava v, being the transitive sign, iterated, or not, in the form of t) I, thou, he strike, or struck, or will strike. In Báhing also, which has a clear discrimination of time into present cum future and past, the former is ti-b-ú, ti-b-í, ti-b-á, I, thou, he strike or will strike. In these samples, we see, again, the transitive sign b = p = v, and this sign discriminated clearly from the temporal sign or t. The manner in which pá becomes pó in the Báhing noun; pá, my father: pó, = pa-u, any body's father, is most suggestive and should warn us against laying such undue stress on the position (prefix or post-fix) of the conjunct pronouns. Frequently both are used, the former being in the full separate form and the latter in the contracted, as in the Altaic tongues, and not less in Sonthal and Hó and indeed in all. Kuswar beautifully demonstrates the character of the infixed pronoun as a mark of the transitive verb, and it will be seen that this language inverts the order of the agentive and objective, and adds a common termination or an. The neuter verb of course omits the transitive sign and runs thus, walg-en-im, walg-en-ir, walg-en, I, thou, he fell. En is possibly the participial particle. But it is more probably the neuter sign.

plurals, and are often added to a true inflective plural pronoun to mark that distinction; thus, *nam* = *we*; *namella* = *we all*, plural; *nam rendálu* = *we two*, dual. Sometimes the pronominal inflexion is repeated, as in *emellam*, *we* (or *we all*); *niv ellam*, *ye*; *avar ellam*, *they*, of Toda.

### *Verb.*

The verbal forms of the Nilgiri tongues clearly place them in the same category with the cultivated Dravirian, that is, the pronominalized class. But, whether from non-development or from decomposition, the pronominalization is very imperfect on the whole. Nor is it easy to discern in the one or other group of these southern tongues those generic and temporal signs which are still so palpably traceable as a distinct element of the northern tongue verbs. All of the pronominalized class, and some that can hardly be ranged in that class, in the Himálaya, as in Altaia and Ugrofinnia, have the verbal root or imperative followed by the transitive or intransitive (often with many subdivisions) sign, and that, again, in the pronominalized class, by the personal ending, which too is sometimes agentive, sometimes objective (equivalent to active and passive voice respectively) and sometimes both, in which case the agentive form always follows the other and makes the ending. But, even in the northern tongues, the transitive or intransitive sign is constantly confounded with the temporal sign, whilst the personal endings likewise sometimes exhibit as much irregularity and defectiveness as they do in the Nilgirian verbs. Nevertheless, judging by analogy and resting on the wonderful similarity of genius and character pervading all the languages of the sons of Túr, I should not hesitate to say that the cultivated Dravirian and the Nilgirian tongues are framed on the same model as that above described as belonging to the northern, and that the samples above cited from Badaga and Kurumba are palpable proofs of it, notwithstanding the silence of all Dravirian grammarians touching the generic or class sign (transitive, intransitive, &c.) of their verbs. For example :

I have no doubt whatever that



|                                   |                      |                    |                  |
|-----------------------------------|----------------------|--------------------|------------------|
| Badaga                            | hui-d-an             | } I struck (him).  | } Active voice.  |
| Kurumba                           | huiyu-t-an           |                    |                  |
| Kurumba                           | mad-id-en            |                    |                  |
| May be analysed precisely as are— |                      |                    |                  |
| Turkie                            | sever-d-im           | I loved (him)      | } Active voice.  |
| Hungarian                         | var-t-an             | I waited for (him) |                  |
| Kiranti (Báhing)                  | tip-t-ong            | I struck (him)     |                  |
| Háyu                              | top-t-um             | struck him         | } Passive voice. |
| Khamti                            | há-t-o               | gave him           |                  |
| Háyu                              | há-t-um              | gave him           |                  |
| Kuswar                            | tha-tha-im-<br>ik-an | } I struck (him)   | Active.          |

and numberless others of which I shall have, ere long, to speak in full. That is to say, I hold it for certain that all these verbal forms consist of, 1st, the root or crude, 2nd, the transitive and preterite sign, 3rd, the personal ending; and that moreover, the 2nd of these elements may, in every case, be resolved into the 3rd pronoun, current or obsolete, and used objectively. Kuswar baba-ik, = *his father* compared with tha-tha-ik = *strike* (i. e. him, the object) settles the last point even more clearly than Samoiede lata-da = *his stick* and Magyar Cicero-t = *Ciceronem*.\*

Having mentioned the wonderful analogy of these tongues I will give a telling instance. In the Háyu language of the central Himálaya and in the Mantchu we have khwachambi or khwachammi, = *I feed*, that is to say, *feed myself*; for, khwá, vel khóa, is the root; chá, the reflex sign; and mbi vel mmi, the personal ending, and one too that in both tongues is invariable, though Háyu appears sometimes to drop the iteration in the 2nd and 3rd person, khwachammi, khwá-chá-m, khwá-chá-m, *I, thou, he, feed* (self). Now, that root, reflex sign, and personal ending should thus concur to absolute identity, and that sense also should be as identical as form, in two unconnected languages, is simply impossible. It follows therefore, that we have people of the Mantchu race forthcoming now in the central Himálaya close on the verge of the plains! And, again, what shall we say to such grammatical coincidences as—

Túrki Baba-im = my father, sever-im = I love.

Kuswár Baba-im = my father, saken-im = I can.

The answer is clear, that we have people of the Turkic stem also

\* Muller apud Bunsen, I. 319.

in the central Himálaya, close to the verge of the plains of India. Nor need we doubt that such is the case in regard both to the Mantchuric and Turkic relations of the Himálayans, though the precise degree of such family connexions can hardly become demonstrable until we have (what is now alas! wholly wanting) a just definition of the Túránian family and of its several subfamilies to test our Himálayan analogies by. The Mantchuric and Mongolic groups of tongues were long alleged to show no sign of pronomenalization. It is now known that that was a mistake.

Other still maintained distinctions will, I anticipate, disappear before the light of fuller knowledge, when it will plainly appear that not mere and recent neighbours, such as are alleged to be the Tibetans proper of our day (Bodpas), formed the Túránian element of Indian population, from the Himálaya to the Carnatic, but successive swarms from the one and same great northern hive—whether Turkic, Mongolic, Mantchuric, or these and others—who passed into Indo-China as well as India, and directly into the latter, as well as through the former into the latter, by all the hundred gates of the Himálaya and its southern offshoots. Simple as the Mongolic and Mantchuric languages are wont to be called, they seem to me to possess entirely the essential Túránian characteristics, that is, in like manner as they have endless noun relational marks without any distinct declension, so they have a rich variety of sorts of verb (but all reduceable into the two great classes of action, or that of things and that of beings, equal neuter and transitive) and this peculiar richness united with great poverty of voice, mood and tense, whilst the participles partake fully of this character of the noun and of the verb, that is, they are poor on one side but luxuriant on the other, and throughout the whole Túránian area perform the very same function or that of continuatives, being employed to supply the place of conjunctions and conjunctive (relative) pronouns.

The central Himálayan languages, but perhaps more especially those of the pronomenalized type, all present these characteristics with perfect general fidelity and with some instances of minute accord, besides those cited above, among which may be mentioned the hyper-luxuriant participial growth of Kiránti and of Mantchu, both of which have ten or rather eleven forms of the gerund, and these obtained by the very same grammatical expedient!

The general absence of a passive, the partial or total absence of tense distinctions, and the combination of the present and future when there *is* such partial distinction, as well as the denoting of tense by annexed adverbs (to-day, yesterday and to-morrow) when there is *none*, are Túránian traits common to the (not to go further) Altaic, Himálayan and Tamulian tongues. Thus, the Toda and Kota verbs are always or generally aoristic and the three tenses are expressed by the above adverbs of time, used prefixally. Precisely such is the case with the Bontáva dialect of Kiránti and with the Háyu; whilst the Báhing dialect of Kiránti discriminates the past tense from the other two by the use of an appropriate infix which is at once the transitive and temporal sign. If such be not visibly the case with the Badaga, Kurumba and Irula dialects, we may yet discern the cause, partly in the carelessness of barbarians, partly in that fusion of transitive and preterite signs which cultivated Dravirian also exhibits, and, not less, Ugrofianic and Turkic. But in the Tin-d-é of Badaga and Kurumba and Tid-d-é of Kota, = *I ate*, as in the Mad-id-é of Kurumba, = *I made*, not to cite more instances, I perceive that identical preterite sign (t, vel, d) which marks it in Báhing (tib-á, *he strikes*; tib-d-á, or tip-t-á, *he struck*), as in endless other northern and north-western tongues.

I will add a few more words on these important points for I conceive that the passive of the cultivated Dravirian tongues is clearly factitious and suggested by contact with Arianism. There are still extant long works in Canarese, says Mr. Metz, in which hardly one instance of the use of the passive voice occurs, and the fact that the *uncultivated* Dravirian tongues have it not, is I think decisive as to its adopted character in the cultivated. Again, there can be no doubt that the negative conjugation of the cultivated Dravirian tongues presents the primitive form, and that form is aoristic, e. g. mad-en, *I do, did, or will, not make*. In Himálaya and Tibet and Sifán the passive is wanting. Its absence is supplied by the use of the instrumentive and objective cases of the pronouns for the active and passive forms respectively. Even Khas still adheres to this primitive and indigenous form, overlaid as that tongue is by Arian forms and vocables, and I have myself not the least doubt that the anomalous né of the preterite of Hindi and Urdu

is nothing but a commutative equivalent of the Khas instrumental sign lé. A Khas of Nepal invariably says, *by me struck*, for *I struck*, and *me struck* for *I was struck*; and moreover there is still the strongest presumptive proof, internal and external, that this, the present preterite, was a primitive aorist and the only tense in Khas. Those who are fully conversant with the spoken Prákrits of the plains can testify that the same traits still cleave to the vernaculars of the so-called Arian class of tongues in the plains—traces, I conceive, of primitive Turánianism as palpable as are to be found in the secondary terms (*bhat-wat*, *mar-dal* (vide infra), *kapra-latta*, &c.) of the Prakrits, and which their grammarians can only explain by calling them tautological sing-song. That all such terms are really genuine samples of the double words so common throughout the Turanian area, and that the latter member of each term is Turanian, I trust by and by to have time to show. Meanwhile and with reference to the Tartar substitute for the voices, here are a few examples.

*By me struck*, = *I struck*, active voice.

Tibetan, Ngági dúng: Newári, Jíng dáyá: Háyu, G'ha toh'mi: Khas, Mailè kútyo: Urdu, Main nè kúṭa.

*Me struck* = *I was struck*, passive voice.

Tibetan, Ngála dúng: Newári, Jita dála: Háyu, Go toh'mi: Khas, Manlai kútyo: Urdu, Mujh ko kúṭa (subaudi, usnè).

The languages which employ conjunct suffix pronouns have a form precisely equivalent to the latter, e. g. Sontal dál-éng, and Háyu toh'-múm = *struck me*. And observe that Sontal dál *to strike* reproduces, not only the wide spread dá vel tá root of the north, but also the l of Newari dála,\* as to which see remarks on the transitive and preterite sign aforegone, and Urdu már-dál with its comment.

\* Observe also that Jita dála reproduces the objective sign, ta vel da, above spoken of. Compare *latada* and *Cicero t.* As a transitive sign of verbs it is most widely diffused, and nearly as widely are *ka vel ga*, and *pa, vel ba, vel va*. *Sa vel cha* is a very widely diffused neuter sign which also can be traced indubitably to the 3rd pronoun used to denote the object—in this case, the agent himself or itself. The French forms, *Je lève* and *Je me lève*, &c. very well serve to indicate the latter form, though not the former of Turanian verbs.



With regard to the personal endings or pronominal suffixes of the Nilgirian verbs, their obscurity is sufficiently conformable to the cultivated Dravirian models with due allowance for mistakes on the part of the rude speakers of the former tongues. Something may also be ascribed with probability to decomposition and disuétude. But upon the whole we cannot doubt that these tongues belong to the pronomenalized class, and that, for example, the *ni* and *mi* of Toda *tinsbi-ni*, *I eat*, *tinsbi-mi*, *we eat*, with the *an*, *al*, *ad* of Nidre-maḍut-*an*, *maḍut-al* *maḍut-ad*, *he*, *she*, *it*, *sleeps* of Kurumba, are instances of suffixed pronouns. And now, having already remarked sufficiently upon the other peculiarities of the Nilgiri pronouns under the head of "pronoun," I shall here bring these remarks, suggested by the Nilgirian vocabularies, to a close.

*P. S.*—Of the many resembling or identical words in the Himálayan and Dravirian tongues, I say nothing at present. Those who meanwhile wish to see them, have only to consult the several vocabularies printed in the Journal.

But with reference to what I have stated above, that there exists an authentic tradition (reduced to writing some five hundred years back) identifying the people of the Malabar coast with those of Nepal proper (or the Newár tribe) I may just point to such words are *wá vel vá* = *come*, and *sumaka* = *silent*, as perfectly the same in form and meaning both in the Newár language and in that of the Nilgirians.

| English.   | Toda.                                         | Badaga.                                    | Kota.                                   | Kurumba.                                 | Irula.                                                                                                       |
|------------|-----------------------------------------------|--------------------------------------------|-----------------------------------------|------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Eat        | Tennu                                         | Tinnu                                      | Tinnu                                   | Tinnu                                    | Tinnave. Tinduko, (the latter to a superior) Kudiukove. Kudi-dukoveko. Kadandukove. Kadanduko. Nénevá girave |
| Drink      | U'nú                                          | Kudi                                       | U'ne                                    | Kudi                                     | Girkádu                                                                                                      |
| Sleep      | Vorg                                          | Voragu                                     | Vorage (g = ger-<br>man g.)             | Nidre maðu ( <i>Sleep<br/>make</i> )*    | Aluve                                                                                                        |
| Wake       | Vorigadi<br>chagirt                           | Yecharagiru ( <i>awake be</i> )            | Yecharike iru ( <i>A-<br/>wake be</i> ) | Yecharikeagiru ( <i>A-<br/>wake be</i> ) | Pésu                                                                                                         |
| Laugh      | Kari                                          | Négé                                       | Kárje                                   | Nage                                     | Maniadeiru ( <i>Speech-<br/>less be</i> )                                                                    |
| Weep       | Atthi                                         | Lau (au = ou)                              | A'ge (g = german g.)                    | Alu                                      | Barave                                                                                                       |
| Speak      | Arvor                                         | Nudi (u = oo)                              | Mánivo                                  | Matádu. Nudi                             | Bhó                                                                                                          |
| Be silent  | Bokir                                         | Sumagiru, Japaniru                         | Pakiru                                  | Symaniru ( <i>Silent be</i> )            | Yéndu kove                                                                                                   |
| Come       | Itva? Vá, (It-va =<br>come here)              | Ba. Iti ba? (Iti-ba =<br>come here)        | Váge                                    | Ba                                       | Ukandu kove                                                                                                  |
| Go         | Atfo? Fo, (At-fo =<br>go there)               | Hógu. Ate hógu? (Ate<br>hógu = go there)   | Athóge? Hóge, (At<br>hóge = go there)   | Hógu                                     | Nadandu kove                                                                                                 |
| Stand up   | Mklo                                          | Lyettu                                     | Méke                                    | Yeddu                                    | Vódu                                                                                                         |
| Sit down   | Neshkir ( <i>be down</i> )                    | Kuli                                       | Kúkiru ( <i>Be down</i> )               | Kutukó                                   | Tarave                                                                                                       |
| Move, walk | At nar? Nar, (At<br>nar = walk there)         | Nade. Ate nade? (Ate<br>nade = walk there) | Nade                                    | Nade                                     | Bóngu                                                                                                        |
| Run        | Vór                                           | Vódu                                       | Ate vódu                                | Vódu                                     | Adi                                                                                                          |
| Give       | Ta. Kor                                       | Ta. Kor                                    | Ta                                      | Kodu                                     |                                                                                                              |
| Take       | Tégi. Yettfo ( <i>hav-<br/>ing taken go</i> ) | Tégi                                       | Véde                                    | Tégi                                     |                                                                                                              |
| Strike     | Burv                                          | Hui                                        | Puiye                                   | Hui                                      |                                                                                                              |

\* The brackets denote suggestions of my own.

† Ch = kh. English ch represented by tsh. Former = guttural Scotch ch in loch, &amp;c.

| English.                         | Toda.                                                                   | Badaga.                                                                                                                                       | Kota.                 | Kurumba.              | Irula.                    |
|----------------------------------|-------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------------|---------------------------|
| Kill                             | Birshkir. Koddu                                                         | Kodd hóku                                                                                                                                     | Tavarsidade           | Kondu hóku            | Adidukove. Kondu-<br>kove |
| Raise, lift up                   | Túch*                                                                   | Túku                                                                                                                                          | Mékarse               | Táku                  | Túkove                    |
| Put down                         | Atrei                                                                   | Háku. Idu. Atebí, (Ate<br>bi = <i>put there</i> )                                                                                             | Vei                   | Ate idu               | Bhodu                     |
| Hear                             | Vorañir                                                                 | Kte. Vorañiru, ( <i>hear-<br/>ing be</i> )                                                                                                    | Vóruñulle             | Kelu                  | Kétukove                  |
| Understand                       | Aridir                                                                  | Aridiru. Aridutto                                                                                                                             | Arsulle               | Ariduko               | Arindiru                  |
| Tell                             | Eshtr                                                                   | Hlegu                                                                                                                                         | Parrde                | Helu                  | Sollu                     |
| Strike                           | Burw                                                                    | Hui                                                                                                                                           | Puiye                 | Hui                   | Adi                       |
| Strike not                       | Burthtati                                                               | Huiya béda                                                                                                                                    | Puiyade               | Huiya béda            | Adio-venda                |
| To strike                        | Burken                                                                  | Huiya                                                                                                                                         | Puikede               | Huiya                 | Adia                      |
| Striking                         | Burthtp                                                                 | Huiyuva                                                                                                                                       | Puika                 | Huiyuva               | Adika                     |
| Stricken                         | Burtht (used active-<br>ly as well as pas-<br>sively, see re-<br>marks. | Huida                                                                                                                                         | Possa                 | Huida                 | Adida                     |
| The striker or<br>He who strikes | Burthpavan or<br>Burthpál<br>(= <i>striking man</i> )                   | Huiyuvavanu (van or<br>vanu is masculine<br>suffix, and ál or álu<br>= <i>man</i> is equivalent.<br>The two forms there-<br>fore are but one) | Puikálu               | Huiyuvava             | Adikálu                   |
|                                  |                                                                         |                                                                                                                                               | Puikálu               | Huiyuva álu           | Adika                     |
| Having stricken                  | Burthtudd                                                               | Huiyuva álu                                                                                                                                   | Possutte              | Hui du gondu          | Adidu                     |
| I strike                         | Burthtsbini, or<br>Burthversbini                                        | Huidu. Huidundu                                                                                                                               | Ane puikape           | 5) Huiyutine          | Ná adi kallave            |
| I struck                         | 2) No preterite                                                         | Huide                                                                                                                                         | Ane possupe           | Huide                 | Ná adide                  |
| I will strike                    | No future                                                               | The present tense is<br>used.                                                                                                                 | Present tense is used | Present tense is used | Ná adike                  |

\* Ch = kh. English ch represented by tsh. Former = guttural Scotch ch in loch, &amp;c.

| I sleep              | An vorchsbini                                                     | Ná voragine. giunnane | Voragape or Indel       | *Voragape or Indel      | Nidre mađutine                | Ná kađandu kóge                               |
|----------------------|-------------------------------------------------------------------|-----------------------|-------------------------|-------------------------|-------------------------------|-----------------------------------------------|
| I slept              | No preterite.                                                     | Ná voragidde          | 3) Voragape or voragape | 3) Voragape or voragape | Nidre mađide (sleep made I)   | Ná kađandu kónde                              |
| I will sleep         | No future.†                                                       | Ná voragine           | Voragape or voragape†   | Voragape or voragape†   | Present tense.                | Ná kađandu kóge                               |
| I eat                | Tetthbini. Tinsbini                                               | Tinnane               | Tingape                 | Tingape                 | Tinnutine                     | Ná tindu kóge                                 |
| I ate                | No preterite.                                                     | Tinde                 | Tidde                   | Tidde                   | Tinde                         | Ná tinde                                      |
| I will eat           | No future.†                                                       | 4) Tinnane            | Tingape                 | Tingape                 | Present tense.                | Ná tinge                                      |
| I see                | Nothbini. Kaddersbini                                             | Nóđine                | Nosigape                | Nosigape                | Kandane. Kanutine             | Ná pátu kóge                                  |
| I saw                | No preterite.†                                                    | Nodide                | Nósipe                  | Nósipe                  | Kande                         | Ná pátu kónde                                 |
| I will see           | The future is the same as the present tense in all these tongues. |                       |                         |                         |                               |                                               |
| I sleep              | Vorchsbini                                                        | Voragine              | Voragape                | Voragape                | Nidre mađutine (sleep make I) | Ná kada ke. Ná kađandu kóge                   |
| Thou sleepest        | *Vorchsti                                                         | *Voragire             | Voragape                | Voragape                | Nidre mađuti                  | Ní kađandu kónde                              |
| He sleeps            | Vorchsti                                                          | Voragina              | Voragapo                | Voragapo                | Nidre mađutane                | Avanu kađandu kónda                           |
| She sleeps           | Vorchsti                                                          | Voragla               | Voriglo                 | Voriglo                 | Nidre mađutale                | Avla } kađandu                                |
| It sleeps            | Vorchsti                                                          | Voragida              | Vorigo                  | Vorigo                  | Nidre mađutade                | Avala } kóndala                               |
| We two sleep         | No dual in any of these languages.                                |                       |                         |                         |                               | Adu kađandu kónda                             |
| We all sleep. Inclu. | Amellam vorchsbini                                                | Angella voragineo     | Amella vorigame         | Amella vorigame         | Navella nidre mađutere        | These have been casually omitted by Mr. Metz. |
| We all sleep. Exclu. | Emellam vorchsbini                                                | Yengella voragineo    | Emella vorigame         | Emella vorigame         | Yengella nidre mađuteve       |                                               |
| Ye all sleep         | Nivellam vorchsbini                                               | Ningella voragiari    | *Vorigire               | *Vorigire               | Nivella nidre mađutiri        |                                               |
| They all sleep       | Avarellam vorchsbini                                              | Avakaella voragiari   | Vorigoro                | Vorigoro                | Avarella nidre mađutare       |                                               |

About the Passive see Remarks.)

\* For omitted pronouns see elsewhere.

† Adverbs of time used to mark tense. I sleep yesterday = I slept. I sleep to-morrow = I will sleep.



| English.              | Toda.                                                                                                                  | Badaga.           | Kota.                         | Kurumba.           | Irula.                   |
|-----------------------|------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------------------|--------------------|--------------------------|
| I cause to kill       | I have found no form for this.                                                                                         | Koddhákisine      | Tavarsiken                    | Kondhakisutine     | Ná kollisé vittige       |
| I cause to make       | "                                                                                                                      | Madisine          | Kesiken                       | Madisutine         | "                        |
| I cause to love       | "                                                                                                                      | "                 | "                             | "                  | Ná pria pannisige        |
| I love                | "                                                                                                                      | "                 | "                             | "                  | Ná pria panni kan-dirige |
| I strike              | *Burthtsbini                                                                                                           | Huidane           | *Puikape                      | Huiyutine          | Ná adikallave. Ná        |
| Thou strikest         | Burthtssti                                                                                                             | Huidere           | Ni puikape                    | *Huiyuti           | adida vittige            |
| He strikes            | Burthtssti                                                                                                             | Huidana           | Avane puikapo                 | Huiyutane          | Ni adika                 |
| She strikes           | Burthtssti                                                                                                             | Huidla            | Avale posso                   | Huiyutale          | Ava adika                |
| It strikes            | Burthtssti                                                                                                             | Huidada           | Adu posso                     | Huiyutade          | Avla adika               |
| We two strike. Dual   | Dual is the same as plural; adding only the numeral <i>two</i> after the pronoun instead of <i>ella</i> = <i>all</i> . |                   |                               |                    | Adu adika                |
| We all strike. Inclu. | Am ellam burthts-bimi                                                                                                  | Angella huidaueo  | Amella puiyame                | Angella huiyuteve  | Namella adikemet         |
| We all strike. Exclu. | Em ellam burthts-bimi                                                                                                  | Yengella huidaneo | Emella puiyame                | Yengella huiyuteve | The same.                |
| Ye all strike         | Nivellam burthtssti                                                                                                    | Ningella huidari  | Nímella pórsire               | Nivella huiyutiri  | Nimella adikiri          |
| They all strike       | Avarellam burthtssti                                                                                                   | Avarella huidara  | Avarella posso                | Avarella huiyutare | Avarella adikaru         |
| A dog                 | Noi                                                                                                                    | Nai               | Nai                           | Nai                | Nai                      |
| Two dogs. Dual        | A'ed noi                                                                                                               | Yeraðu nai        | A'ed } Nai                    | Yeraðu nai         | Rendu nai                |
| Dogs. Plural          | (1) No plural.                                                                                                         | Naigla            | (1) No plural. (See Remarks.) | Naigalu            | No plural for neuter.    |
| A Father              | Eiyan                                                                                                                  | Appa. Tande       | Eiyane                        | Tande              | Amma                     |
| Two fathers. Dual     | It is wanting                                                                                                          | It is wanting     | It is wanting                 | It is wanting      | It is wanting            |
| Fathers. Plural       | It is wanting                                                                                                          | It is wanting     | It is wanting                 | It is wanting      | It is wanting            |
| A father. Indefinite  | } No such distinction exists in any of these languages.                                                                |                   |                               |                    |                          |
| The father. Definite  |                                                                                                                        |                   |                               |                    |                          |

\* For omitted pronouns see elsewhere.

+ Dual is not a separate form, but rendu = 2, is added after pronoun instead of *ella*, as Nam rendál adikeme, &c.



## ORIGINAL.

Akayam,  
Iratt-tham,  
Pasú,

Kákam.  
Kakkei,  
Naul.

Thenam, Malabar.  
Dina, Singalese.

Tahappen.  
Thanthei. Thatthei.

Poo.  
Meen.

Dawasa Singalese.

Irattiri.

Natchetheram.

Keramam.

Ah'-thu.

## CORRECTION.

Ágáyam. Ágáam : the y, merely intercalary.

Irattam. Rattam : the i servile, = Sanscrit rak tam.

Pasú.

Kágam. Kákei.

Nál. Naul would be pronounced Nowl on the continent of Europe and would mislead.

{ These words, seemingly so different, are identical, the difference resulting merely from bad pronunciation and a bad spelling. Singalese (and Sanscrit) d is expressed in the Madras Presidency generally by th, but quite erroneously, and European foreigners might suppose this th = the English th, whereas in all the world only Todas and Danes have the English th. Even the Greek theta Θ is not quite the same. [I doubt the implied Arian etymology. Dina vel Thina = *day* and *to-day*, is thoroughly Turanian. B. H. H.]

Tagappen. [Hard h, = k vel g, throughout the Turanian area. B. H. H.]

Tandei. Tatei. { [T' = d, and aspiration neutral, are characteristically Turanian, and so also a hard nasal followed by t rather than by d.]

Pú. } [These are merely the Gilchristian and Jonesian representations of vowels. B. H. H.]  
Mín. }

{ Dása : = Canarese Dinsa and Latin Dies [Query ? w, like y, is an intercalary consonant, used normally to separate vowels. B. H. H.]

Irátir.

{ Natchétiram = Sanscrit Nakshatra. The native word is ván mín = *fishes of the sky* for stars [In Newari the stars are called forest or jungle of the sky. B. H. H.]

{ Kerámam. { Better Kráman. The separation of the coalescing consonants being a mere trick of Tamil [Such separation is nevertheless normally Dravian. B. H. H.]

Adu [ah' is merely the abrupt accent separating the root a and the servile ôu. B. H. H.]  
Nimeal [u for n is a misprint merely. B. H. H.]

## CORRECTION.

Avargal [gal = kal, plural sign. But gal is better a after liquid B. H. H.]  
 Avar [misprint merely. B. H. H.]  
 Ennudéyadu. Enadu. { And so also read Avanudéyadu and erase Avarudeyadu which is  
 Ummudéyadu. Umadu. { the plural.  
 Avarudéyadu, just cited. In the neuter, avattin.

{ [I never use the diphthong ei so common in European writing of Dra-  
 virian tongues. With me é makes ai, and á, au, and ó, ou. I never  
 confound these two latter. The sliding French u I present in the  
 form of eu or in combination with a precedent consonant in the form  
 of yú, thus English *puling* and *tune* I write pyúling and tyún. The  
 French j and u as seen in *jeu* d'esprit are among the commonest and  
 most characteristic of Turanian sounds. I write them separately,  
 z and eu; united zyú B. H. H.]  
 Külé. Long German dotted ü, or French ú.  
 Metta.

Edukkágu.

This. That.

Moustachio.

{ These are slips of the pen in the English column. The latter is inferred  
 from the Malabar terms.  
 { The Hindi and Urdu relative and correlative are wholly unknown in Tamil. Whatever is  
 put down therefore must be incorrect.

Tungu.

Alu. { Nitirei and Alukei (recte Alugei) are substantival forms, = *the sleep-  
 ing and the weeping.*

Ulukkáru. { Iru means literally *Be*, but is often used for *Sit*. But ulukkáru is the  
 proper word for *sit down*.

{ These are compounds from the verbs *come* and *go* and mean *taking come* and *taking go*.

Nada.

Odu. { Thal suffix means *the doing*; maduthal in Canarese = *to do*. Nada  
 and Odu are quite enough for *walk* and *run*.

Averkal.

Avei.

Ennudevathu.

Enathu.

Ummadiathu.

Umathu.

Oné.

Inthu.

Pat-thu.

Sympathu.

Idat-thu.

Nettu.

Inga. Angei.

Engé.

Kéli.

Met-tha.

Ethukkuka.

His. That.

Moschito.

Which. Jón.

H.

Which. Tón.

H.

Net-thirei.

Alukei.

∞ Iru.

4

Konduvá.

Eduutupódu.

Nadamaduthal.

Oduthal.



REMARKS.—I give the above as they reached me without entirely assenting to the value set on such precision by the venerable Author of these corrections, or always even approving the corrections; for the more ample and careful becomes our survey of the Turanian tongues, the more deep is the conviction that the largest commutability of consonants and vowels is normal in this family of tongues, that local varieties of utterance are not to be reduced to a quasi exotic standard, and that Akayam and Keramam, for instance, reflecting as they do the well known preference of Tamil for surds and its aversion to heaped consonants, may very reasonably be preferred to Agayam and Kramam. Mr. Schmid's conjecture that the English *th* is known only to the Todas is incorrect, for, the Burmese and Kúkis as well as some Himalayan and Sifanese tongues have the sound; and likewise the Todava proneness to blend the sounds of *s*, *z*, and the English *th*, and the latter also with *d*, like the Tamulians of the Eastern Coast. My Ceylonese papers were prepared for me by a gentleman who used the ordinary English way of representing oriental words. I myself always use the continental, but the other does not mislead me. The Nilgirian vocabularies are framed on the latter model. The cerebral letters are marked by a dot, thus *ṭ*, *ḍ*, *ḷ*; *ch* is to be pronounced as in English much, *ch* with the mark > above, as in gaelic loch; and in Toda *th* is always to be sounded the English way. B. H. H.

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*Entomological Papers*—being descriptions of new Ceylon Coleoptera, with such observations on their habits as appear any way interesting.  
—By JOHN NIETNER, Colombo, Ceylon.

(Continued from page 394.)

Trib. Lebiidæ.

*Anchista*. n. g. N.

Corpus depressum, ovatum. Mentum dente magno obtuso, lobis parum brevioribus, his extus rotundatis, apice acuminatis. Palpi robusti, maxillares art. ultimo magno ovato, apice obtuso, labiales art. ultimo valde securiformi. Ligula cornea apice obtuse acuminata, labri marginem anteriorem attingens. (Paraglossæ a me non dissectæ.) Labrum transversim quadratum. Mandibulæ simplices apice arcuatæ et acuminatæ. Antennæ robustæ art. 1° mediocri, 2° brevi, 3° quarto paulo longiore, 4-10 subæqualibus, 11° penultimo parum longiore. Thorax longitudine latior, angulis anticis rotundatis, medio obsolete angulatus, basi angustatus, angulis rectis. Elytra apice quadrata truncata. Pedes robusti tarsis art. 4° profunde bilobo, unguibus fortitor pectinatis.

## 12. *Anchista modesta*. N.

A. brunneo-testacea, elytris (maculis 2 obsoletis subhumeralibus exceptis) obscurioribus abdomine piceo. Long. corp. 4 lin.

Caput fronte medio leviter uniimpressa. Thorax linea media longitudinali divisus. Elytra apicem versus parum dilatata, striato-punctata, ad stiam 2<sup>m</sup> punctis 2 majoribus subapicalibus, cum thorace marginata.

Prope Colombo nocte ad lumen cepi.

The characteristics of this new genus are those of the g. *Calleida* (between which and *Cymindis* I place it) excepting the ligula which in this case is obtusely acuminate, the last joint of the maxill. palpi which is obtuse at the apex, and the thorax which is not as in *Calleida* longer than broad, but the reverse. From *Cymindis* it would differ principally in the deeply bilobed 4th tarsal joint, and in some other minor points, but it is difficult to say what the true characteristics of this genus (which appears from this reason to require a careful revision) are, if even Lacordaire uses the particle

"on" not less than five times in the diagnosis he gives of it in his g.d. Col. However, I feel justified in separating *Anchista* from *Cymindis* as well as from *Calleida*. The name "*Anchista*" has reference to the affinity of the insect to the two genera just mentioned, whilst the specific name "*Modesta*" refers to its inconspicuous colours. Amongst its peculiarities, weight ought to be laid upon the plumpness of the palpi, and in fact on all the other parts of the mouth and even the whole head, which was very striking to me.

Like many of my best *Carabidæ* I found this insect at night on the table, whither it had been attracted by the light. I may mention that the single specimen which came thus into my possession has an oblong shallow impression on either elytron, perhaps accidental, perhaps a peculiarity. The anterior tarsi are dilated and furnished with hairy brushes below, longest at the apex of the lobes of the 4th joint.

Trib. *Lebiidæ*.

*Elliotia*. n. g. *N*.

Corpus subconvexum, ovatum. Caput mediocre, oculis maximis. Mentum leviter transversim emarginatum, edentatum, lobis acuminate. Ligula submembranacea apice truncata, paraglossis connatis marginem anteriorem parum superantibus, obtusis. Palpi elongati, art. ultimo elliptico, acuminato. Labrum magnum transversum, integrum, mandibulas fere obtegens. Mandibulæ validæ, edentatæ. Antennæ robustæ filiformes, humeros superantes, art. 1° mediocri, 2° brevi, 3° quinti prope longitudine, 4° præcedente brevior, 2-4 obconicis, 5-10 æqualibus, cylindricis, 11° præcedente tertia parte longior, 4-11 pilosis. Thorax parvus, capite minor, transversus, longitudine duplo latior; antice leviter emarginatus, lateribus elevato-marginatus, ab apice ad medium lateribus rotundatus, medio fortiter angulatus, a medio ad basin valde abrupteque angustatus, basi truncatus, subtus cylindricus. Scutellum leviter excavatum. Elytra ovata, marginata, apice sat fortiter truncata. Pedes omnes subæquales, simplices, tenues, tarsi cylindricis art. 3-4 magis minusve trigonis, unguibus simplicibus. Prosternum carinatum.

In honorem Dom. Hon. Walteri Elliotti (*Maderaspatani*), naturalistæ diligentissimi, meritissimi, nomen imposui.

13. *Elliotia pallipes*. N.

E. supra nigra-nitida, thorace scutelloque rufo-testaceis, labro elytrorumque limbo atque sutura brunneo-testaceis; subtus piceus, pectore rufo-testaceo, pedibus albidis, his geniculis oreque (palpis obscurioribus exceptis) testaceis. Long. corp.  $2\frac{1}{4}$  lin.

Caput ad antennarum insertionem et inter oculos utrinque profunde impressum. Thorax basi rugosus, ante medium utrinque uniimpressus, linea media longitudinali divisus. Elytra punctato-striata, infra humeros leviter impressa.

In ripis lacus Colombensis sub veget. putrescent. mens. Jul. non infrequenter legi. Agilis est et avolare semper expeditus.

A pretty and very interesting little insect, about whose systematic position I am not quite satisfied; however I provisionally place it towards the end of the true Lebiidæ. I find it most to agree with the descriptions of the g. *Pentagonica* S. G. and *Rhombodera* R. with neither of which, however, it is identical. The head is distinguished by the large and prominent eyes and 4 deep impressions, 2 larger ones at the root of the antennæ, 2 smaller ones between the eyes, also by a very distinct neck which connects it with the thorax; the labrum is large, transverse and entire, with the angles rounded off and the base narrowed; the mentum is but slightly transversely emarginated, edentate; the ligula is truncated at the tip, the paraglossæ adhere to it, reach a little beyond it and are obtuse at the apex; the palpi are rather long with the last joint elliptic, acuminate; the antennæ are strong, filiform and reach beyond the shoulders, joints 5-10 are of equal length and cylindric, 4-11 are pilose. The most remarkable part of the insect is, however, the thorax which is of a subrhomboidal shape, transverse, smaller than the head, as broad again as long, it has 2 strong lateral angles at the middle, each furnished with a strong bristle, the anterior part has the sides rounded, the posterior abruptly obliquely contracted, at the base it is cylindric. As a specific distinction of the thorax I mention moreover that in the present species it is impressed with 2 deep punctures before the middle and that it is rugose at the base. The abdomen is slightly peduncled. The scutellum is slightly excavated. The elytra are oval, rather convex and impressed with rows of punctures. The legs are simple and weak, apparently equal in both sexes. The



anterior tarsi are a little stouter than the rest, but not dilated nor furnished with any additional clothing below, the anterior tibiæ are deeply notched. As to the colour: the head and wing-covers are black, the latter with the suture and margin of a light brown and highly polished, the thorax is reddish and the legs are whitish. The insect is very agile and ever ready to take to its wings. It is of quite a peculiar appearance, imparted to it by its large eyes, small curiously shaped thorax and rather plump elytra and abdomen. I may further mention that I have observed the 4th joint of the maxillary palpi to collapse when the specimens become quite dry, so as to give them a different, spoonlike, appearance, apt to mislead any one who has not examined fresh specimens.

14. *Harpalus advolans*. *N*.

H. æneus, clypeo, labro, antennis mandibulisque brunneis, his apice nigris, subtus testaceus, lateribus obscurior, pedibus flavis, tarsis geniculis spinulisque brunneis, ore testaceo. Long. corp.  $4\frac{3}{4}$ — $5\frac{1}{4}$  lin.

Caput læve. Mandibulæ unidentatæ. Palpi art. ultimo elongato, apice truncato. Menti dens simplex, obtusus. Ligula apice quadrate truncata, angulis acutis leviter productis, paraglossis inflatis marginem anticum parum superantibus. Thorax longitudine sesquialtor, dorso anticeque lævis, basi rugoso-punctatus, 2-impressus. Elytra striata, cum thorace anguste marginata. Variat colore testaceo-ænea.

Nocte ad lumen, sed ad huc non usquam alibi, non infrequenter cepi.

I have taken this species frequently at night on my table, but never found it as yet anywhere else. It is not very distinguished, for which reason I have mentioned the parts of the mouth in the description, these being moreover not very constant in this genus. The insect is of the usual oval *Harpalus*-form, of a dark metallic green on the back and more or less yellowish or light brown below, the colour of the back changing occasionally to a brownish green.

15. *Oodes piceus*. *N*.

O. ovatus, subconvexus, piceus, tarsis, palpis antennarumque articulis 3 primis castaneis, palpis apice flavis. Long. corp. 4 lin.

Caput parvum, inter antennis linea latitudinali abbreviata impressum. Labrum integram, punctis 3-impressum, puncto intermedio bi-, lateralibus uni-setigeribus. Mandibulæ validæ prominentes. Palpi art. ultimo elongato-ovato, apice leviter truncato. Menti dens apice truncatus leviterque sinuatus. Antennæ art. 3<sup>o</sup> quarto æquali nisi paulo brevior. Thorax amplus basi elytris applicatus, apicem versus angustatus, angulis posterioribus subdepressis translucetibus, ante scutellum leviter sinuosus, ante sinum obsolete latitudinaliter impressus. Elytra striata, cum thorace angustissime marginata. Pedes validæ, ant. tibiis apice intus uni—, intermed. et post. bi-calcaratis.

Specimen singulum f. in ripis lacus Colombensis sub vegetab. putrescent. legi.

As already one species with a bifid mentum tooth (*O. pulcher*) has been received into this genus, I have waved the hesitation I should otherwise have felt in referring to it the present one, the tooth of which is of a similar description. I have not seen the *O. pulcher*, but as it is said to be an inhabitant of this part of the world it may possibly be identical with my species. If not, they might, as the g. is otherwise pretty constant in its characteristics, be separated under a new name as types peculiar to India. Besides the abnormal mentum tooth the insect has not much to distinguish it from others of the genus. The labrum is, however, peculiar, being entire, or even very slightly produced in the middle, with the angles rounded off; it is impressed near the anterior margin, with 3 deep punctures, the central one of which is furnished with 2, the lateral ones with one strong bristle each. The anterior tibiæ are but slightly notched. The prosternum is largely developed, reaching beyond the anterior coxæ, obtusely acuminate, and received in a deep excavation of the mesothorax. But I doubt whether the development is sufficiently large to entitle the insect to a place in the g. *Lonchosternus* Laf. which, however, I have not seen in nature.

16. *Trichopteryx cursitans*. N.

T. ovata, subconvexa, pubescens, supra obscure ænea, elytris æneo-brunneis, subtus picea, pedibus oreque testaceis, antennis art. 3-11 nigrescentibus. Long. corp.  $\frac{2}{5}$  lin.

Antennarum clava art. 2 primis ovatis, ultimo conico, acuminato.

Thorax amplissimus, elytris tertia parte minor, convexus, angulis acutis, basi humeros amplexens, apice angustatus. Elytra subdepressa, subquadrata, apicem versus parum angustata, truncata, abdominis 3-4 segmenta ultima non obtegentia. Tibiæ medio incrassatæ. Coxæ posticæ maxime dilatatæ. Mesosternum carinatum.

Sub veget. putrescent. exsicciscentibus in prov. occid. copiosa.

A rather large species commonly met with in this part of the Island under rotting vegetable substances somewhat dried up. It is very agile and ready to take to its wings, which are of the beautiful typical construction, about twice the length of the body and in dead specimens frequently produced behind. These insects vary a little as to shape, some being more narrowed behind than others, and also as to the exact number of the abdominal segments left uncovered by the elytra. The head is large but exhibits nothing abnormal or extraordinary; the thorax is very large, emarginated in front and behind, with the angles acute, the basal ones enveloping the shoulders; the wing covers are subquadratic with the angles rounded off and a little narrowed behind; the legs have the tibiæ incrassated in the middle and the posterior coxæ very much dilated and distant from each other, in all other respects they are typical. The shape of the body is that of an egg, broadest at the shoulders, gently narrowed towards the apex of the abdomen, and rounded off towards the head.

#### 17. *Trichopteryx immatura*. N.

T. præcedenti similis, differt tamen colore supra æneo-testacea, subtus testacea, antennarum art. 3-11 nigrescentibus; differt etiam corpore crassiore, magis quadrato, capite paulo majore, thorace minus convexo, parum ampliore, elytris abdomen totum vel fere totum obtegentiis. Pedes, antennæ etc. omnino præcedentis. Long. corp.  $\frac{1}{3}$  lin.

In præcedentis societate specimina nonnulla legi.

Of somewhat the appearance of an immature individual of the former but sufficiently distinct to be formed into a new species. The insect is altogether of a different appearance, imparted to it by the greater general plumpness of the body, the larger head, the less convex but at the same time possibly still ampler thorax, the altogether more

quadratic shape, etc. The remark regarding the exact number of abdominal segments left uncovered by the elytra, applies to this and all other species as well. The present one has generally the last 2 segments uncovered.

18. *Trichopteryx invisibilis*. N.

T. ovata, subdepressa, subparallela, pilosa, supra obscure ænea. subtus picea, pedibus, abdomine, antennis oreque testaceis. Long. corp. vix  $\frac{1}{5}$  lin.

Thorax amplus, elytris sesqui minor, convexus, angulis posticis humeros vix superantibus. Elytra oblonge quadrata angulis rotundatis, subdepressa, truncata, abdomen totum vel fere totum obtegentia. Coxæ posticæ approximatae. Tarsi typicis minus elongati, art. 3<sup>o</sup> præcedentibus haud multo longiore.

Cum *T. cursitante* victitat; frequenter legi.

A very pretty and very distinguished species. Its most striking peculiarity consists in the posterior coxæ which are as little distant from each other as those of the anterior legs, and almost touch each other, and also in the shortness of the tarsi. The head with the antennæ, the mesosternum, the tibiæ, which are incrassated in the middle, and the posterior coxæ with regard to their enlargement, are quite typical. However, the thorax and elytra differ again from those of *T. cursitans* (which in every respect may be looked upon as the typical representative of the family in Ceylon and which is here referred to as such) the former by the shortness of the posterior angles which can hardly be said to envelop the shoulders, the elytra by being less or not at all narrowed behind, giving an oblong rather than an oval shape to the insect. Although in length only about one half shorter, it is in bulk certainly one-fourth smaller than *T. cursitans*, and although probably the smallest Ceylon beetle, it is distinguished at first sight.

19. *Ptilium subquadratum*. N.

P. subquadratum, subconvexum, pilosum, obscure æneotestaceum, thorace dilutiore. Long. corp.  $\frac{1}{4}$  lin.

Caput mediocre. Antennarum clava art. 1<sup>o</sup> inverte conico, 2<sup>o</sup> subcylindrico, ultimo elongato-ovato. Thorax convexus, angulis



basalibus humeros fortissime amplectentibus, apicem versus valde rotundatus, apice leviter sinuatus. Elytra quadrata, abdomen non totum obtegentia. Scutellum parvum. Pedes robusti tibiis apicem versus incrassatis, tarsis art 3 primi secundique longitudine, his subbilobis subtus penicillatis, coxis posticis simplicibus distantibus. Mesosternum non carinatum.

Ubi præcedentes sed infrequenter occurrit.

The g. *Ptilium* is the repository for all the anomalies of the family, its characteristics therefore are very vague, but if the absence of the mesosternal carina and the simplicity of the posterior coxæ are the determining features amongst them, the present species, in spite of a variety of anomalies it exhibits in other respects, belongs to it. The head is of middling size; the antennæ robust with the 1st joint of the club of the shape of an inverted cone, the 2nd rather cylindrical, narrowed at the base and the last elongate, ovate. The thorax is of very different structure from that of the foregoing species of the family the basal angles being produced unusually far beyond the shoulders; towards the head it is strongly and rapidly rounded off, being thus altogether of a semicircular shape; at the apex it is merely slightly sinuated, and the head is inserted rather below than in this sinuosity; the whole thorax moreover is very convex whilst the elytra are depressed. The wings vary from the typical form by being fringed with short simple cilia instead of those long feathery appendages, they are moreover without a distinct peduncle, but still folded in the manner characteristic of the family. The legs are stout, with the tibiæ thickest at the tip; the 3rd tarsal joint is of the length of the preceding two, the latter are somewhat bilobed and hairy below. The posterior coxæ are simple and distant. The mesosternum without a carina. The whole shape of the insect is quadratic rather than otherwise.

20. *Ptenidium macrocephalum*. N.

P. ellipticum, subconvexum, nitidum, sparsim pilosum, supra piceo-æneum, subtus piceum pedibus oreque testaceis. Long. corp.  $\frac{3}{4}$  lin.

Caput maximum. Antennarum clava elongata articulis ellipti-

cis. Thorax subquadratus antice posticeque angustatus, basi punctis 4 magnis profunde impressus. Elytra ovata, medium versus leviter inflata, apice obtuse acuminata, abdomine longiora et ampliora, punctulis lineis dispositis absoletissime impressa. Alæ corpore plus duplo longiores. Tibiæ fortiores spinulosæ. Tarsi breviores. Prosternum carinatum.

In præcedentium societate frequenter lectum.

This is perhaps the prettiest of the 5 species of the family just described and at first sight recognised by the shape of its body and the polished back. The head is very large. The thorax is narrowed in front and behind, at the latter place impressed with 4 deep, not to be overlooked, punctures. The wing-covers are oval, a little inflated about the middle, rounded at the apex, and longer and wider than the abdomen. The prosternum is carinated.

It affords me much gratification to be enabled to publish representatives of 3 genera of this highly interesting and probably very extensive and widely distributed family of pigmies, the Asiatic representatives of which have hitherto been entirely unknown. I have no doubt that even this Island is the abode of a great many more species.

21. *Stenus barbatus*. N.

*S. elongatus*, æneo-niger, nitidus, punctatus, sparsim pubescens, pedibus palisque albidis, ore coxisque testaceis, antennis brunnescentibus. Long. corp.  $2\frac{1}{2}$  lin.

Caput thorace tertia parte latius, fronte costis 3 abbreviatis, antice albido-pubescens. Antennæ art. 3<sup>o</sup> sequentium 2 fere longitudine, 3 ultimis elongatis, ellipticis. Palpi max. elongati apice densius pubescentes. Thorax cylindricus medio leviter incrassatus, basi subquadratus. Elytra thorace paulo longiora, sed fere duplo latiora, convexa, ovata. Abdomen immarginatum. Pedes elongati tenues, tibiis apice tarsisque fortiter setosis, his art. 4<sup>o</sup> profunde bilobo.

In lacus Colomb. ripis specimina nonnulla legi.

This, as well as the following species, belongs to Erichson's division II. B. of the g., both having the abdomen immarginate and the 4th tarsal joint bilobed. Everything about this species is

elongated. The head is about one third broader than the thorax ; the forehead is slightly excavated with two elevated ridges running from the root of the antennæ a short distance upwards ; a third runs from the crown of the head down towards the centre of the two former, but all three reach only about the middle of the head. The part below the antennæ is covered with white hair. The antennæ have the 3rd joint much elongated and the terminal club composed of elliptic joints. The thorax is rather slender, incrassated at the middle, gradually narrowed in front, but nearly quadratic behind. The elytra are longer than the thorax, about double its breadth, and oval, being slightly narrowed at the shoulders and the apex. The legs are long and slender, hairy at the apex of the tibiæ and the tarsi, the latter very much so on the inner side. The insect is of a metallic black colour highly polished ; the legs, palpi and the first 2 antennal joints are whitish, the tibiæ and the apex of the palpi being, however, rather darker ; joints 3-11 of the antennæ are brownish ; the coxæ and the mouth are yellowish ; the tarsi have a brown spot at the apex of the first 3 joints ; the claws are black. The insect is punctured all over, but less so on the abdomen, the apical segments of which are indeed nearly smooth, than elsewhere, and sparingly covered with small white hairs.

22. *Stenus lacertoides*. N.

S. robustus, nigro-æneus, dense profundeque punctatus, subtus sparsissime pubescens, pedibus palpisque testaceis, femoribus apice nigrescentibus, antennis oreque castaneis. Long. corp.  $1\frac{1}{2}$  lin.

Caput thorace quarta parte latius, fronte 2 costata. Antennæ robustæ art. 3<sup>o</sup> quarto paulo longiore, 9-10 globosis, 11<sup>o</sup> conico. Thorax cylindricus, medio fortius incrassatus, latitudine quarta parte longior, margine anteriore elevato, basi subquadratus. Elytra thorace longiora, convexa, humeris prominentibus. Abdomen immarginatum. Tarsi art. 4<sup>o</sup> profunde bilobo.

In prov. occid. stagnorum ripis rarius occurrit.

About this species every thing is robust. It is well distinguished by the rounded club-joints of the antennæ, the elevated anterior margin of the thorax, the prominent shoulders, and its general shortness and plumpness. The forehead is rather more depressed or

excavated than in the former, the two antennal ridges are shorter, the vertical one is altogether obsolete. The palpi are robust. The 3rd antennal joint is about one third longer than the 4th. The thorax is shorter and plumper than in the former. The elytra are less oval, having the shoulders more prominent and only the apex rounded off or narrowed. The legs are similar to those of the former, but more robust, less hairy and have the tarsi more cylindric. The insect is of a blackish metallic colour; the legs and palpi are yellowish; the tibiae, however, the apex of the palpi, and also joints 1-2 of the antennae are rather darker; the femora are blackish towards the end; the mouth and joints 3-11 of the antennae are chestnut and the coxae pitch-colour. The animal is densely and deeply punctured all over, very sparingly covered with small greyish hairs, nearly obsolete on the back but more distinct below. It is less highly polished than the former. I have known this species for a long time, and specimens of it must exist at the Mus. Berol.; the former I met with but lately.

I may mention that in dissecting these two species I have observed the same remarkable production of the oesophagus with the ligula, characteristic of the g. and noticed in many of the European kinds.

23. *Anthicus formicarius*. N.

A. castaneus, capite, abdomine elytrisque piceis, his pilorum niveorum fascia media transversali interrupta maculisque concoloribus 6 humeralibus, obsoletis, parce pilosus. Long. corp.  $1\frac{2}{3}$  lin.

Caput globosum supra subtusque profunde punctatum, oculis parvis. Thorax nodoso-pyriformis, infra medium constrictus, parte anteriore crassiore lin. long. med. profunde divisa, subcordiformi. Elytra elliptica.

Sub veget. putrescent. victitat; prope Colombo rarius legi.

This insect looks uncommonly like an ant. It is easily distinguished from all other species of the Island partly by this resemblance, partly by the sculpture of the thorax and the white fascia across the elytra. The antennae are robust, thickened towards the tip, the 3 last joints forming a club. The legs have the femora very much incrassated, the tibiae at the apex bicalcarate and the tarsi,



especially of the anterior pair, very hairy below; the 4th joint appears to be slightly cordiform. The white marks of the shoulders and the fascia across the wing-covers are composed of white hairs, the former are rather an interrupted row of these than true maculæ, the fascia consists of two halves, one in either elytron, reaching neither the external margin nor the suture. The insect is of slow motion.

24. *Anthicus insulanus*. *N.*

A. testaceus, abdomine obscuriore, capite thoraceque rufotaceis, elytris fasciis 2 nigris, parce pilosus. Long. corp.  $1\frac{1}{4}$ - $1\frac{1}{2}$  lin.

Caput globosum oculis mediocris. Thorax pyriformis, cum capite supra punctata. Elytra ovata. Tarsi art. 4<sup>o</sup> bilobo.

Prope Negombo in pratis sat copiosus.

In some of the specimens before me the anterior femora are furnished with a strong thorn inside, having at the same time the tibiæ of the same pair of legs slightly emarginated inside near the apex—I have reason to believe these individuals, if the distinction be a sexual one, to be females not males.

25. *Meligethes orientalis*. *N.*

M. ovatus, subconvexus, pilosus, supra nigro-æneus, subtus piceus, pedibus, antennis palpisque maxill. dilutioribus, tarsis palpisque labial. brunneo-aureis. Long. corp.  $1$ - $1\frac{1}{2}$  lin.

Mentum transversum planum, punctatum, lobis apice depressis excavatis, glabris, obtusis. Palpi lab. art. ultimo inflato, ovato; maxill. art. ultimo apice angustato levissime truncato. Mandibulæ unidentatæ. Thorax amplus angulis acutis, antice emarginatus, postice pluries sinuatus, subtus punctatus. Elytra ovato-quadrata, angulis 4 apicalibus rotundatis, pygidium haud obtegentia. Pedes validæ, femoribus tibiisque incrassatis; anteriores tibiis apice intus unispinosus, tarsis art. 1-3 fortiter dilatatis, 1-2 subæqualibus transversis, profunde reniformibus, 3<sup>o</sup> minore, cordato, 4<sup>o</sup> minimo, subcylindrico; intermed. et post. tibiis extus spinulosus, tarsis anterioribus similibus sed art. 1-3 minus dilatatis, cordiformibus. Prosternum marginatum, punctatum, obtuse acuminatum. Mesosternum antice carinatum.

Variat magnitudine et colore æneo-brunnea.

Prope Colombo in floribus per occasionem frequentissime legi.

Of the usual shape and colour, but larger than usual, varying, however, in this respect, some individuals being fully one third smaller than others. These small individuals, which occur in the proportion of about 1 to 20, are moreover nearly always of a brownish metal colour instead of a blackish green. I have been unable to discover any other distinctions. I was much interested by the discovery of these insects, having missed them for years amongst the abundantly represented *Nitidulidæ* of the Island. They appear of local occurrence or attached to certain plants, which is nearly the same. I find them in abundance in the beautiful bellshaped blossoms of the *Argyrera argentea* and one or two other plants in my garden. The species appears to differ from the typical *Meligethes* in the following points: the structure of the mentum, which I have sufficiently described above, the last joint of the lab. palpi which in this case is not truncated, and the first of the antennæ which is externally incrassated as in *Epuræa*. The antennæ are otherwise robust, the club is firm and hairy. The thorax is very ample, thinly ciliated along the upper part of the interior margin, rather strongly below. The prosternum is largely developed, marginated, punctured and obtusely acuminate, overlapping the anterior part of the mesosternum which (the anterior part) is cylindric and carinated. Joints 1-3 of the tarsi are strongly penicillated below, the penicilla being composed of glanduliferous hairs of a fine golden colour.

26. *Georyssus gemma*. N.

G. pygmæi statura et magnitudine, supra purpureo-æneus, iridescens, subtus piceus; *alatus*. Thorax subsemior bicularis infra apicem constrictus, sulco med. long. divisus, lateribus, basi apiceque excavatus, impressionibus 3 majoribus dorsalibus, 2 minoribus later-alibus. Elytra fortissime costata, costis obtuse dentatis, in interstitiis transversim punctato-impressa, ad humeros profunde excavata, infra medium leviter sinuata. Tibiæ extus spinulosæ, intus sparsim ciliatæ.

In prov. central. montibus Kotmaliensibus alt. 3500 ped. in rivulorum ripis non infrequenter legi.

Lacordaire and others characterize the g. *Georyssus* as having the elytra soldered together and being destitute of wings. *In the present species, however, the elytra are unconnected and cover wings proportionately larger than in any other beetle I can at present think of.* They are elongated and comparatively narrow, resembling in shape very much those of a *Libellula*, have a few veins at the base, and are ciliated at the margin. I have moreover occasionally taken insects of this g. *flying* about the light at night, but I am not quite sure at present whether it was this or any other species. The sculpture of the thorax is complicated and difficult to describe, however, the leading features in it are these : a subapical sinuosity on either side ; a longitudinal furrow ; excavated sides, base and apex ; 3 larger dorsal depressions (1 central, 2 obliquely basal) and 2 smaller lateral ones at the subapical sinuosities—a short elevated ridge at the centre of the base separating the 2 basal impressions and being itself divided by the longitudinal furrow ; 2 elevations separating the anterior part of the basal impressions from that of the central one (at the middle these 3 depressions are connected) ; 2 small rugosities near the anterior margin, one on either side of the longitudinal furrow.

The sculpture of the elytra is less complicated : they have a deep cavity at the shoulder, a large, but not deep sinuosity below the middle, and are obtusely acuminate. The costæ of the back are 11 in number, the suture lying in the central one. The half of this central costæ and the exterior margin form an elevated border round either elytron. The first and second on either side run towards the apex but come to a stop (very abrupt in most, but less so in some, specimens) before reaching it ; the third, after having been interrupted near its base by the subhumeral cavity, runs on, but does not reach as far as the former ; the 4th does not leave the region of the shoulder ; the last on either side is very prominent at the base but soon forms an abrupt declivity and runs on as a low ridge to below the middle. The back of all these costæ is obtusely dentated. The interstices are marked with large, shallow, transverse impressions. The head of the insect is rather large and even. The mandibles are furnished with an obtuse subapical tooth, the two lower thirds are ciliated. The maxillæ have the apex of the outer lobe externally

enlarged, rounded off and furnished with 3 strong teeth replaced by cilia on the inside, the inner lobe is conic and similarly provided with teeth and cilia, but much thinner and finer. The maxillary palpi are robust, the last joint is inflated at the base. The antennal club is hairy, dark (whilst the remaining joints are yellowish), conic and somewhat securiform, the 6th joint being inserted on one side of the 7th. The legs are robust, the tibiæ slightly curved, obliquely truncated at the end, furnished with spines along the outside and with distant cilia along the inner.

27. *Hydrochus lacustris*. N.

H. elongatus, subdepressus, supra metallicus, iridescens, subtus piceus, pedibus, antennis, palpis elytrorumque margine magis minusve brunneis, mento cyaneo. Long. corp. m. 1 lin., f. multo major atque robustior.

Palpi. maxill. robusti art. ultimo elliptico leviter inflato. Mandibulæ apice bifidæ. Antennarum clava dense pilosa. Thorax oblonge quadratus basin versus angustatus basi medio productus, cum capite profunde punctatus. Elytra ad humeros oblique truncata, apicem versus sat fortiter angustata, profunde striato-punctata. Tibiæ extus spinulosæ.

Specimina nonnulla in lacu Colomb. legi.

The head is robust, broader than the thorax, the eyes large and prominent.

The femora, the last joint of the maxill. palpi, the mandibles and the tarsal joints are dark towards the apex. The last abdominal segment of the f. is furnished with a bifid hairy appendage.

28. *Hydrous rufiventris*. N.

H. ovatus, convexus supra oleagino-niger, subtus obscure ferrugineus, pedibus dilute piceis, labro æneo, reliquis oris partibus cum clypeo testaceis. Long. corp. g. lin.

Palpi maxill. articulis apicem versus abruptius incrassatis, art. 3<sup>o</sup> quarto sesqui longiore. Antennæ art. 7-8 fortiter perfoliatis, ultimo acuminato. Caput antice utrinque punctulorum serie subsemicirculari et ad oculorum marginem anteriorem impressum. Thorax punctulorum seriebus 4 lateralibus, 2 subapicalibus obliquis



abbreviatis signatus. Elytra subliliter striato punctata. Tarsi omnes unguibus basi fortiter unidentatis. Carina prosternalis cultriformis.

Specimen singulum f. nocte ad lumen cepi.

As far as my resources allow me to ascertain, a very anomalous species, having the perfoliated antennæ and toothed claws of a *Hydrophilus* and the cultriform prosternal carina and the elytra of a *Hydrous*. I have placed it in the latter g. on account of the sharp edge of the prosternal carina, in which the great distinguishing character of this g. seems to lie, the same being deeply grooved in *Hydrophilus*.

The insect at once attracts attention by the reddish colour of its abdomen. It is of a blackish olive colour on the back, having, however, the clypeus and the anterior margin of the labrum of a yellowish brown, the latter being otherwise of rather a metallic colour. The remaining parts of the mouth are more or less yellowish. Joints 1-6 of the antennæ are yellowish too, with the exception of the 2nd which is dark; joints 7-9 are blackish and pubescent. The legs are of a light pitch colour. The lower part of the head is impressed with 2 rather semicircular series of punctures, similar punctures occurring along the internal margin of the eyes. The thorax is marked with 6 series of them and on the elytra they are arranged in lines. The sternal carina is well developed, the prosternal part has a sharp edge, whilst the mesosternal one is obtuse on the back and the metasternal part depressed and slightly grooved.

29. *Hydrous inconspicuus*. N.

H. præcedente minus convexus, supra oleagino-niger, subtus rufo-piceus, ore testaceo. Long. corp.  $4\frac{1}{2}$  lin.

Palpi maxill. art. 2° et 4° subcylindricis, 3° apicem versus sensim incrassato, sequente tertia parte longiore. Antennæ art. 7-8 subglobosis, 9° magno, ovato. Caput, thorax et elytra ut in præcedente sculpta et signata.

In lacu Colomb. mens. Jun. non infrequenter cepi.

This is in every respect a normal species. The prosternal carina has a sharp edge, the claws are simple, the antennal club is com-

posed of rounded joints, the elytra are of the typical structure, etc. In the latter respect, as well as with regard to the various series of punctures upon head, thorax, and elytra it resembles the former; the punctures of the elytra are, however, less distinct. Joints 1-6 of the antennæ are yellowish, the club being dark and finely pubescent. The maxill. palpi have joints 2 and 4 subcylindric, but the intermediate one thickened towards the tip.

I have frequently in the month of June taken the pupæ of this species on the banks of the Colombo lake and hatched them at home. I found them about one inch under ground, and often as far as 12 feet from the edge of the water, but still in muddy places. The imago is very active, perhaps more so than any other species of the g.

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*General Remarks on certain Scydmanæi described below.*

In the first number of these papers I have described a winged species of *Ædichirus*, a g. supposed to be without organs of flight; and above I have given publicity to the more important discovery of wings in the single g. which forms the family of the *Georyssi*, also hitherto supposed to be apterous; I am now about to announce to some and confirm to others the existence of these organs in the family of the *Scydmanidæ*, a fact, although incomplete, of more importance than either of the former, considering the extent of the family and the difference of opinion which appears to exist on the subject amongst the most eminent entomological authorities. It is this importance which induces me to enter more fully on the subject.

I am not acquainted with the famous monograph of the family of the *Scydmanidæ* by Dr. Schaum; however, from the manner in which it is quoted by Lacordaire in his g. d. Col. I should infer that these two celebrated authors agree in all the vital points. In Lacordaire's diagnosis of the family these insects are described as having (with the exception of the American g. *Brathinus*, of which Lacordaire is not quite sure that it belongs to the family) the elytra soldered together and being destitute of wings. Now, it is scarcely credible that on a point so easily ascertained as this any difference

of opinion should exist, still Westwood in his Modern Classification of Insects in describing the same family makes statements which imply the contrary. However, Lacordaire's description, being by 15 years more recent and in fact the latest, is from this reason alone entitled to be considered before all others, and looking upon it in this light, that is as the essence of all former observations, I shall for the present occupy myself with it alone. According to this description, as mentioned above, the insects which it regards *have the elytra soldered together and are destitute of wings*. This being the case, I was startled to find that out of the 13 species described below, 9 or 10 which I examined in this respect, had neither the elytra soldered nor were they destitute of wings—*on the contrary the elytra were unconnected in the middle and the wings were nearly double the size of the whole insect and could not possibly be overlooked*. I would willingly suppose that the 100 species of this family contained in European collections, and principally derived from Europe and N. America, agreed with Lacordaire's description and that the Ceylon species were exceptions to the general rule, had not Westwood's observation alluded to above corroborated my own, thus rendering me suspicious of some unaccountable mistake or oversight somewhere or other. That this mistake can not consist in a slip of the pen or a misprint in the g. des Coléoptères quoted above, is clear from the obvious care which has in every respect been bestowed upon this work, and from the same remarks being repeated in different words. Where this mistake is, and upon what grounds it rests—it would, under my circumstances, be useless to attempt to unravel. However, it appears certain to me that some more detailed and positive remarks on the subject can not be superfluous, and must be new to some Entomologists. Placing the fullest confidence, as every one would do without hesitation, in the infallibility of the description of the Belgian author, it was not likely that I should have looked for wings at all in the Scydmanidæ (a family to which I have not until lately paid much attention) had I not been struck by seeing the elytra of my *S. alatus* open when handling it with a fine painter's brush in a drop of water, it being at the time quite out of the question that the opening could have been effected by pressure. On opening the elytra fully I had no difficulty in discovering the wings. Ren-



dered extremely curious by this discovery—diametrically opposed to the distinct statement of so great an authority as the one just alluded to—I now examined other species, and all with the same result, most of them opening the elytra without my assistance in the same manner as the *S. alatus*, and I have not the slightest doubt that when a sufficient number of specimens enable me to examine the rest it will still be with the same result. That these insects use their organs of flight may be gathered from the following: At a former period I lived in a house situated on a small eminence and overlooking extensive groves of Cocconut trees, Cinamon gardens, Paddy fields and patches of jungle. Here I collected large numbers of Pselaphidæ, especially *Euplectus*, in thin, scarcely visible spider webs with which the white walls of the house were covered in certain places—thus forming one large trap for anything small flying about. That these had been caught here when on the wing there could be no doubt, but I was much surprised to find with them (what is so common in more congenial localities, here also) a considerable number of Scydmaeni, especially my *S. advolans* and *pubescens*, as they were said by the most recent authority to be unable to fly, and the position they then found themselves in was one they could not well, or could not possibly, have got into otherwise than by flying. From some reason or other, I am ashamed to say, I did not follow up the matter at the time, but I am now certain on the subject, indeed to remove all doubt and to settle all disputes I have just been so fortunate as to take my *S. advolans* actually on the wing, flying in my garden in the evening at sunset.

Having gone so far, I will (in spite of some slight misgivings of being laughed at for telling an old story with so grave a face) add a few descriptive words about the organs in question: The wings of my Scydmaeni are ample, about double the size of the whole insect, oblong, having the margin beautifully ciliated and, with the exception of a few yellowish veins at the base, without any visible organs of this kind.

In spite of the difference in their shape, etc. I believe the species described below all to be genuine Scydmaeni as restricted at present. Being, however, unacquainted with the sexual distinctions of these insects (which indeed I believe not to have been satisfactorily



pointed out by any one, and to differ in different species) I should not be surprised if one or two of my species were eventually ascertained to have been separated upon these grounds alone. However, as I have been very reluctant to admit of new species, it is just as likely that individuals may hereafter be found united in one, which ought to be separated into two species. But I trust that neither may happen. The species were all collected by myself in the immediate neighbourhood of Colombo, I have, however, no doubt that they occur all over the S. W. of the Island, which is of a uniform physical character, and perhaps occupy a still larger portion of it. None of them are quite common, on the contrary of nearly half of them I possess only 1 or 2 specimens. My *S. femoralis* I found under the soft, rotting bark of an *Erythrina indica*, *S. Ceylanicus* and *ovatus* I found dead in spider-webs; *S. graminicola*, *glanduliferus* and *pyriformis*, I have hitherto exclusively taken in the sweeping net on the lawns of my garden about sunset; the other species I have met with indiscriminately in spider-webs, under rotting vegetable substances and in the grass.

After this preamble, which I trust may not be deemed quite superfluous, I now enter upon the description of my species, drawing attention previously to the three very natural and very distinct groups which they form, the characteristics of which will at once be perceptible from the headings given below. With regard to the first group (A. I. spec. 30-34) I may mention that the elongated legs, largely developed posterior trochanters and often distant posterior coxæ render the motions of the insects belonging to it staggering when walking, which together with their oblong, subdepressed body distinguishes them at a glance. I have subdivided them from the cultriform or grooved mesosternal carina. The second group (A. II. spec. 35-41) is equally well characterized as the former by the more robust, pyriform and subconvex body of the insects. *S. pselaphoides* in the former and *S. advolans* in the present group form connecting links between the two, especially *S. pselaphoides*, which in general appearance rather belongs to the second; upon closer examination, however, it is easily ascertained to be an anomalous member of the former. From the rounded or narrowed occiput I have divided the second group into two subdivisions giving

preference to the distinctions to be drawn from this part of the body to those to be derived from the thorax, which from the variety of shapes it assumes would naturally suggest itself for that purpose, but the gradations between the principal forms appear to me too many, too fine, and therefore too indistinct, to adopt them. As to the third group (B. spec. 42) the insect which alone forms it amongst those described below, is so different from any of the others that its peculiarities must strike any one at first sight.

*A. Species with a thick neck, abruptly formed and immersed in the thorax.*

*I. Fourth joint of the maxill. palpi not acuminate; head subquadrato-ovate; eyes middling or small, finely granulated, little or not at all prominent; antennæ subapproximate at the base; posterior trochanters elongated at the apex; thorax obovate; body elongate, subdepressed.*

*a.) Mesosternal carina slight, simple.*

30. *Scydmænus alatus. N.*

*S. dilute brunneus, pedibus antennisque dilutioribus, tarsis palpisque testaceis; pubescens; long. corp.  $\frac{2}{3}$  lin.*

*Antennæ art. 1<sup>o</sup> apice biacuminato, 3-4 subæqualibus, 5 præcedente majore, 6 longitudine inter 4 et 5, ovato, 7-8 subæqualibus, 9 majore, 7-9 apice angustatis, tubiformibus, 10-11 ovatis, clavam formantibus, vel art. 9 globoso, 9-11 clavam formantibus. Palpi maxill. art. ultimo minimo, apice truncato. Mandibulæ dente bifido munitæ, basi fortiter abrupteque dilatatæ. Thorax foveis basalibus nullis. Pedes elongati tarsis art. 2-3 subæqualibus.*

I include in this species individuals with a 2- and others with a 3-jointed antennal club. The latter are further distinguished by having a slight sinuosity in the rounded outline of the basal angles of the thorax, by having the posterior part of the metathorax and the base of the abdomen sensibly incrassated, and the head rather less quadratic than the former. However, the individuals thus distinguished being in all other respects exactly like those with the 2-jointed club, I cannot help looking upon all these distinctions as sexual ones and uniting the insects in the same species.

The head from the eyes to the neck is of a transverse sub-quadratic form merging into the oval by the angles being rounded off; the anterior part is narrowed. This is the typical sculpture of the skull in all the 5 species of this group. The eyes in the present species are middling. The antennæ are rather approximated at the base and inserted in the centre of the front under a ridge which runs across it from eye to eye. The first joint is biacuminated at the apex, the 5th is longer than the adjoining ones, joints 7-9 in the individuals with the 2-jointed and 7-8 in those with the 3-jointed club are of a peculiar construction being narrowed at the apex and fitting into each other like the tubes of a spy-glass. The club joints are ovate, flat at the base, the last is large and obtusely acuminate. I consider the principal distinguishing character to lie in the remarkable structure of joints 7-9 of the antennæ. The maxil. palpi have joint 2 rather strongly incrassated at the apex, joint 3 obovate, narrowed at the base, joint 4 very minute, truncated at the apex. The mandibles are furnished with a bifid tooth and are strongly and abruptly dilated at the base. The thorax is of an obovate or obcardato-ovate form being rather strongly rounded off before the middle and gradually narrowed below it; the usual basal impressions are wanting. The posterior margin has 2 slight sinuosities, the posterior angles are rounded off or obliquely truncated. Scutellum obsolete. Elytra furnished with a very short elevated ridge at the shoulder. Legs elongated; coxæ large, the 2 posterior ones rather distant from each other; 2 posterior trochanters much elongated, incrassated at the tip; apex of tibiæ subcylindric, but not narrowed, and hairy, especially in the 2nd pair; joints 2-3 of the tarsi of equal size, the first longer, the 4th a little shorter, 2 anterior tarsi slightly contracted, 2nd and 3rd pair more and more elongated. Penultimate segment of abdomen with a strong longitudinal groove on the back.

31. *Scydmænus femoralis*. N.

S. statura et magnitudine præcedentis; testaceus. Antennæ art. 3-4 subæqualibus, 5 præcedente longiore, 6-8 gradatim minoribus, subglobosis, 7-8 apice fortius oblique truncatis, 9-11 gradatim majoribus, subglobosis, clavam formantibus. Palpi maxill. art.



ultimo minimo semigloboso. Thorax magnus obovatus, basi rotundatus, 4 foveolatus. Elytra apice truncata, 2-sinuata. Pedes femoribus 2 posticis medio constrictis, tarsis art. 1-4 gradatim minoribus.

Of the general appearance of the former, but of a light yellowish colour, and well distinguished by the large thorax, truncated elytra, and abnormal construction of the 2 posterior femora. Antennæ with joints 7-8 rather strongly obliquely truncated at the apex, 9-11 forming a club, subglobose, flat at the base, the last acuminate and slightly cut away or even excavated on the inside at the apex. Last joint of maxill. palpi semiglobose, these otherwise the same as in the former. Thorax and elytra of *S. alatus*, the former however, larger, rounded at the posterior margin and with 4 basal impressions, the latter slightly truncated at the apex and with a slight sinuosity in the truncature on either side of the suture. Scutellum very small. Legs with the tibiæ slightly bent at the base, the apex as in the former; tarsi with joints 1-4 gradually decreasing in size, first pair contracted and furnished with brushes on the inside. The 2 posterior legs inserted rather distant from each other, the basal part of abnormal construction: the trochanters are much elongated and incrassated at the tip whilst the femora are at the place of the juncture rather abruptly narrowed, bent and slightly compressed; as they are at the same time thinner than the adjoining apex of the trochanter the constriction is very striking.

### 32. *Scydmænus Ceylanicus*. N.

*S. alati* colore, sed major et magis depressus; long. corp.  $\frac{3}{4}$  lin. Caput magnum, robustum, thoracis latitudine. Antennæ basi non approximatae, art. 3-4 et 5-7 inter se subæqualibus, arcum formantibus, 8-10 gradatim majoribus, subglobosis, depressis, apice oblique truncatis, 11° magno, conico, 8-11 longius pilosis, clavam formantibus. Palpi maxill. art. 4° minimo, semigloboso. Thorax ovatus, foveis basalibus nullis. Elytra apice singulatim rotundata. Pedes validi tarsis art. 1-4 subæqualibus, 2 anterioribus art. 1° *subtus acumine sat forti producto*.

An anomalous species, especially with regard to the antennæ which are much less approximated at the base than those of the rest of the species belonging to this group, and with regard to the



2 posterior coxæ, which, on the contrary, are more approximated than in any of the species just referred to. The insect is of the light brown colour of the two former, but larger and more depressed. The head is strikingly large and heavy, of the width of the thorax; in its hind part, which is strongly transverse, the oval form prevails over that of the square. Eyes small. Antennæ inserted under two strong protuberances rather than under a ridge; their club 4-jointed, joints 3-7 forming an inwards bent section of a circle, joints 8-10 strongly compressed, obliquely truncated (subperfoliated) 11 large, conic. The 3rd joint of the maxill. palpi is of an oblongo-ovate shape, the external basal angle is prolonged into a small peduncle inserted in the apex of the 2nd joint, the 4th joint, about the semiglobose shape of which I am not quite satisfied, appears to be obliquely inserted in the tip of the preceding. Thorax oval, of a similar shape to that of the former, anterior margin slightly emarginated. Scutellum obsolete. Elytra with the traces of a humeral costa, separately rounded off at the apex. Legs strong, 2 posterior coxæ not more distant from each other than the 4 anterior ones; tibiæ elongated, bent at the base and apex, at the latter place slightly narrowed, subcylindric and hairy; tarsi with joints 1-4 subequal, in the first pair strongly contracted, joint 1 of this pair produced in a spine on the inside.

b.) *Mesosternal carina middling, grooved.*

33. *Scydmaenus intermedius*. N.

*S. alati* statura sed major et robustior, colore obscuriore; long. corp.  $\frac{3}{4}$  lin.

Antennæ art. 1° apice biacuminato, 2 et 5, 3 et 4, 7 et 8 inter se subæqualibus, 6 quarto paulo minore, obovato, 7-8 subglobosis apice oblique truncatis, 9-11 gradatim majoribus, obovatis, clavam formantibus, 11 acuminato. Palpi maxill. art. 3° obovato, 4° minimo semigloboso. Thorax subrotundatus, basi 4-foveolatus. Elytra apice singulatim rotundata. Pedes tarsi art. 1-4 gradatim minoribus vel 2-3 subæqualibus, 4 anterioribus intus pilosis. Mesosternum sat fortiter carinatum, *carina dorso deplanata, fossulata, apice acuminata.*

This species stands in the middle between *S. alatus* and *pselaphoides*. To the former it is allied by its general appearance rather than by anything else, differing from it very much in the structure of the antennæ and the mesosternal carina. To the latter, on the contrary, it is allied by similarity in the structure of the said carina, differing, however, from it in general appearance. The colour is that of *S. alatus* but a shade or two darker, the insect being at the same time larger and altogether more robust. The eyes are small. Antennal club 3-jointed, the joints forming it gradually increasing in size, obovate, flat at the base, the last acuminate. Scutellum obsolete. Elytra with 2 slight basal impressions, the traces of a humeral costa, separately rounded off at the apex. Legs elongated as usual; 2 posterior coxæ distant, tibiæ straight, subcylindric but not narrowed at the apex, the 4 anterior ones hairy; tarsi with joints 1-4 almost imperceptibly decreasing in size or perhaps 2-3 equal, the anterior ones slightly contracted, these and the intermediate ones hairy on the inside. Mesosternal carina middling, flat on the back, with a shallow, but very distinct, longitudinal groove or excavation, anterior part projecting, acuminate.

#### 34. *Scydmaenus pselaphoides*. N.

*S.* subpyriformi-ovatus, subconvexus, magis minusve brunneus, pedibus annisque subtestaceis, femoribus apice nigrescentibus, tarsis palpisque testaceis; flavo-pubescent; long. corp. 1-1 $\frac{1}{4}$  lin.

Antennæ art. 1<sup>o</sup> mediocri, apice biacuminato, 2-4 sensim minoribus, 5 et 2, 6 et 3, 7 et 8, 9 et 10 inter se subæqualibus, 9-11 clavam formantibus, 6-11 basi rotunde truncatis, 6-8 apice oblique truncatis, 7-8 compressis, 9-11 obovatis. Mandibulæ dente bifido munitæ, basi dilatatæ et ciliatæ. Palpi maxill. art. 3<sup>o</sup> invertè conico, 4<sup>o</sup> minimo apice truncato. Thorax obovatus, latitudine quarta parte longior, basi 4 foveolatus. Elytra apice singulatim rotundata. Pedes validi, tarsi art. 1-4 gradatim minoribus, anterioribus dilatatis, his cum intermediis subtus fortius pilosis. Mesosternum præcedentis.

An anomalous species with regard to its general appearance, which differs considerably from that of the rest of the group, and makes it, as I have remarked above, the connecting link between this and

the following group. This is the largest species I have hitherto met with. The system of coloration is the usual one : more or less deep brown, legs and antennæ lighter, tarsi and palpi quite so. Eyes middling. Antennæ with a 3-jointed club, the joints subglobose, flat on the base, the last large, conic, joints 6-8 are slightly truncated at the apex, 7 and 8 being at the same time strongly compressed have a sub-perfoliated appearance. The mandibles are furnished with a bifid tooth. The 3rd joint of the maxill. palpi is of the shape of an inverted cone, the 4th minute and truncated at the apex. The thorax is of an obovate form, about  $\frac{1}{4}$  longer than broad, rounded off before and gradually narrowed below the middle, subquadratic at the base impressed with 4 foveæ or pits, the posterior angles rounded off. Scutellum minute. Elytra with 2 short humeral costæ, separately rounded off at the apex. Legs stout ; 2 posterior coxæ distant ; tibiæ slightly bent at the base, subcylindric at the apex, the 4 anterior ones hairy ; tarsi with joints 1-4 gradually decreasing in size, the anterior ones dilated, the joints transversely triangular, the intermediate pair hairy on the inside. Mesosternum of the preceding. Metasternum with a slight longitudinal depression down the middle. Penultimate abdominal segment grooved on the back as in *S. alatus*. In the enlargement of the anterior tarsi lies undoubtedly as in other beetles a sexual distinction, as it is not equally strong in all individuals. I may mention here that upon some of the individuals I found ticks (some g. allied to *Ixodes* but not a *Gamasus*) fastened, one of them having made a wound such as, supposing it to be inflicted at a corresponding place and on a proportionate scale, few animals of a higher order, I think, would have survived—still this little beetle appeared perfectly at its ease. The parasite alluded to had fastened itself right in the centre of the forehead and the wound it had inflicted in this, one should imagine most dangerous place, was a deep hole or pit with a callous border. The latter led me to infer that the injury was an old one, and the tick being at the time fastened in it (and this so firmly that I had some difficulty in detaching it) I felt sure it had been in this position for months. The injury was observable under a slight magnifier, and to compare it to one inflicted by a rifle-ball would I think be greatly underrating its importance.



II. *Fourth joint of the maxill. palpi acuminate; mesosternal carina strongly developed; eyes large, prominent, coarsely granulated; antennæ distant at the base; 2 posterior trochanters simple; thorax variable; body robust, pyriform; subconvex.*

a) *Occiput rounded.*

35. *Scydmaenus advolans. N.*

S. long. corp.  $\frac{3}{4}$  lin. Antennæ art. 3 et 4, 5 et 6, inter se subæqualibus, obovatis, 7 majore, subgloboso, 8-10 subglobosis, basi rotunde—, apice oblique—, truncatis, cum 11° conico clavam formantibus. Palpi maxill. art. 3 elongato, inverte conico, 4° mediocri. Mandibulæ tenues, medio acuminate 1-dentatæ, basi abrupte dilatatæ. Thorax ovato-rotundatus, apice fortius angustatus, basi leviter 2-sinuatus, 4-foveolatus. Elytra apice singulatim rotundata. Tarsi art. 2-3 subæqualibus.

The insect is of a brown colour, the antennæ lighter, the legs still more, and the tarsi and palpi quite so; the femora are dark towards the apex; the head, thorax and suture are occasionally of chestnut colour; it is as usual pubescent. The sculpture of the head in this and the following species is not, as in the preceding, based upon the oblong square or the oval, but rather upon the form of a ball, which in a more or less compressed state is always perceptible; in some instances it is narrowed on one side. In the present species the head is heavy and subglobose. The eyes are large, prominent and coarsely granulated. The antennæ are inserted distant from each other under 2 protuberances of the anterior part of the forehead. The club is 4-jointed, the joints composing it being flat at the base, and, with the exception of the last, obliquely cut away at the apex, the last itself being conic. The maxill. palpi have joint 3 rather elongated and of the form of an inverted cone, joint 4 middling, acuminate. The thorax is of a rounded oval shape and rather strongly narrowed towards the apex. The scutellum is obsolete. The elytra have the usual rudimentary costæ at the shoulders and are separately rounded off at the apex. The legs are middling; 2 posterior coxæ inserted close together; trochanters all simple; tibiæ slightly bent at the base, narrowed and subcylindric at the tip, the 4 anterior ones hairy; tarsi with joints 2-3 subequal, the first a



little longer and the 4th shorter, the 2 anterior ones slightly contracted. I include in this species some individuals which slightly differ from the foregoing description, being more robust, covered more densely and with longer hair, especially on the occiput and thorax, with the latter rather obconico-ovate and the costæ of the elytra more distinct, and moreover occasionally of a chestnut colour.

36. *Scydmaenus pubescens*. N.

S. præcedente gracilior; long. corp.  $\frac{2}{3}$  lin. Antennæ art. 3 et 4 5 et 6 inter se subæqualibus, subcylindricis, 7° secundo paulo minore, *fortiter cylindrico*, 8-10 subglobosis, cum 11° conico clavam formantibus. Palpi maxill. art. 3 inverte conico, 4° minuto. Mandibulæ tenues, medio obtuse obsoleteque unidentatæ, basi abrupte dilatatæ. Thorax conicus, latitudine haud longior, basi 4-foveolatus. Elytra et pedes præcedentis, tibiis tamen apice leviter arcuatis.

Less robust than the former and further distinguished from it by the 7th antennal joint (the one preceding the club), which is of a strongly cylindric shape, by the minuteness of the last joint of the maxillary palpi, the obtuse and nearly obsolete tooth of the mandibles, the short conical form of the thorax, and the tibiæ which are slightly bent at the apex.

37. *Scydmaenus pygmæus*. N.

S. statura et colore præcedentis sed longius pubescens et sesqui minor; long. corp.  $\frac{1}{3}$  lin. Antennæ art. 3 et 4, 5 et 6 inter se subæqualibus, 7° majore, ovato, 8-10 subglobosis, fortius compressis, cum 11° clavam formantibus, hoc magno, obconico, apice obtuso. Palpi maxill. art. 2° tenuiore, 3° inverte conico, 4° minuto. Mandibulæ obsolete unidentatæ. Thorax conicus latitudine parum longior, elytris fortiter applicatus, basi 2-sinuatus et 4-foveolatus. Pedes et elytra præcedentis, his tamen amplioribus.

Strongly allied to the 2 preceding species, but very much smaller, more compact and covered with longer hair—thus of rather a different appearance regardless of its size. From *S. pubescens* this species would principally differ in the shape of the 7th antennal joint, also in that of the 3 first club joints which are much more

compressed and more hairy in *S. pygmæus*. The thorax of the latter is more firmly applied to the base of the elytra, the latter have a fuller, more robust appearance about them, the palpi are more slender and the tooth of the mandibles is pointed. From *S. advolans* it would principally differ, besides in the generalities mentioned above, in the shape of the thorax and in some of the points in which it differs from *S. pubescens*.

b) *Occiput narrowed.*

38. *Scydmaenus glanduliferus*. N.

*S. robustus*; long. corp.  $\frac{3}{4}$  lin. Antennæ art. 3-7 sensim majoribus, 8-10 globosis, fortiter compressis, cum 11° *glanduliformi* clavam formantibus, longe ciliatis. Palpi max. art. 2° tenuiore, 3° invertite conico, 4° mediocri. Thorax conicus latitudine basali haud longior, elytris fortiter applicatus, basi 2-impressus, in impressionibus 2-foveolatus. Tarsi art. 2-3 subæqualibus.

Of the size of *S. advolans* and the plump shape and colour of *S. pygmæus*, the latter being rather lighter than that of *S. advolans*; it has the longer hairy vesture of the former (especially on the occiput and thorax). The occiput is slightly narrowed behind. The antennal club is composed of 4 joints, the 3 first of which are strongly compressed, the 4th being plump and of the shape of an acorn with its cup; all are strongly ciliated. The thorax is conic, firmly applied to the base of the elytra as in the preceding species, depressed and with 2 pits, at the base posterior margin with 2 sinuities. The shoulder-ridges of the elytra are short but rather strongly marked. The tibiæ are narrowed, subcylindric and hairy at the apex. Joints 2-3 of the tarsi are subequal, the anterior pair more, the intermediate less contracted.

39. *Scydmaenus graminicola*. N.

*S. gracilior*; long. corp.  $\frac{3}{4}$  lin. Antennæ art. 3 et 4, 6 et 7, 9 et 10 inter se subæqualibus 5° adjacentibus paulo longiore, 3-7 subcylindricis, 8 subgloboso, 9-10 fortiter globosis cum 11° clavam formantibus. Palpi maxill. art. 3° invertite conico, 4° mediocri. Mandibulæ apice arcuatæ, medio acuminate 1-dentatæ, basin versus *sensim dilatatæ*. Thorax obconicus basi depressus, 2-sinuatus et 2 fo-

veolatus, rectangulatus. Pedes *tibiis elongatis* basi apiceque arcuatis.

Of the usual brown colour, legs and antennæ lighter, tarsi and palpi quite so, femora nigrescent at the apex, hairs of occiput and thorax rather long. The former slightly narrowed behind, the head thus of a somewhat rhomboid form. Antennal club composed of 3 joints, the 2 first of which are strongly globose, the last being acuminate and slightly cut away on one side at the apex. The mandibles are furnished with an acuminate tooth at the middle, bent at the apex, and, what is rather uncommon in this g., gradually enlarged towards the base. The thorax is obconic, rather longer than broad. The elytra are somewhat more stretched than usual in this group, the rudimentary humeral costæ are rather prominent, they are separately rounded off at the apex. Tibiæ more or less elongated, slightly bent at the base and apex, at the latter place subcylindric and hairy. Tarsi with joints 2-3 subequal, first pair slightly contracted. A sexual distinction appears to be expressed in the length of the tibiæ which are less elongated in certain individuals which are at the same time less robust than the others. The insect is easily distinguished by its general appearance.

#### 40. *Scydmaenus pyriformis*. N.

S. supra castaneus, subtus brunneo-testaceus, pedibus antennisque dilutioribus, tarsis palpisque flavo-testaceis, antennarum clava nigricante; long. corp.  $\frac{1}{2}$  lin.

Antennæ art. 3-8 fere subæqualibus excepto 5° parum longiore, 8° subgloboso, minore, 9-10 subglobosis majoribus cum 11° acuminato clavam formantibus. Palpi maxill. art. 3° inverte conico, 4 minuto. Thorax obovatus, basi 2 foveolatus. Pedes coxis 2 posticis, distantioribus; tibiis 2 anterioribus basi apiceque leviter arcuatis, reliquis subsimplicibus; tarsis art. 2-3 subæqualibus.

A pretty little species, at once distinguished by its colour which is chestnut, darker at the base and suture of the elytra, and light, more or less brownish or yellowish, below; the antennæ being of the latter colour with a nigrescent club. The occiput is slightly narrowed, the head altogether plump, heavy and transverse. The antennal club is composed of 3 subglobose joints the last of which is acu-

minated and slightly cut away on one side as in some of the preceding species. The thorax is obovate, broadest below the middle, and gradually narrowed towards the apex. The elytra have the usual 2 shoulder-ridges and are rather strongly dehiscent at the apex. The 2 posterior coxæ are rather distant at the base; the tibiæ are slightly angustated and subcylindric at the apex, the 4 anterior ones hairy, the first pair moreover slightly bent at the base and apex, but the rest nearly straight.

41. *Scydmaenus angusticeps*. *N.*

*S. castaneus*, antennis pedibusque dilutioribus, tarsis palpisque testaceis; long. corp. 1 lin.

Caput magnum subtrigonum, occipite *fortiter angustato*, hoc et thorace longe pilosis. Antennæ art. 3 et 4, 5 et 6 inter se subæqualibus, 7-11 gradatim majoribus, vel 9-10 subæqualibus, subglobosis, 8-10 leviter depressis, cum 11° clavam formantibus. Palpi maxill. art. 2° tenuiore, 3° inverte conico, 4° mediocri, conico-acuminato. Thorax obconicus, basi subquadratus, 2-sinuatus et 4-foveolatus. Elytra costis 2 fortioribus abbreviatis. Tibiæ subrectæ.

A handsome species of a chestnut colour more or less deep with lighter legs and antennæ. The head is large, heavy, and from the eyes to the neck strongly triangular; the occiput and thorax are covered with long hair, which adds much to the peculiar appearance of the insect. The antennæ are thick and robust, the club 4-jointed. The thorax is subquadratic at the base up to the middle and conic towards the apex. The punctures or pits at the base are 4 in number. The scutellum is small. The humeral costæ are more strongly developed than in any of the other species and traceable to the middle of the elytra. The tibiæ are nearly straight, subcylindric at the apex; the 4 anterior ones hairy. The tarsi have joints 2-4 nearly subequal.

*B. Species without a neck.*

42. *Scydmaenus ovatus* *N.*

*S. ovatus*, convexus, brunneus; long. corp.  $\frac{1}{2}$  lin.

Caput subquadrato-ovatum. Antennæ art. 3-11 sensim incrassatis, 9-11 subglobosis, depressis, cum 11 magno, conico clavam



formantibus. Palpi maxill. art. 4 minuto acuminato. Thorax *amplus semiorbicularis*, margine posteriore medio producto, basi 2-foveolatus. Tarsis art 1-4 subæqualibus.

The colour of this insect is as usual shaded off from brown to light yellow; however, in other respects it differs materially from all the preceding species. The body is regularly oval, thorax and elytra convex, pubescent. The head is subquadratic—ovate; the eyes rather small, but prominent; the neck is altogether wanting. The antennæ are at the base as distant from each other as they can be, being inserted below the eyes; the club is 3-jointed; the joints increase gradually in size from the 3rd to the 11th. The maxill. palpi have the 2nd joint slender, the 3rd rather pear-shaped, the 4th minute and acuminated. The thorax is very ample, semiorbicular, of the shape and nearly the size of the apical half of the elytra; the basal angles are acuminated and slightly envelop the shoulders; the posterior margin is prolonged in the middle, towards the scutellum; the foveæ or basal impressions are 2 and rather distant from each other. Scutellum obsolete. Elytra with 2 depressions at the base. Tibiæ straight; tarsi with joints 1-4 subequal or very nearly so. Mesosternal carina middling.

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*Report on the Proceedings of the Magnetic Survey, from January to May 1856, by HERMANN SCHLAGINTWEIT.*

ROUTES.—After having completed the observations at Gowhatty, detailed in my last Report\* I left Gowhatty, December 21st, and proceeded up the Brahmaputra to Mungeldie, and from thence to Oodulgoorie on the Frontier of Assam and Bhootan.

I found occasion to proceed from this place into the country of the Kampo-Bhootans, who occupy the Himalayas East of Bhootan Proper; while my Assistant, Mr. Adams, and the Draftsman, Abdool, who accompanied me as far as Oodulgoorie, went to the coal mines and salt wells in the Baree Dihing.

\* See Journal No. 1, 1856, p. 30.

I made arrangements, immediately after my arrival at Oodulgoorie, with a former Rajah of Towang-Chang-To, who was found willing to be my guide as far as Nurigoon, which is situated at about one-third of the breadth of the Himalayas.

I staid four days at Nurigoon, and besides taking magnetic observations, (the instruments had been, till used, carefully concealed in cotton bags,) I succeeded in making an excursion to the Zinghyla (Deer Mountains) in order to survey the different valleys and make some drawings.

Here too I got some very valuable information (not from the inhabitants, but from traders coming down from Thibet) about the routes to Lowany, only 4 marches distant, and to Lhasa.

A very intelligent Bhootea from Tussisoodun even constructed a map, with a vertical Section in the Chinese style, of the route from Nurigoon\* to Lhasa, which agreed very well with the verbal information I received from the Thibetans.

Nurigoon is situated on a rock on the left side of the Riju at a height of from 3,200 to 3,500 feet, and offers many interesting features for comparison with the Western Himalayas.

The valleys here rise much more *gradually* than in the Western parts of the Himalayas; at the same time the height of the mountains is less and the inclinations less steep. The vegetation has the luxuriant character peculiar to the Eastern Himalayas, though the quantity of rain is much less than in the lower ranges of the Naga, Khosia and Garrow Hills, on the left side of the valley of the Brahmaputra.

Yâks come down from Thibet as far as Nurigoon in the cold season and chiefly towards the end of it, when the trade with the plains is greatest; and wild elephants are very frequent in the valley of the Dhunsiri and the Riju, and are occasionally met with even a little above Nurigoon. Such coincidences of lower and upper limits of animals, so different in reference to their zones of altitude, may perhaps be not without interest in explaining the variety of fossil remains in places which were formerly under similar local and climatological conditions.

\* This Map is included in the drawings, portfolio the 6th, sent from Calcutta to the Hon'ble the Court of Directors.

I left Nurigoon January 13th and went to Tezpore, and from thence to Debrooghur in Upper Assam, where, besides, my own observations, I obtained much valuable information, particularly from Colonel Hannay, about geological subjects.

From Debrooghur I descended the Brahmaputra and went by Goalpara, Serajgunge, Koolna, and through the Sunderbunds to Calcutta.

After a stay of twenty-nine days I proceeded by Cawnpore, Agra and Umballa to Simla, visiting Lucknow in Oude and Meerut for magnetic observations.

I arrived at Simla on the 24th. From hence Ladak, and the ranges of this part of the Himalaya and the Kuenlun, will be examined.

Two of the four Sikim men I had with me in Sikkim and Assam, the Lepcha Chezy and the Bhootea Dublong, are to make some observations during this summer in Sikkim, furnished with some thermometers, a boiling thermometer, and a prismatic compass.

Mr. Montairo, attached to my Establishment for collections, left Darjiling August 23rd, and went to Calcutta, where he received, and packed for transmission to Europe, the collections sent down to him from the Khosia Hills and Assam. He arrived at Simla May 20th. He is going *via* Kangra to Kashmere.

#### MAGNETIC OBSERVATIONS.

Magnetic observations have been made at the following Stations:—

##### A—Assam and Delta of the Ganges.

1. *Oodulgoorie*, on the Bhootan Frontier—December 30th and 31st, 1855, January 1st, 2nd, 3rd and 4th, 1856. Declination, horizontal intensity, vertical intensity, and a set of observations for ascertaining the daily variations, longitude and latitude.

2. *Nurigoon*, in Bhootan—January 9th, 10th and 12th. Declination, horizontal and vertical intensity, longitude and latitude.

3. *Tezpore*, on the right shore of the Brahmaputra—January 24th, 25th and 28th. Declination, horizontal and vertical force, longitude and latitude.

4. *Debrooghur*, Upper Assam—February 5th and 6th. Declination, horizontal and vertical intensity, longitude and latitude.

*Gowhatty*—see preceding Report.

5. *Serajgunge*, on the right shore of the Kenur River—February 17th. Vertical intensity.

6. *Dacca*—February 21st. Vertical intensity.

7. *Koolna*, on the right shore of the Bhogrup—February 24th. Declination, vertical force, longitude and latitude.

8. *Calcutta*, Botanical Garden, March 23rd and 24th. Declination, horizontal and vertical intensity, longitude and latitude.

#### B—*Plains of the Ganges in Hindoostan.*

9. *Benares*—April 3rd and 4th. Declination, horizontal and vertical intensity, longitude and latitude.

10. *Lucknow*, Oude—April 8th and 9th. Declination, horizontal and vertical intensity, longitude and latitude.

11. *Agra*—April 15th. Declination.

12. *Meerut*—April 18th. Declination.

The magnetic elements were therefore determined from between latitude  $22^{\circ}$  to  $27^{\circ} 5' N.$  in the valley of the Brahmaputra, and to  $29^{\circ}$  in the plains of the Ganges including a difference in longitude of  $16^{\circ} 5'$  from  $95^{\circ}$  to  $78^{\circ} 5'$  East of Greenwich.

One of the general results was, that the magnetic force, particularly the dip, has been found much greater than is indicated by the general formulæ.

#### *The Dip.*

A.—In the valley of the Brahmaputra and delta of the Ganges, the dip was found to be—

|                       |    |    |    |                        |
|-----------------------|----|----|----|------------------------|
| At Debrooghur,        | .. | .. | .. | $38^{\circ} 29' 17$    |
| „ Tezpore,            | .. | .. | .. | $37 \quad 14 \quad 58$ |
| „ Oodulgoorie,        | .. | .. | .. | $36 \quad 27 \quad 52$ |
| „ Nurigoon (Bhootan,) | .. | .. | .. | $37 \quad 11 \quad 69$ |
| „ Gowhatty,           | .. | .. | .. | $35 \quad 18 \quad 73$ |
| „ Serajgunge, ..      | .. | .. | .. | $32 \quad 3 \quad 15$  |
| „ Dacca,              | .. | .. | .. | $31 \quad 0 \quad 80$  |
| „ Koolna,             | .. | .. | .. | $29 \quad 18 \quad 49$ |
| „ Calcutta,           | .. | .. | .. | $28 \quad 6 \quad 4$   |

B.—In the plains of Hindoostan it was—

|             |    |    |    |                        |
|-------------|----|----|----|------------------------|
| At Benares, | .. | .. | .. | $32 \quad 40 \quad 9$  |
| „ Lucknow,  | .. | .. | .. | $35 \quad 18 \quad 20$ |



A similar result has been found by my brothers for the parts of corresponding latitude in the North-West Provinces and in Central India.

The Southern part of India seems to agree better with the results of calculation.

### *The Declination.*

*The declination* was not found to alter so irregularly in any of the places examined, as we formerly found to be the case at Cherrapunji, though the granite rocks in the valley of the Brahmaputra on both sides of the river are identical with the rocks of the Khosia and the Garrow Hills along the left edge of the Brahmaputra valley, and the geological situation of the Himalayas along the right side of the valley is very different. Some of these rocks in the valley contain, as well as in the Northern parts of the Khosia Hills, a very great amount of magnetic iron (in the rocks near Doobree, Colonel Hannay recently has found it particularly predominant); but the action on the needle is confined to the place itself, and becomes at a very small distance untraceable.

*The declination* in the territory examined was *East*, being greatest at Koolna and decreasing East and West of it. In Assam, as well as at Meerut, a small increase is caused by the difference in latitude. In Nurigoon, as in the Himalayas in general, the declination is decidedly greater than the difference of latitude would lead us to expect.

*A.*—In the valley of the Brahmaputra and Delta of the Ganges, the *declination* was found to be—

|                       |    |    |    |          |    |
|-----------------------|----|----|----|----------|----|
| At Debrooghur,        | .. | .. | .. | N. 2° 8' | E. |
| „ Tezpore,            | .. | .. | .. | N. 1 59  | E. |
| „ Oodulgoorie,        | .. | .. | .. | N. 2 5   | E. |
| „ Nurigoon (Bhootan,) | .. | .. | .. | N. 4 5   | E. |
| „ Gowhatty,           | .. | .. | .  | N. 1 41  | E. |
| „ Koolna,             | .. | .. | .. | N. 2 55  | E. |
| „ Calcutta,           | .  | .. | .. | N. 2 24  | E. |

*B.*—In the plains of Hindoostan—

|             |    |    |    |         |    |
|-------------|----|----|----|---------|----|
| At Benares, | .. | .. | .. | N. 1 27 | E. |
| „ Lucknow,  | .. | .. | .. | N. 1 12 | E. |
| „ Agra,     | .. | .. | .. | N. 1 14 | E. |
| „ Meerut,   | .. | .. | .. | N. 1 28 | E. |

## METEOROLOGY.

In Assam, observations were made on the variations of the temperature of the Brahmaputra, from Debrooghur to its ramifications in the Delta, a subject of particular interest. Also, besides the regular observations on the temperature, moisture, and pressure of the air, I made several experiments on the thermic influence of surfaces covered with grass and tree jungle; and Dr. Simmons, at Gowhatty, kindly assisted me during my absence, by making observations on the ozone contained in the air, with papers identical with those used by myself.

These observations are being continued for the next year.

The following Table contains\* the temperature found in the Brahmaputra, in its ramifications, and in the Delta, from Debrooghur to Calcutta. The daily variations, even in Upper Assam, scarcely exceeded 0.5 degrees C. = 0.9 degrees F., but occasionally differences of 2 to 3 degrees F. are found even in the very current, caused in some cases by differences of depth, in others by lateral rivers discharging themselves into the Brahmaputra.

I choose for the Table the temperature of the rivers at 11 A. M., this hour representing very nearly the mean of the twenty-four hours for the water; for the temperature of the air for the same reason the temperature at 9 A. M. is selected. Errors of the zero points of the Thermometers Nos. 29, 70 and 88 are corrected.†

\* A second series during the hot season is now being made by my Assistant, Mr. Adams, on his way down from Sudiya.

† For the Hooghly, at Calcutta, I was furnished with observations on the monthly variations of the temperature at high and low water by the kind assistance of Mr. Schiller. The observations are now being continued by Dr. Thomson.

*Temperature of Rivers.*

| Names of Rivers. | Names of the nearest Places.            | February 1856. | Temperature of the water at 11 A. M. | Temperature of the air at 9 A. M. |
|------------------|-----------------------------------------|----------------|--------------------------------------|-----------------------------------|
|                  |                                         |                | ° Centigrade.                        | ° Centigrade.                     |
| Brahmaputra,...  | At Debrooghur,...                       | 6              | 15.6                                 | 12.4                              |
| "                | ... Above Dikhoo Mookh,...              | 8              | 15.7                                 | 12.6                              |
| "                | ... Above Dhunsiri Mookh,               | 9              | 16.2                                 | 13.7                              |
| "                | ... Tezpore,...                         | 10             | 17.1                                 | 16.2                              |
| "                | ... At the mouth of the Kulluny, ...    | 11             | 17.2                                 | 15.8                              |
| "                | ... Gowhatty, ...                       | 13             | 17.5                                 | 14.6                              |
| "                | ... Above Doobree,...                   | 14             | 17.8                                 | 17.0                              |
| "                | ... Below Doobree,...                   | 15             | 18.4                                 | 19.3                              |
| "                | ... Bugwa, ...                          | 16             | 19.4                                 | 18.6                              |
| "                | ... Hajeeppore, ...                     | 17             | 19.3                                 | 18.7                              |
| Zuboona, ...     | ... Serajunge, ...                      | 18             | 19.6                                 | 20.7                              |
| "                | ... Amerbad, ...                        | 19             | 19.7                                 | 22.1                              |
| Kertinana, ...   | ... Sempore,...                         | 20             | 21.2                                 | 21.7                              |
| Bargunga, ...    | ... Kalaghaut, ...                      | 21             | 22.8                                 | 22.8                              |
| Damudar, ...     | ... Burrissole, ...                     | 22             | 21.6                                 | 21.8                              |
| Charcollee, ...  | ... Bidaboorea, ...                     | 23             | 21.6                                 | 21.4                              |
| Passur, ...      | ... Koolna, ...                         | 24             | 22.0                                 | 20.5                              |
| Seprah, ...      | ... Near Grant No. 214 Sunderbunds, ... | 25             | 23.5                                 | 23.4                              |
| Terra Banka, ... | ... Near Grant No. 155 Sunderbunds, ... | 26             | 23.8                                 | 25.5                              |
| Moree Gunga,...  | ... East of Saugor Island,...           | 27             | 24.6                                 | 26.1                              |

The variation of the temperature of the air is  $26^{\circ} 1 - 12^{\circ} 4 = 13^{\circ} 7$ , C., of the water  $24^{\circ} 6 - 15^{\circ} 6 = 9^{\circ}$  C.

In the Dhunsiri and in the Riju, the difference between the temperature of the Dhunsiri near Orang in the valley of Assam and of the Riju, a lateral affluent of the Dhunsiri at Nurigoon, was

|                     |       |
|---------------------|-------|
| Dhunsiri, . . . . . | 18° 1 |
| Riju, . . . . .     | 9 0   |

---

Diff. . . . . 9 1 C.

During my journey from Calcutta to Umballa, I also several times, tried some experiments to measure the heating power of the sun's rays under various conditions.

I used for a complete observation, the following thermometers :—

1. } Dry and wet bulb for temperature and moisture of the air.
2. }

3. A thermometer exposed to the sun with white bulb. It had no brass scale, and a very thin capillary tube for the mercury, surrounded by a larger glass tube, the ordinary form of thermometers on the Continent. The advantage of this is that the instrument indicates nearly without error the temperature of the mercury in the bulb unaffected by the disturbing influence of appendices. But even in this shape, a thermometer offers no absolute measure for insolation, the whiteness of the glass forming the bulb, its colour and transparency modifying very appreciably the apparent action of the sun on different instruments.\*

4. A thermometer of a similar construction, with blackened bulb.

5. A Kew standard thermometer, with thick glass tube, the divisions being in the glass stem. It had its bulb blackened, and also half of the mantle of the cylinder behind the divisions. This, as well as the following, was placed on a large surface of black wood, which getting heated all round, very nearly as much as the thermometer itself, prevents an irregular loss of heat towards objects of different temperature in its vicinity; the presence of grass or gravel, for instance, would otherwise affect the reading of the thermometer. It may be considered as a good proof of the comparability of the thermometers in such an arrangement, that the Kew standard and the following thermometer, No. 6, stood very nearly alike.

6. A boiling thermometer, every degree divided into 50ths, the mercury begins to reach the divided scale only at 78 degrees C., being intercepted by a second enlargement of the tube. Bulb blackened. The mercury contained in the capillary tube being here only a very small part of the mercury under the black stratum, and being protected besides by a second outer glass cylinder against loss of heat, I found this instrument the best for these experiments as long as the insolation was hot enough to raise the mercury to the divided part. Besides, the  $\frac{1}{100}$ th of the degree being read with perfect accuracy, it showed very rapidly even the minutest changes in the atmospheric conditions.

7. The surface of the ground. The thermometer was placed in the reddish sand forming the general deposit in the plains of Hin-

\* For relative determinations for distance, and for the annual and daily variations, careful observations with any thermometer would be very useful.



doostan. It was during the first experiments covered with a stratum of the sandy soil about one centimetre thick, but in the experiments at Umballa a little hole was filled with mercury and this covered with the stratum of soil. By this arrangement the thermometer was kept through the medium of the mercury, in a much more intimate contact with the particles of the soil, the temperature of which it was to indicate.

8 and 9. Metals exposed to a tropical sun feel remarkably hot when touched, but this is due in a great measure to their conducting power. Their real temperature seemed an interesting object for direct determination. I therefore exposed two metal vessels, the one an iron bottle, well screwed and filled with mercury to two-thirds of its volume; the other a flat square copper basin (used generally as an artificial horizon,) blackened, with about two cubic centimetres of mercury distributed over it in isolated drops. Both were put upon a soft and thick layer of cotton. In making the observation with the copper basin, the cotton was slightly pressed down at one side, so as to incline the basin without the necessity of touching it, causing the mercury to collect in one corner. The thermometer was then dipped into the mercury, which it might be expected had assumed the temperature of the metallic surface with which it was in contact.

The following Table contains the reading of the different thermometers at Umballa; the correction for index errors are applied to the reading. The instruments with black bulbs and on black wool were read with a telescope from 4 to 5 feet distance, since any near approach to read them with a magnifier altered very suddenly the indications of the thermometers.

*Observations on insolation at Umballa, April 22nd, 1856, Centigrade.*

| HOURS, LOCAL TIME,   | ...                         | ... | ... | 6 A. M. | 7-15 | 8 | 9 | 10 | 11 | 11-54 | 1-4 P. M. | 2 | 3 | 4 | 5-30 |
|----------------------|-----------------------------|-----|-----|---------|------|---|---|----|----|-------|-----------|---|---|---|------|
| HEIGHT OF THE SUN, { | Latitude 30° 20' 7" N., ... |     |     |         |      |   |   |    |    |       |           |   |   |   |      |
| AIR, ... {           | Dry, ... {                  |     |     |         |      |   |   |    |    |       |           |   |   |   |      |
|                      | Wet, ... {                  |     |     |         |      |   |   |    |    |       |           |   |   |   |      |
| SUN, ... {           | White, ... {                |     |     |         |      |   |   |    |    |       |           |   |   |   |      |
|                      | Black, ... {                |     |     |         |      |   |   |    |    |       |           |   |   |   |      |
| SUN, ... {           | Keen, ... {                 |     |     |         |      |   |   |    |    |       |           |   |   |   |      |
|                      | Boil, ... {                 |     |     |         |      |   |   |    |    |       |           |   |   |   |      |
| SURFACE OF GROUND, { | {                           |     |     |         |      |   |   |    |    |       |           |   |   |   |      |
|                      | {                           |     |     |         |      |   |   |    |    |       |           |   |   |   |      |
| METAL, ... {         | {                           |     |     |         |      |   |   |    |    |       |           |   |   |   |      |
|                      | {                           |     |     |         |      |   |   |    |    |       |           |   |   |   |      |

REMARKS.—Some small clouds at 11 A. M.; hazy, but no clouds from 12-10, with W. by N. wind; hot wind.

The haze, during the experiments at Umballa, though generally accompanying the hot winds, modified the heat, particularly for the boiling thermometer; also the small clouds, though very thin, and not covering the sun at the moment of the reading, had caused a sensible depression in the black thermometers *on the wool*; the other black bulb, freely suspended, being much less sensible for the rays of the sun, since the objects against which it radiated changed their temperature but very little (*see* "Surface of Ground,") went on steadily rising.

The great heat of the *air* lasting till sun-set is very characteristic of days with hot winds in general; also the surface of the ground keeps remarkably warm during the first hours after sunset though it loses 25 degrees C. during the night.

Notwithstanding this great variation, no particle of dew is deposited in these regions during nearly three months, the wet bulb thermometer sinking even 10 degrees lower during the night than the dry one.

The power of the sun's rays was also determined at Benares and Cawnpore.

At Benares the boiling point thermometer, in an arrangement like the one just described, was exposed on the 3rd of April.

It stood at 12 H. 30 M., ..... 78°.15 Centigrade.\*

|   |   |    |   |       |       |   |
|---|---|----|---|-------|-------|---|
| 1 | „ | 5  | „ | ..... | 82.60 | „ |
| 1 | „ | 10 | „ | ..... | 84.23 | „ |
| 1 | „ | 15 | „ | ..... | 84.08 | „ |

The maximum seems to fall decidedly after 12, (the sun's power decreasing less rapidly than the loss of radiation is diminished by the general increase of the temperature of the air continuing till 2 or 3 P. M.) The maximum on normal days, without clouds, and with very light wind, seems to be reached pretty regularly at 1½. 10m. to 1½. 20m. P. M.

At 1½. 29m. the wind at Benares became more violent, about 6.5 metres per second, and *felt* very hot. To my surprise the thermometer immediately went down, the thermometer with the white bulb in the sun also fell, though very little. Evidently the instruments had gradually surrounded themselves with a stratum of

\* The readings are corrected for index errors.

heated air, corresponding with the temperature of the mercury, which, during the periods of stronger wind, was removed, and replaced by one less hot.

The readings were

At 1.42 P. M. . . . . 82.60 Centigrade.

(Wind increasing very much at 1.44 P. M.)

Thermometer at 1.46 P. M. . . . . 78.74 „

It rose again, in a slight lull, from 1.53 to 2.10 P. M.

It stood at 2.10 P. M. . . . . 80.45 ;

then the wind setting in again, it gradually sank, and soon (2.35 P. M.) disappeared below the divided scale.

At Allyghur, April 17th, the day was particularly clear ; the West wind hot, but not very strong. Here I found the highest temperature I had yet observed, viz. 90° 30 C. or 194 54 F,\* the time of this maximum, 1.20 P. M., coinciding very nearly with that observed at Benares.

I was enabled to compare my instrument with one used by Mr. Gubbins,† the bulb of which was protected against lateral radiation, by being enclosed in a double cylinder of glass. The two instruments agreed, at least for the maximum, better than might have been expected. The time of the maximum was naturally, not so well defined in the one enclosed in the glass tube, as in the other lying on wool: the former was too cold before the period of its maximum, too warm afterwards. The readings were on April 3rd—

|                | Schlagintweit.<br>Hypsometer<br>No. 5. | Gubbins.<br>In glass cylinders.           | Black bulb<br>exposed free. |
|----------------|----------------------------------------|-------------------------------------------|-----------------------------|
| 12-0 . . . . { | 88.58 C.<br>191.44 F.                  | } 190.5                                   | } 126.0                     |
| 1-15 . . . . { | 90.13 C.<br>194.23 F.                  |                                           |                             |
| 1-20 . . . . { | 90.30 C.<br>194.54 F.                  | } Disturbed by ap-<br>proaching too near. | } 127.1                     |
| 1-45 . . . . { | 86.10 C.<br>186.98 F.                  |                                           |                             |
| 2-35 . . . . { | 80.60 C.<br>177.08 F.                  | } 185.0                                   | 122.0                       |

\* Corrected as the following for index error.  
† We are deeply indebted to Mr. and Mrs. Gubbins for the communication of



When the hot winds are very violent, they diminish the power of insolation very much owing to the quantity of dust they raise, which very often, like thick aqueous clouds, completely hides the position of the sun, and sometimes even produces a darkness like the thickest fog.

I noticed a peculiar coloration of the sun during dust-storms, which is, I think, a regular phenomenon accompanying them, when the air has lost a certain amount of transparency.

In fogs the disk of the sun is red, or at least of a decided reddish tint, when sufficiently darkened to be looked at without a dark glass. In dust-storms the sky has also, as in fogs, a decidedly reddish colour, which in this case is that of the dust itself, but the sun's disk is blue, a phenomenon evidently connected with the suspension of solid particles in the air.\* I observed this colour best on the 6th of April at Futtehpore. The hot wind lasted from 12.45 to 6.10 P. M., and stopped very suddenly after sunset. The sun was very much obscured as early as 1 P. M., and had then assumed this blue appearance so decidedly, that it looked like the sun's disk seen through a dark-blue glass, the shadow of a thin cylinder falling on white paper was nevertheless well defined and reddish, showing that the illuminated paper had received rays of the (complementary) bluish colour.

The blue colour of the sun, though the light was gradually much diminished, lasted until 5.10 P. M., when the sun had a height only of about 15 degrees: then the disk soon disappeared entirely behind the clouds of dust.

The temperature of the air† was corrected for index errors on the 3rd of April—

a series of most accurate meteorological observations, which not only embraced the ordinary objects of observation, but in which, at the same time, a great variety of experiments were combined with equal skill and ingenuity.

\* A similar dust-cloud passing perhaps at a small height above the ground may explain the blue appearance of the sun mentioned in the Second Edition of Sir John Herschel's *Astronomy*.

† A room with tatties was easily kept at 25° to 27° C. in the centre of the apartment, the wind being very strong.

|              | <i>Dry.</i> | <i>Wet.</i> |                                                                              |
|--------------|-------------|-------------|------------------------------------------------------------------------------|
| At 12, ..... | 38.2        | 19.9        | } Direction of the<br>hot winds West, very<br>strong, from 12.45 to<br>6.10. |
| 1, .....     | 38.1        | 19.0        |                                                                              |
| 2, .....     | 37.3        | 19.3        |                                                                              |
| 3, .....     | 37.3        | 19.3        |                                                                              |
| 4, .....     | 37.3        | 19.2        |                                                                              |
| 5, .....     | 36.7        | 19.1        |                                                                              |
| 6, .....     | 36.4        | 18.9        |                                                                              |

The temperature of the air diminished, as occasionally noticed in the observations above-mentioned, with the increase of the wind and discoloration of the air.

A coincidence worthy of notice is the sudden cessation of the wind after sunset, which took place at every one of my observations. Generally speaking, it is characteristic of the hot winds that in the beginning of the hot season the wind always ceases very near sunset, the night is very calm, and towards the morning an Easterly breeze is not unfrequently felt.

The cause of the hot winds ceasing with sunset seems to be the great depression of temperature during the night, coinciding with the Westerly direction of the wind. In consequence the wind meets, soon after sunset, with surfaces covered with a stratum of air cooled by the vicinity of the radiating surface of the ground; the hot wind passes over this stratum and is therefore not felt near the surface.

It is only during the middle, and towards the end of the hot season, that the hot winds blow till 2 or 3 o'clock in the morning, when the rains stop them suddenly.

The hour of the day at which the hot winds *commence*, is variable from the beginning to the end of the hot season. In the first months they begin to blow at 12 or perhaps 1 P. M., then the period becomes gradually earlier, till a short time before the rains they begin at 6 or 7 A. M., leaving only a few calm hours in the very early part of the morning.

The quantity of carbonic acid in the air during the hot winds is very small. It reached, in an experiment at Allyghur,\* scarcely  $\frac{1}{100}$  part

\* The quantity of air examined was 50,000 cubic centimetres, the increase of weight of all potassium tubes reached was not a full millegramme.

in 10,000 parts of air, the ordinary quantity being 3.5 to 4 parts in 10,000.

#### GEOLOGICAL OBSERVATIONS.

Of the valley of the Brahmaputra, a detailed map has been prepared, showing the different soils, with observations on former levels and beds of the river, and depths from the surface deposits to the sub-soil. Different coal localities in the Bhootan Himalayas, and in the Naga Hills, have been examined and entered in this map.\*

These observations, compared with the examinations of the different soils of the Delta of the Ganges, show that the valley of the Brahmaputra differs from the Delta in being covered with lacustrine deposits, occasionally varied by the coarse gravel brought down by the Himalayan Rivers on its North-Eastern side.

The course of the actual Brahmaputra, originally flowing in the bed of the Lohit, (which was the original name used in this valley,) has not been altered by a sudden change of its bed, but has gradually shifted itself; the deposits made on the right bank (where all lacustrine soil is carried away and replaced by the actual deposits of the river) being very different from the clays on the left.

In the Himalayas, along the North-East side of the Brahmaputra, the coal is found in small seams of sand-stone alternating with strata of conglomerates of pebbles (Nageflue,) the pebbles being remarkably smaller than the deposits of the present rivers.

To these sedimentary rocks succeed, at a short distance from the banks (much shorter than in the Western Himalayas,) crystalline hornblendic rocks, chiefly hornblendic gneiss, with a peculiar linear arrangement of quartz nodules succeeding each other, when seen, in the proper section, like beads on a string.

The dip of the stratification in the sand-stones and conglomerates, which form the outer ranges of the Bhootan Himalayas, is very well defined by the alternation of the finely grained sand-stones with the conglomerates.

The dip of the strata is North 30 degrees to 40 degrees West, inclination 55 degrees to 65 degrees.

\* This map, in four sheets, scale four miles to an inch, has been sent with my manuscripts to the Hon'ble the Court of Directors.

In the crystalline hornblendic rocks, the cleavage, which is well developed, dips also in the same direction. The mean direction of this dip was also found North 30 degrees to 35 degrees West, inclination 55 degrees to 60 degrees.

It is deserving of remark, that this dip of stratification and cleavage planes are quite analogous to the direction of dip in Sikkim and the Western Himalayas of Kumaon and Gurhwal. In all these parts of the Himalayas the dip of the cleavage is chiefly Northerly, varying in different parts to the East or to the West.



PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR NOVEMBER, 1856.

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At a monthly general meeting of the Society held on the 5th instant, at the usual hour,

Hon'ble Sir James Colville, Knight, *President*, in the Chair.

The proceedings of the last meeting were read and confirmed.

Rájá Srishchunder Ráya Bahádoor, of Krishnagur, duly proposed and seconded at the last meeting, was balloted for and elected a member.

The election of Mr. E. A. Samuells as a Member of the Council, vice Dr. Sprenger, reported at the last meeting, was confirmed under bye-law 60.

The Council submitted the following reports:—

1st.—In reference to the Stacy collection of coins.

*Report.*

In a letter lately received, Captain Wroughton, on behalf of the daughters of Colonel Stacy, has offered to the Society for sale at Rs. 5,000, the valuable collection of coins and gems made by the late Colonel, a list of which has been submitted. The Council are strongly impressed with the importance of securing this fine collection, if possible, for the Society's Cabinet. They would not, however, consider it prudent to devote to this purpose so large a sum as Rs. 5,000 from the general funds of the Society, and they therefore propose that an endeavour should be made by opening a subscription among the Members to raise such a sum as will defray the whole, or a large part, of the amount necessary for the purchase.

The proposal was agreed to.

2nd.—In reference to the question of transferring the Society's Geological collections to the new Government Museum, as proposed in the letter (dated 11th July last,) from the Government of India, which was laid before the Society at the August Meeting.

*Report.*

The Council has to report on the proposition made by the letter from Government, dated 11th July last. It has also had under its consideration the letters from Mr. Secretary Beadon to Mr. Secretary Grey, and to Mr. Oldham of the same date, and that of Mr. Oldham to the Secretary of the Society, dated 19th July last.

The majority of the Council, consisting of the eight following Members, viz. Drs. Spilsbury, Walker and Macrae, Captain Young, Messrs. Grote and Allen, and Baboos Ramgopaul Ghose and Rājendralāl Mittra, are decidedly adverse to the proposed transfer of the collections in question to the Government Museum. They conceive that such a transfer, if made, would be irreparable, that it would be inconsistent with the terms on which those collections have been acquired by, or presented to, the Society, and would be likely to injure irretrievably the future prospects of the Society.

The minority, consisting of the following six Members:—the President, Messrs. Beadon and Samuells, Drs. Boycott and Thomson, and the Secretary, are in favour of the proposed transfer, but upon such conditions as the following:—

1st.—The separation of the Society's collections from those belonging to Government, and their identification as the property of the Society.

2nd.—The free access to and use of them by every Member of the Society in as ample a degree as he now enjoys those privileges.

3rdly.—The right to resume them should the Society be hereafter minded so to do.

These conditions, however, if this view be adopted, would have to be discussed and settled more formally between the Government and the Society.

The minority is of opinion that such a course, whilst it would secure the property of the Society, would render its collections more generally useful.

In this state of things the Council recommend, that the question should be referred to the Society at large, and that the correspondence considered by the Council, and the minutes of the different Members of Council who have expressed an opinion thereon, be circulated with the proposition.

It should further be noticed as an element in the consideration of the question, that by means of the removal of the Museum of Economic Geology, the Society has lost the services which the Curator of that Museum has heretofore rendered in the care of the Society's Geological and Mineralogical collections.

The Report was adopted.

Communications were received—

1.—From Mr. B. H. Hodgson, a paper on the Aborigines of the Nilghiris with remarks on their affinities.

2.—From Mr. Assistant Secretary Oldfield, enclosing the Meteorological Register kept at the office of the Secretary to the Government of the N. W. P., Agra, for the month of September last.

The Librarian submitted his usual monthly report.

Captain Yule read a paper, being an account of the remains of the ancient Burmese Metropolis, called Pagan, on the left bank of the Irrawaddee, 100 miles below Ava, appropriately termed by the German Geographer Ritter, "the Burman Thebaid."

A short sketch was given of the legendary history of the early Burmese monarchy, chiefly from Colonel Burney's papers in the early journals of the Society. Tagoung, above Ava, was the first seat of the Kings, to whom a sacred Indian descent is assigned. Tradition then carries the kingdom to Prome where a great city existed, before the Christian era, under the name of Thare Khet-tara (*Sri Kshetra*.) On the fall of this city an offshoot of the royal race was established at Pagan, A. D. 107.

According to Burney and Crawford this was the city of which the paper treated. But according to other authorities it was Upper or Old Pagán, adjoining Tagoung above Ava, in lat. 23° 30', where a city is still traceable, which has been visited by Colonel Hannay, Dr. Bayfield, and the Rev. Mr. Kincard; by the latter account Lower Pagán was founded about A. D. 850.

Pagán was destroyed by the Chinese in the end of the thirteenth century. The invasion is supposed to be that described by Marco Polo, as the conquest of the Kingdom of Mien, a name, it is believed, still given to Burmah by the Chinese.

Former accounts of these remains give no adequate idea of their importance and architectural magnificence.

The temples are of all kinds, but most of them are not mere *chaitiyas* or dead masses of brickwork, but hollow vaulted temples containing images of the Buddha. They are of all sizes from 20 or 30 feet square, up to more than 200 feet square; cruciform in plan, containing vaulted cells and corridors, the upper part rising in successive terraces, and crowned by a spire resembling that of the more ancient Hindoo temples in Mr. Fergusson's drawings. The number of temples remaining can scarcely be less than 1,000. They cover an area of about 8 miles by 2.

A detailed description was given of the two most prominent temples, the *Ananda* (of which the etymology is disputed, but probably *Ananta* "the endless,") and the *Thapinyu* (*servagna* "the Omniscient.")

The most singular part of the impression made by these buildings was their strong suggestiveness of resemblance in general effect to the church architecture of southern Catholic Europe.

This led to many speculations in the minds of the visitors of the possibility of European aid in their construction; but there is no good ground for deeming this possible. The first European notice of Burma is Marco Polo's, but he does not seem to speak as an eye-witness. The first traveller on record\* visited Burma about A. D. 1440. These temples date from the 11th and 12th centuries.

The material is what we call in India *kucha pukka*, *i. e.*, brick with mud cement, but covered with plaster in which the decoration is executed. We are not in India used to conceive of *kucha pukka* structures 200 feet high.

Pointed arches and vaults, doorways surmounted by pediments of singular flamboyant spires or horns, decorated pilasters of an almost perfect Roman character, friezes of festoons of beads suspended by tusked and grinning heads, are some of the characteristics of the architecture. In one temple flat brick arches beautifully executed were disclosed by the decay of the plaster.

Many of the details of the ornament were shown to be found in Indian buildings in the South of the Peninsula, in Central India, in Assam, in Sarnath near Benares, in the temples of Orissa, and in the great Javanese remains described by Raffles.

\* Nicolo da Conti.



But where should we find in India any model of the composition? Where anything approaching the classical beauty of decoration in some of the smaller temples, and the stupendous architectural majesty of the larger?

Perhaps the nearest analogy in form is found in the rock-cut *Raths* of Mahabalipooram near Sadras.

The paper was read in explanation of about five and twenty illustrations, partly kalotypes by that accomplished photographer Captain Tripe of the Madras Army, and partly drawings, plans, elevations, sections and details on a large scale, prepared by Captain Yule, from measurements made on the spot with the kind aid of Mr. Oldham and Lieutenant Heathcote of the Indian Navy.

On the motion of the President the thanks of the meeting were voted by acclamation to Captain Yule for his very interesting paper.

Mr. Oldham gave notice that at the next meeting he would move that for rule 8 of the Society's rules the following be substituted.

Ordinary members shall be divided into two classes, Residents and non-Residents. All members who may live in Calcutta, or within any distance thereof, not exceeding 12 miles, for any portion of the year exceeding three months, shall be considered Resident members. All members who may reside permanently at a greater distance, or who may only occasionally visit Calcutta for periods shorter than three months, shall be considered non-Resident members.

Ordinary members "Residents" shall pay an admission fee of 32 Rs. and an annual subscription of 64 Rs., payable in advance, annually or quarterly. Non-Resident members shall pay an admission fee of 32 Rs. payable in advance, quarterly or annually.

Non-Resident members who may subsequently become Residents, shall be liable to the advanced rate of subscription from the first day of the quarter, next succeeding their change of residence, and in the same manner Resident members who may become non-Residents shall be entitled to the reduction in their subscriptions.

## LIBRARY.

THE Library has received the following accessions during the month of October last.

*Presented.*

The White Yajurveda, edited by A. Weber, Part II. No. 8, 1855, Royal 4to.—BY THE EDITOR.

The Anvár-i Suhailí; or, the Lights of Canopus; being the Persian version of the Fables of Pilpay; or, the book “Kalilah and Damnah,” literally translated by E. B. Eastwick, Hertford, 1854, Royal 8vo.—BY THE TRANSLATOR.

A Table of Synchronisms: compiled by E. Clibborn, with an Essay on the Probability of Saul, Beniah, &c. having been the Hycsos Rulers, Salatis, &c. Dublin.—BY THE AUTHOR.

Journal of the Statistical Society of London, Vols. 9 to 18, from 1846 to 1855, and part 2 of Vol. 19, June, 1856.

Sanskrit—Wörterbuch herausgegeben von der kaiserlichen akademie der Wissenschaften, bearbeitet von Otto Böhtlingk und Rudolph Roth, Bogen, 11-20, 21-30, 31-40. *St. Petersburg*, 1853 and 1854.—BY THE EDITORS.

Philosophical Transactions of the Royal Society of London, for the year 1855, Vol. 145, Parts I. and II. A List of Members.—BY THE SOCIETY.

Proceedings of the Royal Society, Vol. VII. Nos. 14, 15 and 22.—BY THE SAME.

The Transactions of the Royal Irish Academy, Vol. XXII. Part VI. *Dublin*.—BY THE SOCIETY.

Proceedings of the Royal Irish Academy, for the years 1854-55, Vol. 6, Part 2nd, two copies.—BY THE SOCIETY.

Indische Studien, Beiträge für die Kunde des indischen Alterthums, von Dr. A. Weber, Dritten Band Zweites und Drittes Heft, 4 copies and Dritter Band, 1 copy.—BY DR. A. WEBER.

Jahrbücher der K. K. Central-Anstalt für Meteorologie und Erdmagnetismus, von Karl Kreil, Band III. January 1851, *Wien*, 1855.—BY THE IMPERIAL ACADEMY OF VIENNA.

Denkschriften der Kaiserlichen Akademie der Wissenschaften, Philosophisch-Historische Classe. Sechster Band.—BY THE SAME.

Ditto, Ditto, Mathematisch-Naturwissenschaftliche Classe, Neunter Band.—BY THE SAME.

Almanach, ditto, 1855, ditto.—BY THE SAME.

Sitzungsberichte der ditto ditto, Band VIII. Heft 4 and 5.—BY THE SAME.

————— Ditto IX. Heft 2 and 2.—BY THE SAME.

Sitzungsberichte der ditto ditto, Band XV. Heft 3.—BY THE SAME.

————— Ditto XVI. Heft 1 and 2.—BY THE SAME.

————— Ditto XVII. Heft 1—3.—BY THE SAME.

————— Ditto Ditto, Philosophisch Historische Classe.—BY THE SAME.

————— Ditto VIII. Heft 3, 4 and 5 in one.—BY THE SAME.

————— Ditto IX. Heft 1 and 2.—BY THE SAME.

————— Ditto XV. Heft 2 and 3.—BY THE SAME.

————— Ditto XVI. Heft 1 and 2.—BY THE SAME.

————— Ditto XVII. Heft 1 and 2.—BY THE SAME.

Archiv für Kunde österreichischer Geschichtsquellen, Band XIV. Heft 2 and Band XV. Heft 1.—BY THE SAME.

Monumenta Habsburgica. Sammlung von Actenstücken und Briefen zur Geschichte des Hauses Habsburg in dem Zeitraume. von 1473 bis 1576, Zweiter Band Erste Abtheilung.—BY THE SAME.

Notizenblatt 1855, Nos. 13 to 24.—BY THE SAME.

Die Feierliche Sitzung der ditto, am 29 Mai, 1852 Wein.—BY THE SAME.

Fontes Rerum Austriacarum. (Esterreichische Geschichtsquellen 1 Band, Erste Abtheilung, VIII. Band, Zweite Abtheilung, and IX. Ditto, Ab. ditto.—BY THE SAME.

“The Discovery of America by the Northmen and the Connection of the Northmen with the East,” 20 sheets.—BY THE ROYAL SOCIETY OF ANTIQUARIES OF NORWAY.

Mémoires de la Société Royale des Antiquaires du Nord, 1848-49, *Copenhagen*, 2 copies.—BY THE SAME.

Antiquarisk Tidsskrift, Udgivet af det Kongelige Nordiske Oldskrift-Selskab. 1849-1851 and 1852-1854.—BY THE SAME.

Remarks on a Danish Runic Stone from the eleventh century, found in the central part of London. By C. C. Rafn.—BY THE SAME.

Bijdragen tot de Taal-land-En Volkenkunde van Neêrlandsch Indië, Derde Deel, and Vierde Deel, Nos. 1 en 2.—BY THE ROYAL INSTITUTE OF HISTORY, GEOGRAPHY AND ETHNOLOGY OF NETHERLANDS, INDIA.

Mémoire sur la Reproduction Imprimée des caractères de l'Ancienne E'criture Démotique des E'gyptiens, par H. Brugsch, *Berlin*, 1855.

Selections from the Public Correspondence of the Punjab Administration, Vol III. No. II. 1856, 4 copies.—BY THE PUNJAB GOVERNMENT.

The Quarterly Journal of the Geological Society, Vol. 12, No. 47, Part 3, August, 1856.—BY THE SOCIETY.

Proceedings of the Anniversary Meeting of the Royal Geographical Society, No. 5.—BY THE SOCIETY.

Mr. David Smith's Report on the Coal and Iron Districts of Bengal.—BY THE GOVERNMENT OF BENGAL.

Entomological Papers, Nos. 2 and 3, July and August, 1856.—BY JOHN NEITNER, THE EDITOR.

Natuurkundig Tijdschrift voor Nederlandsch Indië, Deel XI. Derde Serie, Deel I. Af. 4, 5 og 6.—BY THE NATURAL HISTORY SOCIETY OF NETHERLAND'S INDIA.

The Durbin Newspaper, for October, 1856.—BY THE EDITOR.

The Phœnix Newspaper, for ditto.—BY THE EDITOR.

The Morning Chronicle, for ditto.—BY THE EDITOR.

*Exchanged.*

The Athenæum, for August, 1856.

The London, Edinburgh and Dublin Philosophical Magazine and Journal of Science, No. 78, for September, 1856.

*Purchased.*

The Literary Gazette, Nos. 25 to 29.

L'Athenæum français, Nos. 27 and 30.

Ditto Indien, January to July, 1856.

Revue Des Deux Mondes, 15th August and 1st September, 1856.

Comptes Rendus, Nos. 3 to 6, July and August, 1856.

Tables des Comptes Rendus, Deuxieme Semestre, 1855, Tome 41.

Annales des Sciences Naturelles, No. 1, Tome V.

Revue et Magasin de Zoologie, No. 7 of 1856.

Revue Contemporaine des Athenæum Francais, 15th and 31st August, 1856.

Popular Astronomy, by F. Arago, translated by Admiral Smyth, and Robert Grant, in 2 volumes, *London*, 1855, 8vo. 1 vol.

Meteorological Essays, by F. Arago. With an Introduction by Baron Alexander von Humboldt. Translated under the superintendence of Col. Sabine, *London*, 1855, 8vo.

Odontography; or, a Treatise on the Comparative Anatomy of the Teeth; their physiological relations, mode of development, and microscopic structure, in the Vertebrate Animals. By R. Owen, *London*, 1840-1845, in 2 vols. Royal 8vo. Vol. 2nd contains an Atlas of 168 plates.

The Expedition for the Survey of the Rivers Euphrates and Tigris, carried on by order of the British Govt. in the years 1835, 1836 and 1837. By Lieut.-Col. Chesney: vols. 1st, 2nd, and 3rd, Royal 4to. *London*, 1850.



The Geography of Herodotus, by J. T. Wheeler, *London*, 1854, 8vo.

Quarterly Journal of Microscopical Science: including the Transactions of the Microscopical Society of London. *London*, Nos. 1 to 15, Oct. 1852 to April 1856.

The Geography of Strabo, translated by H. C. Hamilton and Dr. W. Falconer, in 3 vols. *London*, 1854, Royal 12mo. 2 vols.

The Mahāvīra Charita, or the History of Rāma, a Sanskrit play by Bhatta Bhavabhūti, edited by F. H. Trithen. *London*, 1848, Royal 8vo.

The Dasakumāra Charita, or Adventures of ten Princes. A Series of Tales in Original Sanskrit, by Sri Dañdī, edited by H. H. Wilson. *London*, 1846, Royal 8vo.

Bhagavad-Gītā; or the Sacred Lay: a colloquy between Krishna and Arjuna on Divine matters: an episode from the Mahābhārata, with the title श्रीभगवद्गीता ब्रह्मविद्या योगशास्त्रं श्रीकृष्णार्जुनसंवादः। By J. C. Thomson. *Hertford*, 1855, 8vo. Royal 12mo.

Biblisches Realwörterbuch zum handgebrauch für studirende, candidaten, Gymnasiallehrer und prediger ausgearbeitet, von Dr. G. B. Winer. *Leipzig*, 1847, Erster Band, A.—K. Royal 8vo.

Sākuntalā; a Sanskrit Drama, in seven Acts, by Kālidāsa;—the Devanāgarī recension of the text now for the first time edited in England, with literal translations of all the metrical passages, &c., by M. Williams. *Hertford*, 1853, Royal 8vo.

Arabum Proverbia, by G. W. Freytag, Tom. III. *Bonn*, 1843.

Histoire générale et Système comparé des Langues Sémitiques, par E. Renan, Part I. *Paris*, 1855, Royal 8vo.

Alphabets of all Nations, 2 sheets folio, 1 copy.

Natural History Review, from January, 1854 to April, 1856, 10 Nos.

Lexiologie Indo-Européenne ou Essai sur la Science des Mots Sanskrits, Grecs, Latins, Français, Lithuaniens, Russes, Allemands Anglais, &c. par H.—J. Chavée. *Paris*, 1849, 8vo.

Vergleichungs-Tabellen der Muhammedanischen und Christlichen Zeitrechnung; von Dr. Ferdinand Wüstenfeld. *Leipzig*, 1854, 4to.

Description of a Planispheric Astrolabe constructed for Shāh Sultan Husain Safawī, King of Persia, and now preserved in the British Museum; by W. H. Morley, Royal Folio. *London*, 1856.

GOUR DOSS BYSACK,

*Librarian and Asst. Secy.*

*The 1st November, 1856.*

## FOR DECEMBER, 1856.

At a Monthly General Meeting of the Society held on the 3rd instant, at the usual hour.

The Venerable Archdeacon John H. Pratt, senior member present, in the Chair.

The proceedings of the last meeting were read and confirmed.

Presentations received—

1st.—From the Government of India, at the request of Captain Yule, a copy of his narrative of the mission to the Court of Ava.

The thanks of the meeting were voted to Captain Yule for his good offices in obtaining for the Society, this interesting and valuable addition to its Library.

2d. From Capt. W. S. Sherwill, F. G. S., a series of specimens from the Borrowdale Plumbago Mine in Cumberland, collected by him on the spot, consisting of—

1. Slaty rock (upper Silurian) from Borrowdale, 500 feet below the Greenstone Porphyry, containing the Plumbago carburet of iron.

2. Greenstone containing iron pyrites (sulphuret of iron) found in close proximity to the plumbago.

3. Greenstone porphyry discoloured with oxide of iron, the red oxide is considered by the miners as a sure index and guide to the presence of plumbago.

4. The red oxide is here shown in conjunction with the plumbago, the plumbago having been forced into narrow crevices in the greenstone rock, the mineral bearing marks or striæ caused by friction.

5. The plumbago in small nests embedded in greenstone porphyry.

6. Greenstone porphyry strongly impregnated with plumbago.

7. Tolerably pure plumbago. The striæ where it lay against the containing rock are still visible upon its surface.

8. Specimens dug from a nest of plumbago that was found embedded in greenstone porphyry (No. 6.) This quality is used in the manufacture of lead pencils.

9. Plumbago of divers degrees of purity and value, also used for pencils.

10. The purest specimens of plumbago obtainable, valued £30 a ton.

11. Inferior quality plumbago as prepared for polishing iron, price one penny.

Capt. Sherwill also exhibited to the meeting a series of specimens from the strata pierced in boring the Puits de Grenelle or the great artesian well at Paris which now supplies  $\frac{1}{4}$  of Paris with water brought from a depth of 547 metres equal to 1,686 feet.

On the proposition of the Chairman, the thanks of the meeting were voted to Capt. Sherwill for the valuable specimens presented to the Society.

A note from Mr. G. F. Edmonstone, intimating his wish to withdraw from the society, was recorded.

In pursuance of the notice given at the last meeting, Mr. Oldham moved.

“That for rule 8 of the Society’s rules, the following be substituted, *viz.*

“Ordinary members shall be divided into two classes, residents and non-residents. All members who may live in Calcutta, or within a distance thereof not exceeding 12 miles for any portion of the year exceeding three months, shall be considered resident-members. All members who may reside permanently at a greater distance, or who may only occasionally visit Calcutta for periods shorter than three months, shall be considered non-resident members.

“Ordinary members, *residents*, shall pay an admission fee of 32 Rs., and an annual subscription of 64 Rs. payable in advance annually or quarterly; *non-resident members* shall pay an admission fee of 32 Rs., and an annual subscription of 32 Rs. payable in advance quarterly or annually.

“Non-resident members who may subsequently become residents, shall be liable to the advanced rate of subscription from the first day of the quarter next succeeding their change of residence, and in the same manner resident members who may become non-residents, shall be entitled to the reduction in their subscriptions.”

The proposition was referred to the Council for report in accordance with rule 45.

Communications were received—

1. From Mr. Assistant Secretary Oldfield, enclosing copy of a meteorological register kept at the office of the Secretary to the Government of the N. W. P. Agra, for the month of Sept. last.

3. From Mr. J. Nietner, some additional papers on the Coleoptera of Ceylon.

4. From Messrs. Hermann and Robert Schlagintweit, copy of a report on the progress of the Magnetic Survey from July to September last, being an account of a journey across the chain of the Koenluen from Ladak to Khotan.

The Librarian submitted his usual monthly report.

Mr. H. F. Blanford called the attention of the meeting to a series of fossils from the nummulitic rocks of Scinde, which had been found among the boxes belonging to the Government Museum of Economic Geology and had since been arranged and examined. These were now on the table. The Geological Survey were also indebted to Colonel Baker for kindly presenting to their collection a few species of which the original collection did not contain examples.

The collection consisted of 247 species, viz.:

|                            | Species. |
|----------------------------|----------|
| Mammalian Bones, . . . . . | 1 ?      |
| Fish teeth, . . . . .      | 1        |
| <i>Cephalopoda.</i>        |          |
| Nautili, . . . . .         | 2        |
| <i>Gasteropoda,</i>        |          |
| Strombidæ, . . . . .       | 9        |
| Muricidæ, . . . . .        | 26       |
| Buccinidæ, . . . . .       | 10       |
| Conidæ, . . . . .          | 6        |
| Volutidæ, . . . . .        | 8        |
| Cypræidæ, . . . . .        | 8        |
| Naticidæ, . . . . .        | 9        |
| Cerithiadæ, . . . . .      | 10       |
| Turritellidæ, . . . . .    | 10       |
| Littorinidæ, . . . . .     | 3        |
| Turbinidæ, . . . . .       | 4        |
| <i>Lamelli-branchiata.</i> |          |
| Ostreidæ, . . . . .        | 20       |
| Mytilidæ, . . . . .        | 4        |
| Arcadæ, . . . . .          | 9        |
| Chamidæ, . . . . .         | 4        |
| Cardiadæ, . . . . .        | 6        |



|                            |              |
|----------------------------|--------------|
| Succinidæ, . . . . .       | 9            |
| Cyprinidæ, . . . . .       | 16           |
| Veneridæ, . . . . .        | 18           |
| Anatinidæ, . . . . .       | 1            |
| Pholadidæ, . . . . .       | 1            |
| <i>Bryozoa.</i>            |              |
| Discoflustrella, . . . . . | 1            |
| <i>Annelidæ.</i>           |              |
| Serpulidæ, . . . . .       | 2            |
| <i>Crustacea.</i>          |              |
| Balanidæ, . . . . .        | 2 ?          |
| Brachyura, . . . . .       | 3            |
| <i>Echinoidea.</i>         |              |
| Echinidæ, . . . . .        | 9            |
| Cidaritidæ, . . . . .      | 1            |
| Clypeasteridæ, . . . . .   | 1            |
| Cassidulidæ, . . . . .     | 2            |
| Spatangidæ, . . . . .      | 5            |
| <i>Polypiaria.</i>         |              |
| Helianthoida, . . . . .    | 16           |
| Rhizopoda, . . . . .       | 10           |
| <i>Summary.</i>            |              |
| Vertebrata, . . . . .      | 2 ?          |
| Mollusca, . . . . .        | 194          |
| Articulata, . . . . .      | 7            |
| Radiata, . . . . .         | 34           |
| Protozoa, . . . . .        | 10           |
| <hr/>                      |              |
| Total, . . . . .           | 247 species. |
| <hr/>                      |              |

Of the above species not more than 143 have been identified as known forms described and figured in the works of M. M. D'Archiac, Deshayes, and J. de C. Sowerby.

It is not, however, probable that the whole of the remaining species are new, and of the thirteen species of corals as yet not identified, the majority may possibly be found described in the works of M. M. Milne Edwards and Haime. Further comparison may, moreover,

shew that some few other species have been described as occurring in rocks of the Eocene age in Europe, though new to the nummulitic rocks of India, but allowing for such possible identifications, it is probable that a very large proportion, amounting to not less than one-fourth of the whole collection, are new and undescribed forms. As considerable collections of nummulitic fossils from Scinde and Cutch have been previously described and figured by Messrs. Sowerby and D'Archiac, this is a striking fact, and indicates a richness in the fauna of the nummulitic rocks of Scinde, probably not much inferior to that of the Paris Eocenes.

The general *facies* of the fossils in the present collection is that of a moderate depth of water, probably not exceeding 40 fathoms or the equivalent of the Coralline Zone as defined by the late Professor E. Forbes. It would be extremely interesting to institute a comparison between the nummulitic fauna of Scinde and that of the Indian Ocean at the present day, since so far as can be judged from the collections of shells brought from Kurrachee by Col. Baker, a great generic resemblance exists between the two series, but until more detailed investigations of the marine life of the Indian Ocean have been made, and the results of dredgings at different depths placed on record, such a comparison would be premature.

Mr. Oldham gave a brief sketch of the nature and extent of the nummulitic rocks in India, prefacing his remarks by a notice of the distribution of Nummulites in the geological series of Europe. The group was traced from Persia in the west, through Cutch, Scinde Beloochistan, the Salt Range, Nainee Tal district, Sikkim, the Khasi Hills, to the Irrawaddee in the East, the peculiar features in each being represented on sections exhibited to the meeting. With considerable local variation as might naturally be anticipated, there was a constancy in the general succession, and a remarkable constancy in the organic remains.

Some general conclusions bearing on the geological age of these rocks were referred to; and the utter impossibility of any sound results being arrived at without a full knowledge of the organic remains of such deposits insisted upon.

On the motion of the chairman, the thanks of the meeting were voted by acclamation to Mr. Blanford and Mr. Oldham, for their very valuable and interesting communications.

## LIBRARY.

The Library has received the following accessions since the last meeting.

*Presented.*

Report of the Mission to Ava. By Capt. Yule, Folio.

Homer's Iliad, 8vo. (an old copy).—BY MR. THEOBALD, *Junior*.

An Appendix to Report of the Committee for Scientific Inquiries in Relation to the Cholera-Epidemic of 1854.—BY THE SAME.

Selections from the Public Correspondence of the Punjab Administration, Vol. III. No. 3, 1856, 4 copies.—BY THE PUNJAB GOVERNMENT.

General Report on Public Instruction in the Lower Provinces of the Bengal Presidency, for 1855-56.—BY THE BENGAL GOVERNMENT.

Abhandlungen der Philosoph-Philologischen classe der Koenigl. Bayerischen Akademie der Wissenschaften, *München*, Royal 4to. pamphlet, Vol. VII. Parts 2nd and 3rd.—BY THE ACADEMY.

————— der Historischen classe der ditto, 1855, *München*, Royal 4to. Vol. VII. Part 3.—BY THE SAME.

Gelehrte Anzeigen, *Munich*, Vols. 40 and 41, January to December, 1855.—BY THE SAME.

Almanac for 1855.—BY THE SAME.

Fried, W. J. Schelling, Denkrede, von Dr. Beckters. Pamphlet.—BY THE SAME.

Denkrede auf die Akademi ker Dr. Thaddäus Siber und Dr. G. Simon Pym, von Dr. Eamont. Pamphlet.—BY THE SAME.

Dr. Lorenz Hubner's Biographische Charakteristik, von J. Wismayr. Pamphlet.—BY THE SAME.

Ueber Die Gliederung der Bevölkerung, des Königreichs Bägern, von Dr. F. T. W. Herman. Pamphlet.—BY THE SAME ACADEMY.

Proceedings of the Royal Society of Edinburgh, for 1855-56, Vol. III. No. 46.—BY THE SOCIETY.

Transactions of the Royal Society of Edinburgh, Vol. XXI. Part III. for the session 1855-56.—BY THE SAME.

Proceedings of the Royal Society, Vol. VII. No 15, Vol. VIII. No. 22 —BY THE ROYAL SOCIETY.

Journal Asiatique, Tome VII. No. 23, *Juin*, 1856.—BY THE ASIATIC SOCIETY OF PARIS.

Journal of the Proceedings of the Linnean Society, Vol. I. Nos. 1 and 2.—BY THE SOCIETY.

Address of Thomas Bell, President, at the Anniversary of the Society.—BY THE SAME.

Vergleichende Grammatik des Sanskrit, Zend, Griechischen, Lateinischen, Lithuanischen, Altslavischen, Gothischen und Deutschen, von F. Bopp. Erster Band Erste Helfte. *Berlin*, 1856, 8vo.—BY THE AUTHOR.

Grammatik der Huzvâreschsprache von F. Spiegel. *Wein*, 1856, 8vo.—BY THE AUTHOR.

Journal of the Statistical Society of London, Vol. XIX. Part III.—BY THE SOCIETY.

The Oriental Christian Spectator, for October, 1856.—BY THE EDITOR.

The Calcutta Christian Observer, for November, 1856.—BY THE EDITORS.

The Oriental Baptist, for November, 1856.—BY THE EDITOR.

The Upâdeshûk, for November, 1856.—BY THE EDITOR.

The Durbin Newspaper, for November, 1856.—BY THE EDITOR.

The Phoenix ditto, for ditto.—BY THE EDITOR.

The Morning Chronicle ditto, for ditto.—BY THE EDITOR.

The Tuttwabodhini Putrika, for November, 1856.—BY THE EDITOR.

The Central Star, for ditto.—BY THE EDITOR.

*Exchanged.*

The Athenæum, for September, 1856.

The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Sciences, No. 79, for October, 1856.

*Purchased.*

Hewitsoni Exotic Lepidoptera, Nos. 1 to 18, *pamphlets*.

The Literary Gazette, Nos. 30 to 33.

Revue Contemporaine et Athenæum Français, Nos. 107 and 108, for September, 1856.

The Annals and Magazine of Natural History, for October, 1856.

The American Journal of Science and Arts, No. 65, September, 1856.

The Natural History Review, No. XII. October, 1856.

Comptes Rendus, Nos. 7 to 11, for August and September, 1856.

Revue et Magasin de Zoologie, No. 8, 1856.

Journal des Savants, for August, 1856.

Revue des Deux Mondes, 15th Sept. and 1st Oct. 1856, 2 3 Nos.

Annales des Sciences Naturelles, Tome V. No. 3.

The Westminster Review, No. XX. for October, 1856.

The Edinburgh Review, No. 212, ditto.

The Quarterly Review, No. CXCVIII. September, 1856.

GOURDOSS BYSA'CK,

*Librarian and Asstt. Secy.*

*The 1st Dec., 1856.*





*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1855.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Height of the cistern of the Standard Barometer above the level of the Sea, 18.11 feet.

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Faht. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempe-<br>rature during<br>the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|--------------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                             | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                                | o    | o     |
| 1     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                                  |      |       |
| 2     | 29.460                                          | 29.518                                    | 29.417  | 0.101   | 81.3                          | 84.2                                             | 78.3 | 5.9   |
| 3     | .504                                            | .591                                      | .444    | .147    | 81.3                          | 86.0                                             | 78.8 | 7.2   |
| 4     | .627                                            | .696                                      | .557    | .139    | 80.1                          | 87.0                                             | 78.0 | 9.0   |
| 5     | .657                                            | .701                                      | .585    | .116    | 81.7                          | 87.4                                             | 76.2 | 11.2  |
| 6     | .611                                            | .668                                      | .550    | .118    | 80.9                          | 83.8                                             | 78.6 | 5.2   |
| 7     | .572                                            | .626                                      | .505    | .121    | 83.8                          | 90.0                                             | 80.8 | 9.2   |
| 8     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                                  |      |       |
| 9     | .488                                            | .548                                      | .409    | .139    | 83.5                          | 89.5                                             | 80.4 | 9.1   |
| 10    | .416                                            | .479                                      | .337    | .142    | 81.6                          | 87.6                                             | 78.5 | 9.1   |
| 11    | .441                                            | .535                                      | .386    | .149    | 80.6                          | 84.8                                             | 78.2 | 6.6   |
| 12    | .556                                            | .637                                      | .506    | .131    | 81.2                          | 85.4                                             | 78.5 | 6.9   |
| 13    | .619                                            | .682                                      | .560    | .122    | 82.8                          | 88.0                                             | 78.7 | 9.3   |
| 14    | .641                                            | .685                                      | .578    | .107    | 83.1                          | 86.2                                             | 80.6 | 5.6   |
| 15    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                                  |      |       |
| 16    | .508                                            | .589                                      | .435    | .154    | 83.3                          | 92.2                                             | 80.3 | 11.9  |
| 17    | .439                                            | .483                                      | .373    | .110    | 83.2                          | 87.7                                             | 80.4 | 7.3   |
| 18    | .458                                            | .556                                      | .404    | .152    | 82.0                          | 85.0                                             | 79.4 | 5.6   |
| 19    | .567                                            | .617                                      | .522    | .095    | 80.6                          | 84.0                                             | 78.0 | 6.0   |
| 20    | .590                                            | .641                                      | .526    | .115    | 82.7                          | 86.7                                             | 79.0 | 7.7   |
| 21    | .620                                            | .670                                      | .545    | .125    | 83.7                          | 89.7                                             | 80.2 | 9.5   |
| 22    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                                  |      |       |
| 23    | .526                                            | .580                                      | .444    | .136    | 83.0                          | 89.2                                             | 80.3 | 8.9   |
| 24    | .470                                            | .518                                      | .396    | .122    | 82.2                          | 87.4                                             | 80.2 | 7.2   |
| 25    | .427                                            | .481                                      | .348    | .133    | 83.6                          | 88.6                                             | 80.6 | 8.0   |
| 26    | .434                                            | .506                                      | .379    | .127    | 84.6                          | 90.2                                             | 81.2 | 9.0   |
| 27    | .491                                            | .545                                      | .434    | .111    | 83.2                          | 88.8                                             | 81.0 | 7.8   |
| 28    | .463                                            | .514                                      | .394    | .120    | 81.7                          | 84.2                                             | 78.2 | 6.0   |
| 29    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                                  |      |       |
| 30    | .440                                            | .492                                      | .392    | .100    | 82.2                          | 84.6                                             | 80.3 | 4.3   |
| 31    | .433                                            | .477                                      | .379    | .098    | 82.4                          | 87.5                                             | 80.6 | 6.9   |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1855.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Va-<br>pour in a Cubic foot<br>of Air. | Additional weight of<br>vapour required for<br>complete saturation. | Mean degree of Hu-<br>midity complete sa-<br>turation being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|--------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                                | T. gr.                                                              |                                                                    |
| 1     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                       |                                                                     |                                                                    |
| 2     | 79.6                            | 1.7                 | 78.7                | 2.6                          | 0.961                            | 10.35                                                 | 0.89                                                                | 0.921                                                              |
| 3     | 79.4                            | 1.9                 | 78.4                | 2.9                          | .952                             | .25                                                   | .99                                                                 | .912                                                               |
| 4     | 78.1                            | 2.0                 | 77.1                | 3.0                          | .913                             | 9.86                                                  | .98                                                                 | .910                                                               |
| 5     | 78.9                            | 2.8                 | 77.5                | 4.2                          | .925                             | .96                                                   | 1.41                                                                | .876                                                               |
| 6     | 79.2                            | 1.7                 | 78.3                | 2.6                          | .949                             | 10.22                                                 | 0.88                                                                | .921                                                               |
| 7     | 81.2                            | 2.6                 | 79.9                | 3.9                          | .998                             | .69                                                   | 1.41                                                                | .883                                                               |
| 8     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                       |                                                                     |                                                                    |
| 9     | 81.0                            | 2.5                 | 79.7                | 3.8                          | .992                             | .63                                                   | .37                                                                 | .886                                                               |
| 10    | 79.7                            | 1.9                 | 78.7                | 2.9                          | .961                             | .35                                                   | 0.99                                                                | .913                                                               |
| 11    | 78.8                            | 1.8                 | 77.9                | 2.7                          | .937                             | .10                                                   | .91                                                                 | .917                                                               |
| 12    | 79.0                            | 2.2                 | 77.9                | 3.3                          | .937                             | .10                                                   | 1.11                                                                | .901                                                               |
| 13    | 79.6                            | 3.2                 | 78.0                | 4.8                          | .940                             | .09                                                   | .66                                                                 | .859                                                               |
| 14    | 80.2                            | 2.9                 | 78.7                | 4.4                          | .961                             | .33                                                   | .53                                                                 | .871                                                               |
| 15    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                       |                                                                     |                                                                    |
| 16    | 80.1                            | 3.2                 | 78.5                | 4.8                          | .955                             | .25                                                   | .68                                                                 | .859                                                               |
| 17    | 80.0                            | 3.2                 | 78.4                | 4.8                          | .952                             | .21                                                   | .68                                                                 | .859                                                               |
| 18    | 79.2                            | 2.8                 | 77.8                | 4.2                          | .934                             | .05                                                   | .42                                                                 | .876                                                               |
| 19    | 78.7                            | 1.9                 | 77.7                | 2.9                          | .931                             | .04                                                   | 0.97                                                                | .912                                                               |
| 20    | 80.1                            | 2.6                 | 78.8                | 3.9                          | .964                             | .36                                                   | 1.36                                                                | .884                                                               |
| 21    | 80.5                            | 3.2                 | 78.9                | 4.8                          | .967                             | .37                                                   | .70                                                                 | .859                                                               |
| 22    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                       |                                                                     |                                                                    |
| 23    | 80.7                            | 2.3                 | 79.5                | 3.5                          | .986                             | .57                                                   | .25                                                                 | .894                                                               |
| 24    | 80.6                            | 1.6                 | 79.8                | 2.4                          | .995                             | .71                                                   | 0.83                                                                | .928                                                               |
| 25    | 81.0                            | 2.6                 | 79.7                | 3.9                          | .992                             | .63                                                   | 1.40                                                                | .884                                                               |
| 26    | 80.9                            | 3.7                 | 79.0                | 5.6                          | .970                             | .37                                                   | 2.02                                                                | .837                                                               |
| 27    | 80.7                            | 2.5                 | 79.4                | 3.8                          | .983                             | .54                                                   | 1.35                                                                | .886                                                               |
| 28    | 79.7                            | 2.0                 | 78.7                | 3.0                          | .961                             | .35                                                   | .02                                                                 | .910                                                               |
| 29    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                       |                                                                     |                                                                    |
| 30    | 80.3                            | 1.9                 | 79.3                | 2.9                          | .979                             | .53                                                   | .01                                                                 | .912                                                               |
| 31    | 80.6                            | 1.8                 | 79.7                | 2.7                          | .992                             | .66                                                   | 0.95                                                                | .913                                                               |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1855.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Hour.      | Mean Height of the Barometer at 32° Fahrt. | Range of the Barometer for each hour during the Month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the Month. |      |       |
|------------|--------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                            | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                    | Inches.                                                | Inches. | Inches. | o                          | o                                                        | o    | o     |
| Mid-night. | 29.537                                     | 29.690                                                 | 29.429  | 0.261   | 81.1                       | 82.1                                                     | 79.4 | 2.7   |
| 1          | .523                                       | .681                                                   | .423    | .258    | 80.8                       | 81.9                                                     | 78.8 | 3.1   |
| 2          | .511                                       | .675                                                   | .407    | .268    | 80.5                       | 81.7                                                     | 78.4 | 3.3   |
| 3          | .497                                       | .668                                                   | .392    | .276    | 80.2                       | 81.8                                                     | 78.4 | 3.4   |
| 4          | .499                                       | .659                                                   | .386    | .273    | 80.0                       | 81.4                                                     | 78.0 | 3.4   |
| 5          | .508                                       | .679                                                   | .396    | .283    | 79.7                       | 81.2                                                     | 78.0 | 3.2   |
| 6          | .524                                       | .690                                                   | .410    | .280    | 79.6                       | 81.2                                                     | 78.4 | 2.8   |
| 7          | .536                                       | .701                                                   | .428    | .273    | 80.1                       | 82.0                                                     | 76.6 | 5.4   |
| 8          | .547                                       | .693                                                   | .445    | .248    | 81.2                       | 83.6                                                     | 78.2 | 5.4   |
| 9          | .552                                       | .685                                                   | .450    | .235    | 82.2                       | 85.4                                                     | 78.4 | 7.0   |
| 10         | .552                                       | .692                                                   | .448    | .244    | 83.4                       | 87.6                                                     | 79.4 | 8.2   |
| 11         | .546                                       | .691                                                   | .435    | .256    | 84.5                       | 88.5                                                     | 79.6 | 8.9   |
| Noon.      | .533                                       | .672                                                   | .411    | .261    | 85.6                       | 89.6                                                     | 79.7 | 9.9   |
| 1          | .513                                       | .649                                                   | .385    | .264    | 86.0                       | 90.0                                                     | 79.9 | 10.1  |
| 2          | .494                                       | .632                                                   | .372    | .260    | 85.2                       | 89.5                                                     | 81.1 | 8.4   |
| 3          | .477                                       | .630                                                   | .347    | .283    | 85.1                       | 92.2                                                     | 80.2 | 12.0  |
| 4          | .458                                       | .613                                                   | .337    | .276    | 84.2                       | 90.2                                                     | 78.6 | 11.6  |
| 5          | .464                                       | .624                                                   | .340    | .284    | 83.7                       | 89.8                                                     | 78.8 | 11.0  |
| 6          | .476                                       | .635                                                   | .357    | .278    | 83.1                       | 85.8                                                     | 78.8 | 7.0   |
| 7          | .496                                       | .652                                                   | .374    | .278    | 82.5                       | 84.9                                                     | 78.6 | 6.3   |
| 8          | .519                                       | .679                                                   | .394    | .285    | 82.2                       | 84.2                                                     | 79.0 | 5.2   |
| 9          | .542                                       | .689                                                   | .407    | .282    | 82.0                       | 83.6                                                     | 78.8 | 4.8   |
| 10         | .555                                       | .696                                                   | .420    | .276    | 81.7                       | 83.0                                                     | 79.0 | 4.0   |
| 11         | .555                                       | .696                                                   | .425    | .271    | 81.4                       | 82.7                                                     | 79.6 | 3.1   |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1855.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Hour.          | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of Air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity<br>complete saturation be-<br>ing unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                  |
| Mid-<br>night. | 79.5                            | 1.6                 | 78.7                | 2.4                          | 0.961                            | 10.37                                            | 0.80                                                                    | 0.928                                                            |
| 1              | 79.3                            | 1.5                 | 78.5                | 2.3                          | .955                             | .31                                              | .76                                                                     | .931                                                             |
| 2              | 79.2                            | 1.3                 | 78.5                | 2.0                          | .955                             | .31                                              | .67                                                                     | .939                                                             |
| 3              | 78.9                            | 1.3                 | 78.2                | 2.0                          | .946                             | .21                                              | .67                                                                     | .938                                                             |
| 4              | 78.8                            | 1.2                 | 78.2                | 1.8                          | .946                             | .21                                              | .60                                                                     | .944                                                             |
| 5              | 78.6                            | 1.1                 | 78.0                | 1.7                          | .940                             | .15                                              | .57                                                                     | .947                                                             |
| 6              | 78.5                            | 1.1                 | 77.9                | 1.7                          | .937                             | .12                                              | .57                                                                     | .947                                                             |
| 7              | 78.8                            | 1.3                 | 78.1                | 2.0                          | .943                             | .18                                              | .66                                                                     | .939                                                             |
| 8              | 79.4                            | 1.8                 | 78.5                | 2.7                          | .955                             | .29                                              | .92                                                                     | .918                                                             |
| 9              | 79.8                            | 2.4                 | 78.6                | 3.6                          | .958                             | .30                                              | 1.24                                                                    | .893                                                             |
| 10             | 80.3                            | 3.1                 | 78.7                | 4.7                          | .961                             | .31                                              | .65                                                                     | .862                                                             |
| 11             | 80.9                            | 3.6                 | 79.1                | 5.4                          | .973                             | .42                                              | .93                                                                     | .844                                                             |
| Noon.          | 81.4                            | 4.2                 | 79.3                | 6.3                          | .979                             | .46                                              | 2.30                                                                    | .820                                                             |
| 1              | 81.7                            | 4.3                 | 79.5                | 6.5                          | .986                             | .51                                              | .40                                                                     | .814                                                             |
| 2              | 81.3                            | 3.9                 | 79.3                | 5.9                          | .979                             | .46                                              | .15                                                                     | .830                                                             |
| 3              | 81.3                            | 3.8                 | 79.4                | 5.7                          | .983                             | .49                                              | .08                                                                     | .835                                                             |
| 4              | 80.6                            | 3.6                 | 78.8                | 5.4                          | .964                             | .34                                              | 1.90                                                                    | .845                                                             |
| 5              | 80.5                            | 3.2                 | 78.9                | 4.8                          | .967                             | .37                                              | .70                                                                     | .859                                                             |
| 6              | 80.3                            | 2.8                 | 78.9                | 4.2                          | .967                             | .39                                              | .47                                                                     | .876                                                             |
| 7              | 80.0                            | 2.5                 | 78.7                | 3.8                          | .961                             | .33                                              | .31                                                                     | .887                                                             |
| 8              | 79.8                            | 2.4                 | 78.6                | 3.6                          | .958                             | .30                                              | .24                                                                     | .893                                                             |
| 9              | 79.8                            | 2.2                 | 78.7                | 3.3                          | .961                             | .35                                              | .12                                                                     | .902                                                             |
| 10             | 79.7                            | 2.0                 | 78.7                | 3.0                          | .961                             | .35                                              | .02                                                                     | .910                                                             |
| 11             | 79.6                            | 1.8                 | 78.7                | 2.7                          | .961                             | .35                                              | 0.92                                                                    | .918                                                             |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1855.*

Solar radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain.   | Prevailing direction of the Wind. | General Aspect of the Sky.                                          |
|-------|-----------------------|---------|-----------------------------------|---------------------------------------------------------------------|
|       |                       | Inches. |                                   |                                                                     |
| 1     | o                     |         |                                   | Sunday.                                                             |
| 2     | Sunday.               | ..      | E. or S. or S. E.                 | Cloudy and also raining at 4 A. M.                                  |
| 3     | ..                    | 1.76    | S. E. or N. E. or S.              | Cloudy and constantly raining.                                      |
| 4     | ..                    | 1.10    | S. or S. W.                       | Cloudy and occasionally raining.                                    |
| 5     | ..                    | 0.34    | S.                                | Cloudy and also raining between 5 & 9 A. M.                         |
| 6     | ..                    | 1.42    | S. or S. W. or S. E.              | Cloudy and constantly raining.                                      |
| 7     | 125.5                 | 0.42    | S.                                | Cloudy and also raining between 3 and 4 A. M.                       |
| 8     | Sunday.               | 0.80    |                                   | Sunday.                                                             |
| 9     | 117.2                 | ..      | S. or N. E.                       | Cloudy with occasional rain.                                        |
| 10    | ..                    | 3.42    | E. or S. W.                       | Ditto.                                                              |
| 11    | ..                    | 1.16    | S. E. or S.                       | Cloudy and constantly raining.                                      |
| 12    | ..                    | 0.62    | S. or S. E.                       | Cloudy and also rain before sun rise.                               |
| 13    | ..                    | ..      | S. E. or S.                       | Cloudy.                                                             |
| 14    | ..                    | ..      | S. or S. E.                       | Ditto.                                                              |
| 15    | Sunday.               |         |                                   | Sunday.                                                             |
| 16    | ..                    | ..      | w. or N.W. or N. or E.            | Cloudy with occasional rains.                                       |
| 17    | ..                    | 0.54    | E. or N. or S. E.                 | Cloudy.                                                             |
| 18    | ..                    | 0.88    | E. or S.                          | Cloudy with heavy rains before sun rise.                            |
| 19    | ..                    | 0.48    | N. E. or S. E.                    | Cloudy with rain till 9 A. M.                                       |
| 20    | ..                    | ..      | E. or S. E.                       | Cloudy.                                                             |
| 21    | ..                    | 0.26    | S. E. or N. E. or E.              | Cloudless till 5 A. M. cloudy afterwards, also drizzling at 2 P. M. |
| 22    | Sunday.               |         |                                   | Sunday.                                                             |
| 23    | ..                    | 0.46    | N. E. or N. or E.                 | Cloudy and also raining at 4 P. M.                                  |
| 24    | ..                    | 0.68    | N. E. or N. N. E.                 | Cloudy with occasional rains.                                       |
| 25    | ..                    | ..      | N. E.                             | Cloudy and raining at 4½ P. M.                                      |
| 26    | ..                    | 0.24    | N. E.                             | Cloudy and also drizzling at 1 P. M.                                |
| 27    | ..                    | 0.75    | N. E. or E.                       | Cloudy and also raining between Noon and 3 P. M.                    |
| 28    | ..                    | 0.60    | E. or S.                          | Cloudy and constantly raining.                                      |
| 29    | Sunday.               | 1.23    |                                   | Sunday.                                                             |
| 30    | ..                    | 0.43    | S. S. W. or S.                    | Cloudy and constantly raining.                                      |
| 31    | ..                    | 1.59    | S.                                | Ditto.                                                              |

∩i Cirri, ∩i Cirro-strati, ∩i Cumuli, ∩i Cumulo-strati, ∩i Nimbi, —i Strati,  
∩i Cirro-cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of August, 1855.*

Latitude 22° 33' 1" North, Longitude 88° 20' 34" East.

Height of the Cistern of the Standard Barometer above the Level of the Sea 18.11. feet

Daily Means, &c. of the Observations, and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches                                          | Inches.                                   | Inches. | Inches. | °                             | °                                             | °    | °     |
| 1     | 29.449                                          | 29.499                                    | 29.388  | 0.111   | 80.7                          | 81.4                                          | 79.9 | 1.5   |
| 2     | .466                                            | .512                                      | .423    | .089    | 80.8                          | 85.0                                          | 77.8 | 7.2   |
| 3     | .437                                            | .478                                      | .376    | .102    | 79.5                          | 81.2                                          | 77.8 | 2.4   |
| 4     | .437                                            | .497                                      | .389    | .108    | 82.1                          | 85.6                                          | 79.8 | 5.8   |
| 5     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 6     | .509                                            | .554                                      | .470    | .084    | 83.3                          | 87.8                                          | 78.0 | 9.8   |
| 7     | .511                                            | .563                                      | .451    | .112    | 84.2                          | 89.2                                          | 81.4 | 7.8   |
| 8     | .528                                            | .577                                      | .479    | .098    | 82.6                          | 89.6                                          | 78.6 | 11.0  |
| 9     | .555                                            | .611                                      | .492    | .119    | 83.4                          | 87.4                                          | 80.6 | 6.8   |
| 10    | .632                                            | .713                                      | .551    | .162    | 85.1                          | 90.8                                          | 81.3 | 9.5   |
| 11    | .699                                            | .755                                      | .642    | .113    | 84.6                          | 90.1                                          | 81.0 | 9.1   |
| 12    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 13    | .599                                            | .651                                      | .543    | .108    | 85.6                          | 91.5                                          | 80.2 | 11.3  |
| 14    | .651                                            | .712                                      | .610    | .102    | 87.3                          | 92.6                                          | 83.2 | 9.4   |
| 15    | .720                                            | .783                                      | .673    | .110    | 87.5                          | 93.2                                          | 84.2 | 9.0   |
| 16    | .733                                            | .795                                      | .645    | .150    | 86.5                          | 92.4                                          | 82.6 | 9.8   |
| 17    | .681                                            | .739                                      | .598    | .141    | 85.9                          | 90.8                                          | 82.8 | 8.0   |
| 18    | .593                                            | .647                                      | .498    | .149    | 85.9                          | 91.3                                          | 79.0 | 12.3  |
| 19    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 20    | .575                                            | .632                                      | .496    | .136    | 83.6                          | 89.6                                          | 79.6 | 10.0  |
| 21    | .531                                            | .590                                      | .471    | .119    | 84.1                          | 89.3                                          | 81.4 | 7.9   |
| 22    | .485                                            | .538                                      | .381    | .157    | 81.8                          | 85.8                                          | 79.7 | 6.1   |
| 23    | .477                                            | .541                                      | .426    | .115    | 83.1                          | 88.2                                          | 80.0 | 8.2   |
| 24    | .535                                            | .613                                      | .481    | .132    | 83.0                          | 86.8                                          | 80.4 | 6.4   |
| 25    | .567                                            | .624                                      | .497    | .127    | 83.4                          | 88.4                                          | 79.7 | 8.7   |
| 26    | <i>Sunday</i>                                   |                                           |         |         |                               |                                               |      |       |
| 27    | .522                                            | .568                                      | .451    | .117    | 83.9                          | 88.7                                          | 80.8 | 7.9   |
| 28    | .552                                            | .612                                      | .501    | .111    | 83.4                          | 88.0                                          | 80.2 | 7.8   |
| 29    | .618                                            | .681                                      | .567    | .114    | 82.7                          | 87.8                                          | 80.2 | 7.6   |
| 30    | .665                                            | .710                                      | .611    | .099    | 82.8                          | 86.6                                          | 80.3 | 6.3   |
| 31    | .694                                            | .765                                      | .622    | .143    | 83.5                          | 87.8                                          | 80.0 | 7.8   |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of August, 1855.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| 1     | 79.1                            | 1.6                 | 78.3                | 2.4                          | .0949                            | 10.24                                            | 0.80                                                                    | .928                                                                |
| 2     | 78.5                            | 2.3                 | 77.3                | 3.5                          | .919                             | 9.90                                             | 1.17                                                                    | .894                                                                |
| 3     | 77.8                            | 1.7                 | 76.9                | 2.6                          | .908                             | .80                                              | 0.86                                                                    | .919                                                                |
| 4     | 79.6                            | 2.5                 | 78.3                | 3.8                          | .949                             | 10.20                                            | 1.31                                                                    | .886                                                                |
| 5     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 6     | 80.6                            | 2.7                 | 79.2                | 4.1                          | .979                             | .48                                              | .45                                                                     | .878                                                                |
| 7     | 81.3                            | 2.9                 | 79.8                | 4.4                          | .995                             | .66                                              | .58                                                                     | .871                                                                |
| 8     | 80.1                            | 2.5                 | 78.8                | 3.8                          | .964                             | .36                                              | .32                                                                     | .887                                                                |
| 9     | 80.9                            | 2.5                 | 79.6                | 3.8                          | .989                             | .60                                              | .36                                                                     | .886                                                                |
| 10    | 81.4                            | 3.7                 | 79.5                | 5.6                          | .986                             | .53                                              | 2.04                                                                    | .838                                                                |
| 11    | 81.4                            | 3.2                 | 79.8                | 4.8                          | .995                             | .64                                              | 1.75                                                                    | .859                                                                |
| 12    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 13    | 81.8                            | 3.8                 | 79.9                | 5.7                          | .998                             | .65                                              | 2.11                                                                    | .835                                                                |
| 14    | 81.7                            | 5.6                 | 78.9                | 8.4                          | .967                             | .30                                              | 3.11                                                                    | .768                                                                |
| 15    | 82.7                            | 4.8                 | 80.3                | 7.2                          | 1.011                            | .76                                              | 2.73                                                                    | .798                                                                |
| 16    | 81.8                            | 4.7                 | 79.4                | 7.1                          | 0.983                            | .47                                              | .63                                                                     | .799                                                                |
| 17    | 81.8                            | 4.1                 | 79.7                | 6.2                          | .992                             | .59                                              | .28                                                                     | .823                                                                |
| 18    | 82.2                            | 3.7                 | 80.3                | 5.6                          | 1.011                            | .78                                              | .09                                                                     | .838                                                                |
| 19    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 20    | 79.9                            | 3.7                 | 78.0                | 5.6                          | 0.940                            | .07                                              | 1.96                                                                    | .837                                                                |
| 21    | 80.8                            | 3.3                 | 79.1                | 5.0                          | .973                             | .42                                              | .79                                                                     | .853                                                                |
| 22    | 80.1                            | 1.7                 | 79.2                | 2.6                          | .976                             | .50                                              | 0.90                                                                    | .921                                                                |
| 23    | 80.7                            | 2.4                 | 79.5                | 3.6                          | .986                             | .57                                              | 1.29                                                                    | .891                                                                |
| 24    | 80.5                            | 2.5                 | 79.2                | 3.8                          | .976                             | .48                                              | .34                                                                     | .887                                                                |
| 25    | 79.9                            | 3.5                 | 78.1                | 5.3                          | .943                             | .12                                              | .84                                                                     | .846                                                                |
| 26    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 27    | 81.2                            | 2.7                 | 79.8                | 4.1                          | .995                             | .66                                              | .47                                                                     | .879                                                                |
| 28    | 80.5                            | 2.9                 | 79.0                | 4.4                          | .970                             | .42                                              | .54                                                                     | .871                                                                |
| 29    | 80.2                            | 2.5                 | 78.9                | 3.8                          | .967                             | .39                                              | .33                                                                     | .887                                                                |
| 30    | 80.3                            | 2.5                 | 79.0                | 3.8                          | .970                             | .42                                              | .33                                                                     | .887                                                                |
| 31    | 80.6                            | 2.9                 | 79.1                | 4.4                          | .973                             | .45                                              | .55                                                                     | .871                                                                |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of August, 1855.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.      | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | °                          | °                                                        | °    | °     |
| Mid-night. | 29.584                                    | 29.762                                                 | 29.446  | 0.316   | 81.9                       | 85.4                                                     | 77.8 | 7.6   |
| 1          | .570                                      | .746                                                   | .419    | .327    | 81.6                       | 85.1                                                     | 77.9 | 7.2   |
| 2          | .558                                      | .735                                                   | .410    | .325    | 81.5                       | 85.0                                                     | 78.0 | 7.0   |
| 3          | .548                                      | .728                                                   | .400    | .328    | 81.3                       | 84.9                                                     | 78.0 | 6.9   |
| 4          | .545                                      | .723                                                   | .388    | .335    | 81.2                       | 84.8                                                     | 78.0 | 6.8   |
| 5          | .556                                      | .729                                                   | .401    | .328    | 81.2                       | 84.4                                                     | 78.2 | 6.2   |
| 6          | .572                                      | .745                                                   | .428    | .317    | 81.0                       | 84.2                                                     | 78.2 | 6.0   |
| 7          | .587                                      | .763                                                   | .446    | .317    | 81.5                       | 85.0                                                     | 78.0 | 7.0   |
| 8          | .602                                      | .790                                                   | .454    | .336    | 82.9                       | 87.0                                                     | 78.7 | 8.3   |
| 9          | .612                                      | .795                                                   | .468    | .327    | 84.2                       | 88.6                                                     | 78.8 | 9.8   |
| 10         | .617                                      | .794                                                   | .475    | .319    | 85.5                       | 90.4                                                     | 79.2 | 11.2  |
| 11         | .608                                      | .777                                                   | .476    | .301    | 86.5                       | 91.6                                                     | 80.6 | 11.0  |
| Noon.      | .593                                      | .768                                                   | .451    | .317    | 87.3                       | 92.4                                                     | 81.2 | 11.2  |
| 1          | .574                                      | .741                                                   | .437    | .304    | 87.5                       | 92.3                                                     | 80.4 | 11.9  |
| 2          | .551                                      | .712                                                   | .405    | .307    | 87.0                       | 92.6                                                     | 80.0 | 12.6  |
| 3          | .531                                      | .690                                                   | .394    | .296    | 86.9                       | 93.2                                                     | 80.0 | 13.2  |
| 4          | .517                                      | .673                                                   | .378    | .295    | 86.1                       | 91.8                                                     | 80.2 | 11.6  |
| 5          | .514                                      | .674                                                   | .376    | .298    | 85.6                       | 90.7                                                     | 79.7 | 11.0  |
| 6          | .529                                      | .685                                                   | .392    | .293    | 84.6                       | 89.6                                                     | 79.4 | 10.2  |
| 7          | .549                                      | .709                                                   | .409    | .300    | 83.5                       | 88.0                                                     | 78.6 | 9.4   |
| 8          | .574                                      | .747                                                   | .427    | .320    | 83.1                       | 87.4                                                     | 78.6 | 8.8   |
| 9          | .592                                      | .758                                                   | .450    | .308    | 82.6                       | 86.6                                                     | 78.0 | 8.6   |
| 10         | .606                                      | .777                                                   | .457    | .320    | 82.3                       | 86.4                                                     | 77.9 | 8.5   |
| 11         | .606                                      | .783                                                   | .460    | .323    | 82.1                       | 85.6                                                     | 77.8 | 7.8   |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of August, 1855.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Hour.          | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of Air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity<br>complete saturation be-<br>ing unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                  |
| Mid-<br>night. | 80.0                            | 1.9                 | 79.0                | 2.9                          | .0970                            | 10.44                                            | 1.00                                                                    | .0913                                                            |
| 1              | 79.9                            | 1.7                 | 79.0                | 2.6                          | .970                             | .44                                              | .090                                                                    | .921                                                             |
| 2              | 79.9                            | 1.6                 | 79.1                | 2.4                          | .973                             | .49                                              | .82                                                                     | .927                                                             |
| 3              | 79.7                            | 1.6                 | 78.9                | 2.4                          | .967                             | .43                                              | .81                                                                     | .928                                                             |
| 4              | 79.7                            | 1.5                 | 78.9                | 2.3                          | .967                             | .43                                              | .78                                                                     | .930                                                             |
| 5              | 79.6                            | 1.6                 | 78.8                | 2.4                          | .964                             | .40                                              | .81                                                                     | .928                                                             |
| 6              | 79.6                            | 1.4                 | 78.9                | 2.1                          | .967                             | .43                                              | .71                                                                     | .936                                                             |
| 7              | 79.8                            | 1.7                 | 78.9                | 2.6                          | .967                             | .41                                              | .90                                                                     | .920                                                             |
| 8              | 80.5                            | 2.4                 | 79.3                | 3.6                          | .979                             | .51                                              | 1.28                                                                    | .891                                                             |
| 9              | 80.9                            | 3.3                 | 79.2                | 5.0                          | .976                             | .45                                              | .79                                                                     | .854                                                             |
| 10             | 81.2                            | 4.3                 | 79.0                | 6.5                          | .970                             | .35                                              | 2.37                                                                    | .814                                                             |
| 11             | 81.6                            | 4.9                 | 79.1                | 7.4                          | .973                             | .38                                              | .72                                                                     | .792                                                             |
| Noon.          | 82.0                            | 5.3                 | 79.3                | 8.0                          | .979                             | .42                                              | .99                                                                     | .777                                                             |
| 1              | 81.9                            | 5.6                 | 79.1                | 8.4                          | .973                             | .36                                              | 3.13                                                                    | .768                                                             |
| 2              | 81.8                            | 5.2                 | 79.2                | 7.8                          | .976                             | .39                                              | 2.90                                                                    | .782                                                             |
| 3              | 81.9                            | 5.0                 | 79.4                | 7.5                          | .983                             | .45                                              | .80                                                                     | .789                                                             |
| 4              | 81.6                            | 4.5                 | 79.3                | 6.8                          | .979                             | .44                                              | .51                                                                     | .806                                                             |
| 5              | 81.4                            | 4.2                 | 79.3                | 6.3                          | .979                             | .46                                              | .30                                                                     | .820                                                             |
| 6              | 81.0                            | 3.6                 | 79.2                | 5.4                          | .976                             | .45                                              | 1.94                                                                    | .843                                                             |
| 7              | 80.6                            | 2.9                 | 79.1                | 4.4                          | .973                             | .45                                              | .55                                                                     | .871                                                             |
| 8              | 80.6                            | 2.5                 | 79.3                | 3.8                          | .979                             | .51                                              | .35                                                                     | .886                                                             |
| 9              | 80.1                            | 2.5                 | 78.8                | 3.8                          | .964                             | .36                                              | .32                                                                     | .887                                                             |
| 10             | 80.1                            | 2.2                 | 79.0                | 3.3                          | .970                             | .44                                              | .14                                                                     | .902                                                             |
| 11             | 80.1                            | 2.0                 | 79.1                | 3.0                          | .973                             | .47                                              | .04                                                                     | .910                                                             |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of August, 1855.*

Solar radiation, Weather, &c.

| Date. | Max Solar radiation. | Rain.   | Prevailing direction of the Wind. | General Aspect of the Sky.                                                  |
|-------|----------------------|---------|-----------------------------------|-----------------------------------------------------------------------------|
|       | o                    | Inches. |                                   |                                                                             |
| 1     | ..                   | 0.20    | S. W. or S.                       | Cloudy and drizzling occasionally.                                          |
| 2     | ..                   | ..      | S. W. or S. or S. E.              | Cloudy and raining or drizzling occasionally.                               |
| 3     | ..                   | 0.36    | S. W. or S.                       | Cloudy and raining or drizzling occasionally.                               |
| 4     | ..                   | ..      | S. W.                             | Cloudy.                                                                     |
| 5     | Sunday.              | 0.50    |                                   |                                                                             |
| 6     | ..                   | 0.80    | S. W. or W.                       | Cloudy and raining between 2 & 8 A.M.                                       |
| 7     | ..                   | 0.52    | Calm or w. or s.w. or             | Cloudy and rain at 2 & 9 P. M.                                              |
| 8     | ..                   | 0.41    | S. W. [s. s. w.]                  | Cloudy and raining occasionally.                                            |
| 9     | ..                   | ..      | S. W. or S. S. W.                 | Cloudy.                                                                     |
| 10    | ..                   | ..      | S. or S. W.                       | Ditto.                                                                      |
| 11    | ..                   | 0.10    | S. or S. W.                       | Cloudy and a shower of rain at 5 P. M.                                      |
| 12    | Sunday.              | 0.46    |                                   |                                                                             |
| 13    | 126.0                | 0.61    | S. or S. W.                       | Scattered clouds and also rain at mid-night and 1 A. M.                     |
| 14    | 124.8                | ..      | S. W.                             | Scattered clouds.                                                           |
| 15    | 130.0                | ..      | S. W. or variable.                | Scattered \i or \j.                                                         |
| 16    | 135.0                | ..      | S.                                | Scattered \i till 7 P. M. cloudless afterwards.                             |
| 17    | 125.4                | ..      | S.                                | Cloudless till 6 A. M. scattered \i or \j afterwards.                       |
| 18    | 115.0                | 2.30    | S. or S. W. or S.S.E.             | Cloudy and raining between 9 & 11 A. M.                                     |
| 19    | Sunday.              | 0.37    |                                   |                                                                             |
| 20    | 125.0                | ..      | S. or S. W. or N. E.              | Scattered clouds also drizzling at 9 P.M.                                   |
| 21    | 120.0                | ..      | N. E.                             | Scattered clouds of various kinds.                                          |
| 22    | ..                   | 1.35    | Calm or W.                        | Cloudy and drizzling between 11 A. M. and 7 P. M.                           |
| 23    | ..                   | 0.10    | W. or E. or S. E.                 | Cloudy and raining at 5 P. M.                                               |
| 24    | ..                   | ..      | E. or S. E. or S.                 | Scattered \i or \j.                                                         |
| 25    | 133.0                | ..      | S. E. or S.                       | Scattered \i.                                                               |
| 26    | Sunday.              | ..      |                                   |                                                                             |
| 27    | 126.0                | 0.32    | E. or N. E.                       | Scattered \i or \j also raining at 3 P.M.                                   |
| 28    | ..                   | 0.60    | E. or N. E.                       | Scattered \i and \j till 7 A. M. cloudy afterwards, also raining at 3 P. M. |
| 29    | ..                   | 1.31    | N. E. or E.                       | Cloudy and constantly raining.                                              |
| 30    | 130.0                | 0.62    | E.                                | Cloudy and constantly raining.                                              |
| 31    | ..                   | 0.14    | E. S. E. or E. or S.E.            | Scattered \i. or \j or \k.                                                  |

\i Cirri, \j cirro strati, \k cumuli, \l cumulo strati, \m nimbi, —i strati,  
~ cirro cumuli.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the month of June, 1855.*

Maximum pressure observed at 9,50 A. M.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.    |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|-----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                       |
| 1     | 29.155     | 98.0         | 97.8    | 75.0      | W.                 | ..                | Clear.                |
| 2     | 29.169     | 98.5         | 98.2    | 75.6      | W.                 | ..                | Ditto.                |
| 3     | 29.249     | 100.0        | 99.8    | 79.5      | N. W.              | ..                | Ditto.                |
| 4     | 29.231     | 100.8        | 100.9   | 78.5      | N. W.              | ..                | Ditto.                |
| 5     | 29.209     | 101.5        | 101.4   | 73.5      | N. W.              | ..                | Ditto.                |
| 6     | 29.181     | 102.8        | 103.3   | 73.0      | N. W.              | ..                | Ditto.                |
| 7     | 29.127     | 104.3        | 103.9   | 74.0      | N. W.              | ..                | Ditto.                |
| 8     | 29.117     | 104.0        | 105.0   | 70.0      | N. W.              | ..                | Ditto.                |
| 9     | 29.191     | 100.9        | 101.3   | 69.5      | N.                 | ..                | Ditto.                |
| 10    | 29.193     | 103.1        | 103.0   | 71.8      | N. W.              | ..                | Ditto.                |
| 11    | 29.155     | 106.6        | 106.7   | 68.5      | W.                 | ..                | Ditto.                |
| 12    | 29.151     | 104.9        | 105.0   | 75.0      | S. W.              | ..                | Ditto.                |
| 13    | 29.145     | 97.9         | 98.0    | 78.4      | W.                 | ..                | Ditto.                |
| 14    | 29.137     | 98.9         | 98.9    | 97.4      | W.                 | ..                | ~ scattered.          |
| 15    | 29.201     | 94.0         | 94.0    | 78.0      | E.                 | ..                | ~ ditto.              |
| 16    | 29.223     | 93.7         | 93.9    | 77.0      | E.                 | ..                | ~ ditto.              |
| 17    | 29.145     | 100.6        | 101.5   | 78.5      | N. W.              | ..                | Clear.                |
| 18    | 29.167     | 97.8         | 97.2    | 80.5      | E.                 | ..                | Ditto.                |
| 19    | 29.189     | 90.5         | 85.7    | 74.0      | E.                 | ..                | ~ towards east.       |
| 20    | 29.139     | 93.9         | 93.9    | 82.0      | E.                 | ..                | ~ scattered all over. |
| 21    | 29.173     | 86.0         | 84.8    | 77.9      | W.                 | ..                | ~ all over.           |
| 22    | 29.193     | 92.3         | 93.0    | 82.0      | N. E.              | ..                | ~ very few scattered. |
| 23    | 29.165     | 94.0         | 94.5    | 83.0      | N. E.              | ..                | ~ scattered.          |
| 24    | 29.107     | 98.5         | 98.8    | 79.0      | N. W.              | ..                | Clear.                |
| 25    | 29.137     | 100.0        | 100.0   | 81.4      | N. W.              | ..                | ~ scattered.          |
| 26    | 29.097     | 101.0        | 101.2   | 81.4      | N. W.              | ..                | ~ ditto.              |
| 27    | 29.015     | 97.6         | 98.0    | 82.4      | S. W.              | ..                | ~ ditto.              |
| 28    | 29.069     | 93.5         | 92.5    | 82.5      | N. E.              | ..                | ~ ditto.              |
| 29    | 29.041     | 86.0         | 85.5    | 81.6      | E.                 | 1.55              | ~ all over.           |
| 30    | 29.027     | 90.5         | 91.1    | 84.2      | S. E.              | ..                | ~ scattered.          |
| Mean. | 29.149     | 97.7         | 97.6    | 77.5      |                    | 1.55              |                       |

Barometer Observations corrected for Capillarity only.

Symbols. {  
 \ Cirus.  
 / Cirro strata.  
 > Cumuli.  
 > Cumulo strata.  
 ~ Nimbi or Nimbus.



*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the month of June, 1855.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.    |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|-----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                       |
| 1     | 29.141     | 101.5        | 100.6   | 75.5      | N. W.              | ..                | Clear.                |
| 2     | 29.147     | 103.5        | 103.5   | 76.0      | S. W.              | ..                | ~ scattered.          |
| 3     | 29.231     | 102.9        | 102.9   | 82.0      | N. W.              | ..                | Clear.                |
| 4     | 29.211     | 105.5        | 104.2   | 78.2      | N. W.              | ..                | Ditto.                |
| 5     | 29.179     | 105.8        | 106.2   | 75.5      | N. W.              | ..                | Ditto.                |
| 6     | 29.147     | 107.8        | 108.0   | 73.0      | N. W.              | ..                | Ditto.                |
| 7     | 29.115     | 108.1        | 107.8   | 74.0      | N. W.              | ..                | Ditto.                |
| 8     | 29.107     | 107.6        | 108.4   | 72.4      | N. W.              | ..                | Ditto.                |
| 9     | 29.189     | 103.9        | 163.5   | 70.0      | N. W.              | ..                | Ditto.                |
| 10    | 29.175     | 107.0        | 107.0   | 75.4      | W.                 | ..                | Ditto.                |
| 11    | 29.135     | 110.8        | 111.0   | 69.7      | N. W.              | ..                | Ditto.                |
| 12    | 29.125     | 108.6        | 107.8   | 76.0      | W.                 | ..                | Ditto.                |
| 13    | 29.129     | 102.3        | 102.8   | 78.4      | W.                 | ..                | Ditto.                |
| 14    | 29.105     | 102.0        | 102.0   | 78.5      | N. W.              | ..                | Ditto.                |
| 15    | 29.189     | 97.5         | 97.5    | 78.7      | E.                 | ..                | ~ scattered.          |
| 16    | 29.205     | 95.8         | 95.0    | 77.5      | E.                 | ..                | ~ ditto.              |
| 17    | 29.121     | 102.8        | 103.5   | 80.       | N. W.              | ..                | Ditto.                |
| 18    | 29.161     | 100.8        | 101.0   | 80.2      | E.                 | ..                | Clear.                |
| 19    | 29.173     | 88.9         | 86.5    | 77.0      | E.                 | ..                | ~ all over.           |
| 20    | 29.133     | 95.5         | 95.5    | 82.0      | E.                 | ..                | ~ scattered all over. |
| 21    | 29.159     | 89.5         | 89.2    | 78.5      | N. W.              | ..                | ~ all over.           |
| 22    | 29.179     | 95.0         | 95.5    | 81.3      | N. E.              | ..                | ~ scattered           |
| 23    | 29.137     | 96.5         | 98.0    | 81.5      | S. E.              | ..                | ~ ditto.              |
| 24    | 29.093     | 103.0        | 103.4   | 79.5      | N. W.              | ..                | Clear.                |
| 25    | 29.097     | 99.5         | 95.5    | 80.4      | S.                 | ..                | ~ all over.           |
| 26    | 29.077     | 102.4        | 103.0   | 81.4      | W.                 | ..                | ~ scattered.          |
| 27    | 29.011     | 99.9         | 100.0   | 82.5      | W.                 | ..                | ~ ditto.              |
| 28    | 29.039     | 95.0         | 94.6    | 81.6      | N. E.              | ..                | ~ ditto.              |
| 29    | 29.041     | 87.0         | 85.3    | 82.0      | S.                 | ..                | ~ all over.           |
| 30    | 28.995     | 92.8         | 92.3    | 84.4      | S. E.              | ..                | ~ scattered.          |
| Mean. | 29.131     | 100.9        | 100.3   | 78.1      |                    |                   |                       |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the month of June, 1855.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |        | Aspect of the Sky | Direction of Wind. | Quantity of Rain. |
|-------|------------|--------------|---------|-----------|----------------------|----------|--------|-------------------|--------------------|-------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean.  |                   |                    |                   |
| 1     | 29.051     | 106.9        | 105.6   | 76.2      | 107.0                | 89.0     | 98.0   | Clear.            | N. W.              | ..                |
| 2     | 29.093     | 105.2        | 104.4   | 76.4      | 105.0                | 91.3     | 98.15  |                   |                    |                   |
| 3     | 29.137     | 106.0        | 105.4   | 80.4      | 106.0                | 90.0     | 98.0   | Clear.            | N. W.              | ..                |
| 4     | 29.121     | 108.8        | 108.0   | 79.0      | 109.0                | 92.0     | 100.5  | ~ scattered.      | N. W.              | ..                |
| 5     | 29.087     | 110.2        | 110.4   | 74.0      | 110.0                | 90.0     | 100.0  |                   |                    |                   |
| 6     | 29.089     | 111.0        | 110.0   | 72.8      | 110.5                | 90.      | 100.25 | Clear.            | N. W.              | ..                |
| 7     | 29.045     | 112.0        | 111.5   | 74.2      | 111.5                | 94.4     | 102.95 | ~ scattered.      | N. W.              | ..                |
| 8     | 29.049     | 111.9        | 111.3   | 72.9      | 111.5                | 93.7     | 102.6  | Clear.            | N.                 | ..                |
| 9     | 29.131     | 109.5        | 108.4   | 72.4      | 109.2                | 83.8     | 96.5   | Ditto.            | N. W.              | ..                |
| 10    | 29.101     | 111.9        | 111.6   | 71.4      | 111.5                | 83.7     | 97.6   | Ditto.            | W.                 | ..                |
| 11    | 29.057     | 115.0        | 114.9   | 71.5      | 114.5                | 86.0     | 100.25 | Ditto.            | N. W.              | ..                |
| 12    | 29.077     | 112.0        | 111.0   | 75.3      | 111.5                | 92.0     | 101.75 | Ditto.            | W.                 | ..                |
| 13    | 29.041     | 108.1        | 107.5   | 78.4      | 108.0                | 94.0     | 101.0  | Ditto.            | S.                 | ..                |
| 14    | 29.009     | 106.5        | 105.5   | 79.4      | 106.0                | 92.0     | 99.0   | ~ scattered.      | S.                 | ..                |
| 15    | 29.105     | 102.0        | 102.5   | 81.4      | 102.2                | 85.5     | 93.85  | ~ ditto.          | E.                 | ..                |
| 16    | 29.099     | 104.0        | 104.0   | 77.5      | 105.0                | 85.8     | 95.4   | Ditto.            | N. E.              | ..                |
| 17    | 29.033     | 108.5        | 108.0   | 78.8      | 108.0                | 90.0     | 99.0   | Clear.            | N.                 | ..                |
| 18    | 29.073     | 105.7        | 106.4   | 83.4      | 106.0                | 90.5     | 98.25  | Ditto.            | E.                 | ..                |
| 19    | 29.071     | 93.5         | 92.5    | 77.1      | 92.5                 | 84.0     | 88.25  | Hazy.             |                    |                   |
| 20    | 29.021     | 98.9         | 98.9    | 82.0      | 99.                  | 83.5     | 91.25  | Clear. [over.     | E.                 | ..                |
| 21    | 29.061     | 95.8         | 95.8    | 80.0      | 96.0                 | 83.0     | 89.5   | ~ scattered all   | S. E.              | ..                |
| 22    | 29.093     | 98.0         | 98.7    | 82.2      | 99.0                 | 84.0     | 91.5   | ~ scattered.      | N. E.              | ..                |
| 23    | 29.023     | 102.8        | 102.3   | 81.1      | 102.0                | 86.8     | 94.4   | Clear.            | N. W.              | ..                |
| 24    | 28.999     | 108.8        | 108.5   | 77.4      | 108.0                | 90.8     | 99.4   | ~ scattered.      | N. W.              | ..                |
| 25    | 29.025     | 97.9         | 97.0    | 80.4      | 100.0                | 93.0     | 96.5   | ~ all over.       | W.                 | ..                |
| 26    | 28.973     | 106.7        | 107.0   | 81.5      | 106.8                | 89.7     | 98.25  | ~ scattered.      | W.                 | ..                |
| 27    | 28.925     | 90.9         | 88.4    | 82.0      | 100.0                | 87.5     | 93.75  | ~ all.            | S. E.              | ..                |
| 28    | 28.961     | 94.9         | 94.5    | 80.8      | 95.5                 | 85.5     | 90.5   | ~ scattered.      | E.                 | ..                |
| 29    | 28.977     | 89.9         | 89.4    | 83.0      | 90.0                 | 77.5     | 83.75  | ~ ditto.          | S. E.              | ..                |
| 30    | 28.999     | 85.8         | 84.9    | 81.6      | 92.0                 | 81.0     | 86.5   | ~ all over.       | N. W.              | 1.12              |
| Mean. | 28.717     | 101.9        | 105.4   | 78.1      | 104.7                | 88.0     | 96.22  |                   |                    | 1.12              |

*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the month of July, 1855.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the sky. |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|--------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                    |
| 1     | 29.055     | 87.5         | 88.5    | 83.2      | N. E.              | ..                | ☼ scattered.       |
| 2     | 29.027     | 82.8         | 82.8    | 80.5      | N.                 | 0.22              | ☼ all over.        |
| 3     | 28.971     | 84.8         | 85.4    | 80.9      | N. E.              | 0.12              | ☼ scattered.       |
| 4     | 29.071     | 84.2         | 84.5    | 81.0      | S. E.              | ..                | ☼ all over.        |
| 5     | 29.155     | 85.9         | 86.3    | 82.1      | N.                 | ..                | ☼ scattered.       |
| 6     | 29.139     | 87.6         | 87.8    | 83.2      | N. E.              | ..                | ☼ ditto.           |
| 7     | 29.143     | 87.7         | 87.8    | 84.2      | W.                 | ..                | ☼ ditto.           |
| 8     | 29.105     | 86.2         | 86.4    | 83.0      | W.                 | ..                | ☼ ditto.           |
| 9     | 29.093     | 84.8         | 85.2    | 82.0      | W.                 | ..                | ☼ ditto.           |
| 10    | 29.071     | 86.0         | 86.5    | 81.5      | N. E.              | 0.27              | ☼ ditto.           |
| 11    | 29.079     | 85.6         | 86.0    | 82.5      | S. E.              | 0.22              | ☼ ditto.           |
| 12    | 29.083     | 86.5         | 86.6    | 81.4      | E.                 | 0.17              | ☼ ditto.           |
| 13    | 29.061     | 84.9         | 85.5    | 79.5      | S. E.              | ..                | ☼ ditto.           |
| 14    | 29.217     | 86.6         | 86.9    | 80.5      | S. W.              | ..                | ☼ ditto.           |
| 15    | 29.205     | 86.0         | 86.5    | 80.2      | N. E.              | ..                | ☼ ditto.           |
| 16    | 29.137     | 87.0         | 87.6    | 80.2      | W.                 | ..                | ☼ ditto.           |
| 17    | 29.063     | 83.0         | 82.0    | 79.0      | W.                 | ..                | ☼ all over.        |
| 18    | 29.085     | 83.3         | 81.0    | 79.0      | E.                 | ..                | ☼ ditto.           |
| 19    | 29.115     | 85.0         | 86.0    | 81.0      | N. E.              | 0.12              | ☼ scattered.       |
| 20    | 29.125     | 83.5         | 84.0    | 80.5      | E.                 | 0.67              | ☼ all over.        |
| 21    | 29.167     | 83.2         | 84.0    | 81.0      | S. E.              | ..                | ☼ ditto.           |
| 22    | 29.169     | 81.5         | 81.5    | 80.0      | ..                 | ..                | ☼ ditto.           |
| 23    | 29.177     | 81.0         | 81.0    | 79.3      | S. W.              | ..                | ☼ ditto.           |
| 24    | 29.087     | 79.6         | 79.4    | 78.7      | S. W.              | 0.52              | ☼ ditto.           |
| 25    | 29.115     | 81.8         | 83.0    | 81.2      | S. E.              | 0.82              | ☼ ditto.           |
| 26    | 29.109     | 83.9         | 84.2    | 81.2      | W.                 | 0.52              | ☼ scattered.       |
| 27    | 29.175     | 84.9         | 85.3    | 81.9      | S. W.              | ..                | ☼ ditto.           |
| 28    | 29.117     | 85.2         | 85.5    | 81.9      | W.                 | ..                | ☼ ditto.           |
| 29    | 29.105     | 83.4         | 83.8    | 81.8      | N. W.              | ..                | ☼ all over.        |
| 30    | 29.093     | 85.9         | 85.7    | 80.8      | W.                 | ..                | ☼ scattered.       |
| 31    | 29.085     | 85.9         | 85.0    | 79.5      | W.                 | ..                | Hazy.              |
| Mean. | 29.109     | 84.7         | 84.9    | 82.3      |                    | 3.65              |                    |

Barometer Observations corrected for Capillarity only.

Symbols. { ☼ Cirrus.  
☼ Cirro strata.  
☼ Cumuli.  
☼ Cumulo strata.  
☼ Nimbi or Nimbus.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of July, 1855.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the sky. |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|--------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                    |
| 1     | 29.039     | 90.0         | 90.9    | 83.0      | E.                 | ..                | ☼ scattered.       |
| 2     | 29.021     | 82.5         | 82.0    | 80.0      | N.                 | 0.17              | ☼ all over.        |
| 3     | 29.951     | 85.9         | 87.0    | 82.5      | E.                 | ..                | ☼ scattered.       |
| 4     | 29.065     | 86.7         | 87.3    | 82.4      | E.                 | ..                | ☼ ditto.           |
| 5     | 29.143     | 88.5         | 89.4    | 83.1      | N. E.              | ..                | ☼ all over.        |
| 6     | 29.121     | 89.0         | 89.7    | 84.0      | N. E.              | ..                | ☼ scattered.       |
| 7     | 29.105     | 89.9         | 90.5    | 85.0      | W.                 | ..                | ☼ ditto.           |
| 8     | 29.083     | 86.0         | 85.5    | 81.9      | N.                 | ..                | ☼ all over.        |
| 9     | 29.077     | 86.0         | 86.5    | 82.5      | N.                 | ..                | ☼ ditto.           |
| 10    | 29.047     | 86.9         | 87.8    | 81.6      | E.                 | ..                | ☼ ditto.           |
| 11    | 29.057     | 88.0         | 88.5    | 83.4      | S. E.              | ..                | ☼ scattered.       |
| 12    | 29.077     | 87.6         | 87.5    | 81.0      | E.                 | ..                | ☼ ditto.           |
| 13    | 29.061     | 86.8         | 86.5    | 79.0      | N. E.              | ..                | ☼ ditto.           |
| 14    | 29.199     | 86.8         | 87.0    | 80.0      | S. W.              | ..                | ☼ ditto.           |
| 15    | 29.163     | 88.2         | 88.5    | 80.9      | N. E.              | ..                | ☼ ditto.           |
| 16    | 29.105     | 89.0         | 89.0    | 80.5      | S. W.              | ..                | ☼ ditto.           |
| 17    | 29.049     | 80.8         | 80.5    | 78.8      | S. W.              | ..                | ☼ all over.        |
| 18    | 29.065     | 82.9         | 82.5    | 80.3      | E.                 | 0.28              | ☼ ditto.           |
| 19    | 29.101     | 86.5         | 86.6    | 81.0      | N. E.              | ..                | ☼ scattered.       |
| 20    | 29.107     | 86.5         | 87.4    | 82.6      | E.                 | ..                | ☼ all over.        |
| 21    | 29.157     | 86.0         | 86.0    | 81.7      | S. E.              | ..                | ☼ ditto.           |
| 22    | 29.163     | 82.0         | 82.0    | 80.4      | S. W.              | ..                | ☼ ditto.           |
| 23    | 29.149     | 83.5         | 84.0    | 80.4      | S. W.              | ..                | ☼ ditto.           |
| 24    | 29.063     | 82.3         | 82.8    | 80.4      | W.                 | ..                | ☼ ditto.           |
| 25    | 29.083     | 82.3         | 81.9    | 80.3      | S. W.              | 0.22              | ☼ ditto.           |
| 26    | 29.079     | 87.2         | 87.7    | 82.5      | W.                 | ..                | ☼ ditto.           |
| 27    | 29.135     | 83.0         | 81.7    | 80.4      | W.                 | 0.72              | ☼ ditto.           |
| 28    | 29.091     | 86.9         | 88.2    | 82.5      | N. W.              | ..                | ☼ scattered.       |
| 29    | 29.073     | 84.3         | 84.5    | 82.0      | N. W.              | 0.84              | ☼ all over.        |
| 30    | 29.089     | 88.9         | 88.9    | 82.0      | W.                 | ..                | ☼ scattered.       |
| 31    | 29.073     | 88.0         | 88.0    | 80.8      | W.                 | ..                | Hazy.              |
| Mean. | 29.090     | 86.0         | 86.0    | 81.5      |                    | 2.23              |                    |



*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the month of July, 1855.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky. | Direction of Wind. | Quantity of Rain. |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------|--------------------|-------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                    |                    |                   |
| 1     | 28.989     | 84.5         | 84.0    | 81.2      | 90.5                 | 80.0     | 85.25 | ☼ all over.        | E.                 | 0.62              |
| 2     | 28.969     | 82.8         | 82.0    | 80.0      | 84.0                 | 79.9     | 81.95 | ☼ ditto.           | N. W.              | 0.27              |
| 3     | 28.891     | 87.6         | 88.1    | 82.1      | 88.0                 | 79.0     | 83.5  | ☼ scattered.       | S. E.              | 0.12              |
| 4     | 29.025     | 89.0         | 89.3    | 82.3      | 89.0                 | 79.8     | 84.4  | ☼ ditto.           | E.                 | ..                |
| 5     | 29.075     | 85.5         | 84.6    | 82.0      | 89.5                 | 80.8     | 85.15 | ☼ all over.        | W.                 | ..                |
| 6     | 29.055     | 85.8         | 84.4    | 84.0      | 89.5                 | 80.9     | 85.2  | ☼ ditto.           | W.                 | 2.17              |
| 7     | 29.049     | 87.7         | 87.4    | 84.5      | 90.5                 | 80.5     | 85.5  | ☼ ditto.           | W.                 | ..                |
| 8     | 29.041     | 83.0         | 83.0    | 81.0      | 86.0                 | 80.0     | 83.0  | ☼ ditto.           | W.                 | 0.22              |
| 9     | 29.009     | 86.8         | 86.8    | 83.2      | 86.5                 | 78.0     | 82.25 | ☼ ditto.           | N. W.              | ..                |
| 10    | 28.959     | 88.9         | 88.5    | 82.5      | 88.5                 | 78.0     | 83.25 | ☼ ditto.           | E.                 | ..                |
| 11    | 28.979     | 88.0         | 87.5    | 83.6      | 88.0                 | 79.8     | 83.9  | ☼ scattered.       | S. E.              | 0.47              |
| 12    | 29.001     | 89.6         | 89.9    | 81.5      | 89.5                 | 77.5     | 83.5  | ☼ ditto.           | E.                 | ..                |
| 13    | 29.015     | 88.9         | 89.0    | 81.0      | 88.9                 | 79.8     | 84.35 | ☼ ditto.           | N. E.              | ..                |
| 14    | 29.165     | 88.5         | 88.4    | 80.0      | 88.5                 | 79.0     | 83.75 | ☼ ditto.           | W.                 | ..                |
| 15    | 29.105     | 91.0         | 91.2    | 82.0      | 91.0                 | 80.5     | 85.75 | ☼ ditto.           | N.                 | ..                |
| 16    | 29.031     | 92.0         | 91.8    | 82.4      | 92.0                 | 80.0     | 86.0  | ☼ ditto.           | W.                 | ..                |
| 17    | 29.993     | 81.9         | 82.0    | 79.6      | 82.0                 | 79.5     | 80.75 | ☼ all over.        | S. W.              | 0.69              |
| 18    | 28.989     | 86.8         | 87.2    | 81.6      | 87.4                 | 79.5     | 83.45 | ☼ ditto.           | W.                 | ..                |
| 19    | 29.011     | 84.0         | 83.5    | 80.5      | 87.0                 | 77.5     | 82.25 | ☼ scattered.       | E.                 | ..                |
| 20    | 29.071     | 82.0         | 82.2    | 80.5      | 86.0                 | 77.5     | 81.95 | ☼ all over.        | S.                 | 1.17              |
| 21    | 29.069     | 81.0         | 81.6    | 79.4      | 85.5                 | 78.5     | 82.0  | ☼ ditto.           | S. W.              | 0.87              |
| 22    | 29.119     | 82.9         | 82.9    | 80.4      | 82.5                 | 78.0     | 80.25 | ☼ ditto.           | S. W.              | ..                |
| 23    | 29.053     | 84.0         | 85.0    | 81.0      | 84.5                 | 77.8     | 81.15 | ☼ scattered.       | N. W.              | ..                |
| 24    | 29.009     | 82.0         | 80.9    | 79.4      | 84.0                 | 79.9     | 81.95 | ☼ all over.        | W.                 | ..                |
| 25    | 29.029     | 81.5         | 81.5    | 79.5      | 81.5                 | 77.0     | 79.25 | ☼ ditto.           | N. W.              | ..                |
| 26    | 29.041     | 81.5         | 80.6    | 79.4      | 88.0                 | 76.5     | 82.75 | ☼ ditto.           | N.                 | 0.12              |
| 27    | 29.087     | 87.9         | 87.9    | 82.8      | 87.0                 | 78.5     | 82.75 | ☼ ditto.           | W.                 | ..                |
| 28    | 29.035     | 91.8         | 92.3    | 84.6      | 91.5                 | 79.0     | 85.25 | ☼ scattered.       | N. W.              | ..                |
| 29    | 28.997     | 89.9         | 90.2    | 84.5      | 89.5                 | 79.0     | 84.25 | ☼ ditto.           | N. W.              | ..                |
| 30    | 29.033     | 92.0         | 92.4    | 83.0      | 91.5                 | 80.2     | 85.85 | ☼ ditto.           | W.                 | ..                |
| 31    | 29.017     | 91.3         | 91.1    | 80.8      | 90.5                 | 80.0     | 85.25 | ☼ ditto.           | W.                 | ..                |
| Mean. | 29.050     | 86.6         | 89.5    | 81.6      | 87.6                 | 79.0     | 83.39 |                    |                    | 6.72              |

Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of August, 1855.

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.    |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|-----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                       |
| 1     | 29.089     | 84.9         | 85.4    | 78.4      | S. W.              | ..                | ∩ scattered.          |
| 2     | 29.135     | 85.5         | 85.5    | 78.2      | N. W.              | ..                | ∩ ditto.              |
| 3     | 29.081     | 86.3         | 86.4    | 78.4      | S. W.              | ..                | ∩ ditto.              |
| 4     | 29.047     | 86.9         | 86.9    | 78.5      | W.                 | ..                | ∩ scattered in zen.   |
| 5     | 29.115     | 85.0         | 85.6    | 78.0      | W.                 | ..                | Clear.                |
| 6     | 29.155     | 90.5         | 90.7    | 79.0      | W.                 | ..                | ∩ a few to W.         |
| 7     | 29.139     | 88.9         | 89.4    | 78.4      | W.                 | ..                | Clear.                |
| 8     | 29.117     | 89.0         | 89.6    | 78.9      | N. W.              | ..                | Ditto.                |
| 9     | 29.089     | 88.7         | 89.2    | 79.2      | W.                 | ..                | ∩ scattered.          |
| 10    | 29.177     | 88.8         | 89.0    | 78.9      | N. W.              | ..                | ∩ ditto to E. S.      |
| 11    | 29.285     | 89.0         | 89.5    | 76.9      | W.                 | ..                | Scattered to E.       |
| 12    | 29.253     | 90.7         | 92.5    | 78.5      | N. W.              | ..                | ∩ scattered.          |
| 13    | 29.189     | 88.5         | 88.8    | 76.0      | N. W.              | ..                | Clear.                |
| 14    | 29.265     | 89.0         | 89.6    | 77.5      | N. W.              | ..                | Ditto.                |
| 15    | 29.317     | 90.3         | 90.9    | 77.7      | N. W.              | ..                | Ditto.                |
| 16    | 29.319     | 91.0         | 92.0    | 76.6      | W.                 | ..                | ∩ scattered in zen.   |
| 17    | 29.295     | 92.0         | 93.0    | 79.0      | S. W.              | ..                | ∩ scattered.          |
| 18    | 29.235     | 91.8         | 92.0    | 76.9      | N. W.              | ..                | ∩ ditto.              |
| 19    | 29.147     | 92.0         | 92.4    | 78.2      | W.                 | ..                | Clear.                |
| 20    | 29.211     | 87.5         | 88.0    | 78.5      | W.                 | ..                | ∩ scattered in zen.   |
| 21    | 29.209     | 89.9         | 90.2    | 78.9      | S. W.              | ..                | ∩ ditto. [hor.        |
| 22    | 29.193     | 89.5         | 90.5    | 77.0      | S. W.              | ..                | ∩ scattered towards   |
| 23    | 29.191     | 89.5         | 89.9    | 72.5      | N. W.              | ..                | ∩ scattered in zen.   |
| 24    | 29.205     | 92.6         | 93.5    | 73.8      | N. W.              | ..                | Clear.                |
| 25    | 29.241     | 92.5         | 92.5    | 76.2      | N. W.              | ..                | ∩ scattered in zen.   |
| 26    | 29.251     | 93.0         | 93.2    | 76.1      | N. W.              | ..                | Clear.                |
| 27    | 29.213     | 89.5         | 90.0    | 76.0      | N. W.              | ..                | ∩ scattered.          |
| 28    | 29.229     | 92.0         | 93.0    | 77.0      | N. W.              | ..                | Scattered.            |
| 29    | 29.271     | 93.6         | 94.5    | 77.4      | N. W.              | ..                | Clear.                |
| 30    | 29.291     | 92.0         | 92.5    | 81.0      | E.                 | ..                | ∩ scattered all over. |
| 31    | 29.281     | 91.0         | 91.6    | 82.8      | E.                 | ..                | ∩ scattered.          |
| Mean. | 29.201     | 89.7         | 90.2    | 77.7      |                    |                   |                       |

Barometer Observations corrected for Capillarity only.

Symbols. { ∩ Cirrus.  
 { ∩ Cirro strata.  
 { ∩ Cumuli.  
 { ∩ Cumulo strata.  
 { ∩ Nimbi or Nimbus.

Note.—The dry bulb and maximum Register do not agree, the former always reads more than the latter. The average difference is 1.6.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of August, 1855.*

## Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.     |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                        |
| 1     | 29.103     | 87.9         | 87.9    | 80.6      | S. W.              | ..                | ✓ scattered.           |
| 2     | 29.127     | 88.0         | 88.5    | 79.1      | W.                 | ..                | ✓ ditto.               |
| 3     | 29.065     | 88.9         | 88.9    | 78.2      | S. W.              | ..                | ✓ ditto.               |
| 4     | 29.025     | 89.9         | 90.0    | 80.0      | N. W.              | ..                | ✓ ditto.               |
| 5     | 29.085     | 86.5         | 87.9    | 78.5      | W.                 | ..                | Clear.                 |
| 6     | 29.135     | 91.5         | 92.0    | 80.0      | W.                 | ..                | ✓ a few to W.          |
| 7     | 29.119     | 92.5         | 92.9    | 80.5      | W.                 | ..                | ✓ scattered in zen.    |
| 8     | 29.097     | 92.1         | 92.5    | 80.5      | N. W.              | ..                | Scattered in zen.      |
| 9     | 29.079     | 92.3         | 92.6    | 80.0      | W.                 | ..                | ✓ scattered.           |
| 10    | 29.187     | 91.7         | 92.2    | 80.0      | N. W.              | ..                | ✓ all over.            |
| 11    | 29.275     | 92.8         | 93.3    | 79.0      | S. W.              | ..                | ✓ scattered.           |
| 12    | 29.247     | 93.5         | 93.8    | 78.4      | S. W.              | ..                | ✓ ditto.               |
| 13    | 29.179     | 90.0         | 91.6    | 78.0      | N. W.              | ..                | ✓ ditto.               |
| 14    | 29.251     | 92.0         | 92.8    | 77.7      | N. W.              | ..                | ✓ ditto.               |
| 15    | 29.307     | 92.9         | 94.2    | 78.4      | N. W.              | ..                | ✓ scattered in zen.    |
| 16    | 29.311     | 94.0         | 94.8    | 78.4      | W.                 | ..                | ✓ ditto.               |
| 17    | 29.275     | 95.5         | 96.5    | 78.4      | N. W.              | ..                | ✓ scattered.           |
| 18    | 29.203     | 94.8         | 95.5    | 78.5      | N. W.              | ..                | ✓ scattered in zen.    |
| 19    | 29.135     | 92.5         | 93.0    | 78.5      | W.                 | ..                | ✓ ditto.               |
| 20    | 29.191     | 90.0         | 90.9    | 79.0      | W.                 | ..                | ✓ ditto.               |
| 21    | 29.187     | 90.9         | 90.5    | 81.4      | S. W.              | ..                | ✓ scattered.           |
| 22    | 29.179     | 92.8         | 93.7    | 78.4      | N. W.              | ..                | ✓ a few scattered.     |
| 23    | 29.173     | 92.5         | 92.9    | 73.1      | N. W.              | ..                | ✓ scattered in zen.    |
| 24    | 29.187     | 95.8         | 96.6    | 73.4      | N. W.              | ..                | Clear.                 |
| 25    | 29.221     | 96.8         | 97.4    | 77.5      | N. W.              | ..                | Ditto.                 |
| 26    | 29.227     | 97.1         | 97.5    | 76.8      | N. W.              | ..                | Ditto.                 |
| 27    | 29.191     | 93.0         | 93.5    | 76.5      | N. W.              | ..                | ✓ scattered.           |
| 28    | 29.205     | 95.5         | 96.5    | 78.5      | N. W.              | ..                | ✓ ditto.               |
| 29    | 29.247     | 97.0         | 98.0    | 79.4      | N. W.              | ..                | ✓ scattered towards E. |
| 30    | 29.267     | 94.0         | 94.8    | 82.0      | E.                 | ..                | ✓ scattered all over.  |
| 31    | 29.247     | 94.9         | 95.2    | 81.5      | E.                 | ..                | ✓ scattered.           |
| Mean. | 29.184     | 92.5         | 93.1    | 78.7      |                    |                   |                        |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of August, 1855.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and minimum. |          |       | Aspect of the Sky. | Direction of Wind. | Quantity of Rain. |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------|--------------------|-------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                    |                    |                   |
| 1     | 29.069     | 91.5         | 91.4    | 84.4      | 91.0                 | 79.9     | 85.45 | ✓ scattered.       | S. W.              | ..                |
| 2     | 29.061     | 91.5         | 91.8    | 80.6      | 91.5                 | 79.9     | 85.7  | ✓ do. all over     | W.                 | ..                |
| 3     | 28.995     | 92.4         | 92.4    | 78.5      | 92.0                 | 79.0     | 85.5  | ✓ scattered.       | W.                 | ..                |
| 4     | 28.975     | 93.6         | 93.6    | 79.9      | 93.0                 | 80.0     | 86.5  | ✓ very few s.      | W.                 | ..                |
| 5     | 29.105     | 90.2         | 90.5    | 79.8      | 90.5                 | 80.5     | 85.5  | ✓ scattered.       | N.                 | ..                |
| 6     | 29.079     | 95.0         | 95.0    | 80.0      | 94.8                 | 80.0     | 87.4  | Clear.             | W.                 | ..                |
| 7     | 29.053     | 96.2         | 96.4    | 82.6      | 96.0                 | 80.0     | 88.0  | Ditto.             | W.                 | ..                |
| 8     | 29.033     | 96.8         | 96.6    | 80.8      | 96.5                 | 81.5     | 89.0  | ✓ scattered.       | N. W.              | ..                |
| 9     | 29.027     | 93.0         | 93.0    | 79.0      | 95.0                 | 81.0     | 88.0  | ✓ s. all over.     | W.                 | ..                |
| 10    | 29.125     | 95.9         | 96.0    | 80.4      | 95.5                 | 81.2     | 88.35 | ✓ in genl.         | W.                 | ..                |
| 11    | 29.223     | 96.0         | 96.0    | 80.0      | 96.0                 | 81.5     | 88.75 | ✓ scattered.       | W.                 | ..                |
| 12    | 29.195     | 96.0         | 96.5    | 80.0      | 96.0                 | 81.0     | 88.5  | ✓ ditto.           | S. W.              | ..                |
| 13    | 29.141     | 94.9         | 95.4    | 76.7      | 94.5                 | 79.0     | 86.75 | ✓ ditto. [W.       | W.                 | 0.25              |
| 14    | 29.195     | 95.0         | 95.0    | 79.0      | 95.5                 | 79.0     | 87.25 | ✓ towards N.       | N. W.              | ..                |
| 15    | 29.231     | 96.9         | 96.0    | 79.0      | 97.3                 | 81.0     | 89.15 | ✓ scattered.       | N. W.              | ..                |
| 16    | 29.225     | 98.2         | 98.4    | 79.9      | 98.0                 | 83.0     | 90.5  | ✓ ditto.           | N. W.              | ..                |
| 17    | 29.177     | 97.8         | 99.4    | 80.5      | 98.0                 | 83.8     | 90.9  | ✓ ditto.           | N. W.              | ..                |
| 18    | 29.121     | 98.0         | 97.5    | 80.8      | 97.8                 | 83.5     | 90.65 | ✓ ditto.           | W.                 | ..                |
| 19    | 29.083     | 96.0         | 96.8    | 79.9      | 96.0                 | 82.0     | 89.0  | ✓ ditto.           | W.                 | ..                |
| 20    | 29.155     | 93.5         | 94.0    | 80.0      | 94.5                 | 82.0     | 88.25 | ✓ ditto.           | W.                 | ..                |
| 21    | 29.111     | 93.8         | 93.1    | 80.2      | 92.6                 | 83.5     | 88.05 | ✓ ditto in zen.    | N. W.              | ..                |
| 22    | 29.105     | 97.0         | 96.9    | 77.5      | 96.5                 | 81.0     | 88.75 | ✓ ditto.           | N. W.              | ..                |
| 23    | 29.107     | 97.9         | 98.0    | 76.4      | 97.0                 | 78.8     | 87.9  | ✓ ditto in zen.    | N. W.              | ..                |
| 24    | 29.123     | 100.5        | 100.5   | 78.0      | 100.0                | 80.5     | 90.25 | ✓ a few s. in.     | N. W.              | ..                |
| 25    | 29.158     | 101.8        | 101.4   | 76.5      | 101.0                | 83.4     | 92.2  | Scattered in       | N. W.              | ..                |
| 26    | 29.149     | 102.0        | 102.3   | 78.0      | 101.5                | 82.0     | 91.75 | Clear. [zen.       | N. W.              | ..                |
| 27    | 29.131     | 97.5         | 97.0    | 78.5      | 96.5                 | 82.0     | 89.25 | ✓ scattered.       | N. W.              | ..                |
| 28    | 29.145     | 99.8         | 100.0   | 80.4      | 99.5                 | 80.5     | 90.0  | ✓ ditto.           | W.                 | ..                |
| 29    | 29.187     | 100.5        | 95.4    | 79.9      | 101.9                | 83.6     | 92.75 | ✓ all over.        | N. E.              | ..                |
| 30    | 29.177     | 91.5         | 88.5    | 83.1      | 97.0                 | 83.5     | 90.25 | ✓ s. all over.     | N. E.              | ..                |
| 31    | 2.1 43     | 98.0         | 97.8    | 81.2      | 97.5                 | 82.5     | 90.0  | ✓ scattered.       | E.                 | ..                |
| Mean. | 29.119     | 96.0         | 95.9    | 79.6      | 96.1                 | 81.2     | 88.70 |                    |                    | 0.25              |



*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of September, 1855.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.    |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|-----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                       |
| 1     | 29.249     | 92.9         | 93.2    | 80.2      | E.                 | ..                | ☁ scattered.          |
| 2     | 29.225     | 93.0         | 93.5    | 82.8      | W.                 | ..                | ☁ ditto to hor.       |
| 3     | 29.275     | 88.5         | 88.4    | 80.6      | N. W.              | ..                | ☁ scattered.          |
| 4     | 29.293     | 86.0         | 86.0    | 81.0      | N. E.              | ..                | ☁ ditto.              |
| 5     | 29.303     | 88.9         | 88.5    | 82.9      | S. E.              | ..                | ☁ ditto.              |
| 6     | 29.201     | 86.0         | 86.6    | 79.0      | N.                 | ..                | ☁ scattered all over. |
| 7     | 29.237     | 85.0         | 85.2    | 78.4      | N. E.              | ..                | ☁ scattered.          |
| 8     | 29.247     | 85.8         | 85.5    | 79.0      | E.                 | 0.30              | ☁ all over.           |
| 9     | 29.205     | 84.8         | 85.3    | 78.7      | E.                 | 0.37              | ☁ scattered.          |
| 10    | 29.203     | 85.9         | 86.5    | 78.3      | E.                 | ..                | Clear.                |
| 11    | 29.217     | 79.8         | 78.4    | 76.9      | N. E.              | ..                | ☁ all over.           |
| 12    | 29.241     | 82.8         | 83.0    | 77.8      | N. W.              | ..                | ☁ scattered.          |
| 13    | 29.297     | 79.8         | 79.8    | 76.8      | W.                 | ..                | ☁ all over.           |
| 14    | 29.275     | 80.8         | 80.7    | 79.0      | E.                 | 6.62              | Ditto.                |
| 15    | 29.303     | 81.9         | 82.5    | 78.5      | S.                 | ..                | ☁ scattered.          |
| 16    | 29.225     | 86.5         | 87.0    | 79.0      | N.                 | ..                | Ditto.                |
| 17    | 29.251     | 82.0         | 82.1    | 78.9      | N. E.              | ..                | ☁ all over.           |
| 18    | 29.219     | 81.8         | 81.5    | 79.2      | N.                 | ..                | Ditto.                |
| 19    | 29.227     | 81.0         | 81.0    | 78.3      | N.                 | ..                | ☁ scattered.          |
| 20    | 29.245     | 83.0         | 83.0    | 76.5      | W.                 | ..                | Clear.                |
| 21    | 29.339     | 83.5         | 83.4    | 76.9      | N. W.              | ..                | Ditto.                |
| 22    | 29.401     | 83.6         | 83.9    | 74.9      | W.                 | ..                | Ditto.                |
| 23    | 29.345     | 85.0         | 85.0    | 77.6      | N. W.              | ..                | Ditto.                |
| 24    | 29.361     | 86.8         | 87.4    | 75.9      | N. W.              | ..                | ☁ scattered in zen.   |
| 25    | 29.397     | 87.5         | 87.9    | 76.5      | N.                 | ..                | Clear.                |
| 26    | 29.453     | 86.8         | 86.9    | 78.5      | N. W.              | ..                | ☁ scattered in zen.   |
| 27    | 29.439     | 87.9         | 88.0    | 74.4      | N. W.              | ..                | Clear.                |
| 28    | 29.423     | 87.5         | 88.4    | 76.0      | N. W.              | ..                | Ditto.                |
| 29    | 29.443     | 86.5         | 87.0    | 74.4      | N. W.              | ..                | Ditto.                |
| 30    | 29.413     | 87.0         | 87.2    | 73.5      | N. W.              | ..                | Ditto.                |
| Mean. | 29.300     | 85.2         | 85.4    | 78.0      |                    | 7.29              |                       |

Barometer Observations corrected for Capillarity only.

Symbols. {  
 ☁ Cirrus.  
 ☁ Cirro strata.  
 ☁ Cumuli.  
 ☁ Cumulo strata.  
 ☁ Nimbi or Nimbus.

*Note.*—The dry bulb and maximum Register do not agree, the former always reads more than the latter. The average difference is 1.6.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of September, 1855.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.  |  |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|---------------------|--|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                     |  |
| 1     | 29.203     | 25.6         | 95.9    | 79.4      | E.                 | ..                | ☁ scattered.        |  |
| 2     | 29.197     | 95.5         | 96.9    | 83.9      | W.                 | ..                | ☁ to hor.           |  |
| 3     | 29.253     | 90.0         | 90.5    | 82.4      | N. W.              | ..                | ☁ scattered.        |  |
| 4     | 29.259     | 87.7         | 88.0    | 81.5      | N. E.              | ..                | Ditto.              |  |
| 5     | 29.205     | 91.8         | 92.0    | 82.0      | S. E.              | ..                | Ditto.              |  |
| 6     | 29.195     | 83.9         | 82.8    | 80.1      | N.                 | 0.30              | ☁ all over.         |  |
| 7     | 29.203     | 87.7         | 88.0    | 79.9      | N. E.              | ..                | ☁ scattered.        |  |
| 8     | 29.229     | 87.9         | 88.0    | 79.4      | E.                 | ..                | ☁ ditto.            |  |
| 9     | 29.171     | 88.0         | 88.3    | 79.5      | E.                 | ..                | ☁ ditto.            |  |
| 10    | 29.209     | 87.3         | 88.2    | 79.2      | E.                 | ..                | ☁ scattered.        |  |
| 11    | 29.201     | 80.9         | 81.2    | 77.5      | N. E.              | ..                | ☁ all over.         |  |
| 12    | 29.245     | 80.8         | 77.5    | 75.6      | N. W.              | 0.32              | Ditto.              |  |
| 13    | 29.285     | 82.0         | 82.2    | 78.2      | W.                 | ..                | ☁ scattered.        |  |
| 14    | 29.255     | 80.0         | 78.8    | 78.0      | E.                 | 0.32              | ☁ all over.         |  |
| 15    | 29.289     | 84.8         | 84.9    | 79.6      | S.                 | ..                | ☁ scattered.        |  |
| 16    | 29.201     | 89.6         | 90.0    | 79.5      | N. E.              | ..                | Ditto.              |  |
| 17    | 29.201     | 84.5         | 84.4    | 80.0      | N. E.              | ..                | Ditto.              |  |
| 18    | 29.195     | 84.5         | 84.5    | 80.5      | N. E.              | ..                | ☁ all over.         |  |
| 19    | 29.185     | 84.0         | 84.0    | 78.3      | N.                 | ..                | ☁ scattered.        |  |
| 20    | 29.243     | 85.3         | 85.2    | 78.4      | N. W.              | ..                | Ditto.              |  |
| 21    | 29.331     | 85.9         | 85.9    | 79.5      | N. W.              | ..                | ☁ scattered in zen. |  |
| 22    | 29.387     | 86.0         | 86.5    | 77.3      | W.                 | ..                | Clear.              |  |
| 23    | 29.331     | 88.9         | 89.5    | 78.5      | N. W.              | ..                | ☁ scattered.        |  |
| 24    | 29.333     | 89.8         | 90.2    | 77.0      | N. W.              | ..                | Clear.              |  |
| 25    | 29.365     | 89.5         | 89.9    | 77.0      | N.                 | ..                | Ditto.              |  |
| 26    | 29.417     | 89.5         | 89.5    | 77.0      | N. W.              | ..                | ☁ scattered in zen. |  |
| 27    | 29.419     | 91.0         | 91.5    | 74.9      | N. W.              | ..                | Clear.              |  |
| 28    | 29.403     | 90.9         | 91.5    | 76.0      | N. W.              | ..                | Ditto.              |  |
| 29    | 29.425     | 91.0         | 91.2    | 71.5      | N. W.              | ..                | Ditto.              |  |
| 30    | 29.373     | 91.5         | 91.6    | 74.0      | N. W.              | ..                | Ditto.              |  |
| Mean. | 29.274     | 87.5         | 87.6    | 78.8      |                    | 0.94              |                     |  |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of September, 1855.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky. | Direction of Wind. | Quantity of Rain. | Total Rain. |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------|--------------------|-------------------|-------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                    |                    |                   |             |
| 1     | 29.117     | 99.9         | 99.1    | 79.4      | 99.5                 | 83.8     | 91.65 | ☾ scattered.       | E.                 | ..                | ..          |
| 2     | 29.105     | 95.0         | 95.0    | 80.5      | 97.0                 | 83.0     | 90.0  | ☾ ditto.           | W.                 | ..                | ..          |
| 3     | 29.127     | 94.0         | 94.0    | 82.0      | 94.5                 | 75.5     | 85.0  | ☾ ditto.           | N. W.              | ..                | ..          |
| 4     | 29.155     | 92.0         | 92.0    | 82.5      | 92.5                 | 79.8     | 86.15 | ☾ to E.            | N. E.              | ..                | ..          |
| 5     | 29.115     | 94.8         | 94.5    | 83.5      | 94.5                 | 85.0     | 89.75 | ☾ scattered.       | E.                 | ..                | ..          |
| 6     | 29.105     | 86.6         | 85.9    | 81.0      | 86.0                 | 81.0     | 83.5  | Ditto.             | N. E.              | ..                | ..          |
| 7     | 29.121     | 91.9         | 91.5    | 80.9      | 91.6                 | 77.0     | 84.3  | ☾ ditto.           | E.                 | ..                | ..          |
| 8     | 29.149     | 91.0         | 90.8    | 80.5      | 91.0                 | 81.0     | 86.0  | ☾ ditto.           | E.                 | ..                | ..          |
| 9     | 29.129     | 90.9         | 90.6    | 80.0      | 91.8                 | 77.8     | 84.8  | ☾ all over.        | E.                 | ..                | ..          |
| 10    | 29.133     | 89.0         | 88.8    | 78.0      | 91.0                 | 77.0     | 84.0  | ☾ towards S.E.     | S. E.              | ..                | ..          |
| 11    | 29.109     | 79.0         | 79.0    | 77.2      | 80.7                 | 75.0     | 77.85 | ☾ all over.        | N. W.              | ..                | ..          |
| 12    | 29.179     | 83.9         | 83.5    | 77.0      | 84.5                 | 74.0     | 79.25 | ☾ scattered.       | N. W.              | ..                | ..          |
| 13    | 29.201     | 84.8         | 84.6    | 79.0      | 85.0                 | 75.5     | 80.25 | ☾ ditto.           | W.                 | ..                | ..          |
| 14    | 29.201     | 80.0         | 79.9    | 78.4      | 80.5                 | 76.0     | 78.25 | ☾ all over.        | S. W.              | ..                | ..          |
| 15    | 29.217     | 87.8         | 88.1    | 81.9      | 88.0                 | 76.0     | 82.0  | ☾ scattered.       | S.                 | ..                | ..          |
| 16    | 29.173     | 83.0         | 80.5    | 78.4      | 92.0                 | 79.0     | 85.5  | ☾ all over.        | N. E.              | 1.12              | ..          |
| 17    | 29.119     | 84.8         | 83.8    | 79.8      | 88.0                 | 78.5     | 83.25 | Ditto.             | E.                 | 0.07              | ..          |
| 18    | 29.135     | 78.0         | 76.5    | 75.9      | 84.5                 | 77.0     | 80.75 | ☾ ditto.           | N. E.              | 2.17              | ..          |
| 19    | 29.127     | 87.9         | 87.5    | 79.5      | 88.0                 | 75.5     | 81.75 | ☾ scattered.       | N. W.              | ..                | ..          |
| 20    | 29.171     | 86.9         | 86.3    | 79.5      | 87.5                 | 76.0     | 81.7  | ☾ toward           | S. W.              | ..                | ..          |
| 21    | 29.273     | 89.0         | 88.9    | 80.2      | 90.0                 | 76.5     | 83.25 | ☾ scattered.       | W.                 | ..                | ..          |
| 22    | 29.313     | 90.5         | 90.4    | 80.5      | 90.5                 | 75.0     | 82.75 | Ditto.             | W.                 | ..                | ..          |
| 23    | 29.299     | 92.0         | 91.9    | 79.4      | 93.0                 | 77.5     | 85.25 | Ditto.             | N.                 | ..                | ..          |
| 24    | 29.261     | 98.2         | 93.2    | 77.9      | 94.0                 | 79.5     | 86.75 | ☾ ditto.           | N. W.              | ..                | ..          |
| 25    | 29.295     | 93.5         | 93.5    | 78.0      | 93.5                 | 77.5     | 85.5  | Clear. [zen.       | N.                 | ..                | ..          |
| 26    | 29.347     | 93.8         | 93.6    | 77.0      | 93.5                 | 77.5     | 85.5  | ☾ scattered in     | N. W.              | ..                | ..          |
| 27    | 29.361     | 94.5         | 94.0    | 76.0      | 94.5                 | 77.0     | 85.75 | Clear.             | N. W.              | ..                | ..          |
| 28    | 29.337     | 94.8         | 94.4    | 78.0      | 94.5                 | 77.0     | 85.75 | Ditto.             | N. W.              | ..                | ..          |
| 29    | 29.345     | 95.0         | 94.9    | 75.1      | 95.0                 | 77.5     | 86.25 | Ditto.             | N. W.              | ..                | ..          |
| 30    | 29.305     | 95.2         | 95.0    | 95.0      | 95.5                 | 76.5     | 86.0  | Ditto.             | N. W.              | ..                | ..          |
| Mean. | 29.200     | 89.4         | 89.3    | 79.7      | 90.7                 | 77.8     | 84.28 |                    |                    | 3.36              | 10.69       |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agrā, for the month of October, 1855.*

Maximum pressure observed at 10 A. M.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.  |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|---------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                     |
| 1     | 29.391     | 86.9         | 87.9    | 73.0      | N.                 | ..                | Clear.              |
| 2     | 29.419     | 86.9         | 87.5    | 73.5      | N.                 | ..                | Ditto.              |
| 3     | 29.429     | 88.8         | 88.4    | 75.0      | N. W.              | ..                | Ditto.              |
| 4     | 29.391     | 88.7         | 89.3    | 71.9      | N. W.              | ..                | Ditto.              |
| 5     | 29.375     | 84.8         | 85.1    | 69.5      | N. W.              | ..                | Ditto.              |
| 6     | 29.447     | 84.0         | 84.0    | 69.8      | S. W.              | ..                | Ditto.              |
| 7     | 29.463     | 89.0         | 91.0    | 70.0      | N. W.              | ..                | ^ scattered in zen. |
| 8     | 29.519     | 84.0         | 84.4    | 70.0      | W.                 | ..                | Clear.              |
| 9     | 29.475     | 82.9         | 83.2    | 70.0      | S. W.              | ..                | Ditto.              |
| 10    | 29.463     | 83.9         | 84.9    | 70.1      | N. W.              | ..                | Ditto.              |
| 11    | 29.463     | 83.8         | 84.5    | 69.0      | S. W.              | ..                | Ditto.              |
| 12    | 29.435     | 85.6         | 86.5    | 70.8      | S. W.              | ..                | Ditto.              |
| 13    | 29.467     | 84.8         | 86.0    | 71.0      | N.                 | ..                | Ditto.              |
| 14    | 29.455     | 82.5         | 83.0    | 69.7      | N. W.              | ..                | Ditto.              |
| 15    | 29.487     | 82.8         | 83.2    | 71.0      | W.                 | ..                | Ditto.              |
| 16    | 29.471     | 83.0         | 84.0    | 72.5      | W.                 | ..                | Ditto.              |
| 17    | 29.449     | 82.5         | 83.5    | 70.9      | N. W.              | ..                | Ditto.              |
| 18    | 29.467     | 81.9         | 82.7    | 70.5      | N. W.              | ..                | Ditto.              |
| 19    | 29.491     | 82.2         | 83.5    | 72.5      | S.                 | ..                | ^ scattered in zen. |
| 20    | 29.523     | 84.5         | 84.5    | 70.0      | S.                 | ..                | Clear.              |
| 21    | 29.535     | 83.5         | 84.8    | 69.0      | N. W.              | ..                | Ditto.              |
| 22    | 29.619     | 83.0         | 83.5    | 69.5      | N.                 | ..                | Ditto.              |
| 23    | 29.541     | 82.2         | 83.4    | 66.5      | W.                 | ..                | Ditto.              |
| 24    | 29.455     | 81.9         | 82.4    | 68.0      | S. W.              | ..                | ^ to East.          |
| 25    | 29.461     | 81.5         | 82.0    | 66.9      | N. W.              | ..                | Clear.              |
| 26    | 29.577     | 81.0         | 81.5    | 65.9      | N. W.              | ..                | Ditto.              |
| 27    | 29.517     | 81.2         | 82.0    | 65.6      | W.                 | ..                | Ditto.              |
| 28    | 29.485     | 81.0         | 81.6    | 65.4      | N. W.              | ..                | Ditto.              |
| 29    | 29.579     | 74.5         | 74.2    | 67.5      | E.                 | ..                | Ditto.              |
| 30    | 29.573     | 71.7         | 72.4    | 57.5      | N. W.              | ..                | Ditto.              |
| 31    | 29.595     | 74.0         | 74.5    | 57.0      | W.                 | ..                | Ditto.              |
| Mean. | 29.484     | 82.8         | 83.5    | 69.0      |                    |                   |                     |

Barometer Observations corrected for Capillarity only.

Symbols. {  
 \ Cirrus.  
 \ Cirro strata.  
 > Cumuli.  
 ^ Cumulo strata.  
 ^ Nimbi or Nimbus.

*Note.*—The dry bulb and maximum Register do not agree, the former always reads more than the latter. The average difference is 1.6.



*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of October, 1855.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.  |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|---------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                     |
| 1     | 29.363     | 92.0         | 92.0    | 75.9      | N.                 | ..                | Clear.              |
| 2     | 29.395     | 90.7         | 91.5    | 73.5      | N.                 | ..                | Ditto.              |
| 3     | 29.405     | 92.0         | 92.4    | 75.4      | N. E.              | ..                | Ditto.              |
| 4     | 29.355     | 92.9         | 93.2    | 73.5      | N. W.              | ..                | Ditto.              |
| 5     | 29.359     | 90.5         | 90.8    | 70.5      | N. W.              | ..                | Ditto.              |
| 6     | 29.429     | 88.5         | 89.2    | 70.0      | W.                 | ..                | Ditto.              |
| 7     | 29.463     | 89.0         | 91.0    | 70.0      | N. W.              | ..                | ^ scattered in zen. |
| 8     | 29.491     | 87.5         | 88.0    | 70.0      | N. W.              | ..                | Clear.              |
| 9     | 29.433     | 87.6         | 87.9    | 69.2      | S. W.              | ..                | Ditto.              |
| 10    | 29.439     | 89.0         | 89.9    | 68.5      | N. W.              | ..                | Ditto.              |
| 11    | 29.435     | 87.0         | 89.0    | 69.5      | N. W.              | ..                | Ditto.              |
| 12    | 29.415     | 90.0         | 90.5    | 74.0      | S. W.              | ..                | Ditto.              |
| 13    | 29.451     | 89.0         | 89.8    | 71.5      | N.                 | ..                | Ditto.              |
| 14    | 29.427     | 85.2         | 85.7    | 70.0      | ..                 | ..                | Ditto.              |
| 15    | 29.459     | 87.5         | 88.0    | 71.0      | W.                 | ..                | Ditto.              |
| 16    | 29.447     | 89.0         | 89.0    | 71.5      | W.                 | ..                | Ditto.              |
| 17    | 29.439     | 88.0         | 89.4    | 72.5      | N. W.              | ..                | Ditto.              |
| 18    | 29.441     | 88.5         | 89.5    | 71.5      | N. W.              | ..                | Ditto.              |
| 19    | 29.455     | 88.5         | 89.4    | 70.5      | S.                 | ..                | ^ scattered in zen. |
| 20    | 29.485     | 87.2         | 87.5    | 71.0      | S. W.              | ..                | Clear.              |
| 21    | 29.505     | 86.4         | 87.0    | 69.5      | N. W.              | ..                | ^ scattered in zen. |
| 22    | 29.583     | 86.0         | 86.5    | 69.0      | N.                 | ..                | Clear.              |
| 23    | 29.493     | 87.5         | 87.9    | 67.4      | N. W.              | ..                | Scattered in zen.   |
| 24    | 29.415     | 87.2         | 87.9    | 66.5      | W.                 | ..                | Scattered.          |
| 25    | 29.447     | 85.5         | 86.0    | 67.5      | N. W.              | ..                | Clear.              |
| 26    | 29.505     | 88.0         | 88.5    | 65.6      | N. W.              | ..                | Ditto.              |
| 27    | 29.467     | 88.6         | 89.5    | 65.8      | N. W.              | ..                | Ditto.              |
| 28    | 29.435     | 84.9         | 85.5    | 66.5      | N. W.              | ..                | ^ scattered.        |
| 29    | 29.527     | 78.5         | 78.4    | 68.0      | N. E.              | ..                | Clear.              |
| 30    | 29.547     | 78.8         | 78.5    | 57.5      | N. W.              | ..                | Ditto.              |
| 31    | 29.565     | 79.0         | 79.4    | 56.8      | N. W.              | ..                | Ditto.              |
| Mean. | 29.454     | 87.4         | 88.0    | 69.3      |                    |                   |                     |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of October, 1855.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum: |          |       | Aspect of the Sky. | Direction of Wind. | Quantity of Rain. |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------|--------------------|-------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                    |                    |                   |
| 1     | 29.313     | 96.0         | 95.5    | 73.4      | 96.0                 | 76.0     | 86.0  | Clear.             | N. W.              | ..                |
| 2     | 29.355     | 96.0         | 95.0    | 76.0      | 95.5                 | 76.0     | 85.75 | Ditto. [zen.       | N.                 | ..                |
| 3     | 29.351     | 96.9         | 95.9    | 73.5      | 96.5                 | 77.9     | 87.2  | ~ scattered in     | N. W.              | ..                |
| 4     | 29.309     | 95.5         | 94.9    | 73.0      | 95.5                 | 75.0     | 85.25 | Clear.             | N. W.              | ..                |
| 5     | 29.305     | 94.8         | 93.9    | 72.4      | 94.0                 | 73.0     | 83.5  | Ditto.             | W.                 | ..                |
| 6     | 29.383     | 93.5         | 92.0    | 69.5      | 93.5                 | 75.5     | 84.5  | Ditto. [zen.       | S. E.              | ..                |
| 7     | 29.453     | 93.7         | 93.5    | 73.1      | 93.5                 | 74.0     | 83.75 | ~ scattered in     | N. W.              | ..                |
| 8     | 29.427     | 92.5         | 91.9    | 71.9      | 92.0                 | 73.0     | 82.5  | Clear.             | N. W.              | ..                |
| 9     | 29.375     | 92.0         | 92.0    | 72.5      | 91.8                 | 72.0     | 81.9  | Ditto.             | N. W.              | ..                |
| 10    | 29.387     | 93.0         | 92.8    | 70.5      | 93.0                 | 71.5     | 82.25 | Ditto.             | N. W.              | ..                |
| 11    | 29.373     | 93.0         | 93.0    | 71.5      | 93.5                 | 71.0     | 82.25 | Ditto.             | N. W.              | ..                |
| 12    | 29.353     | 94.5         | 94.0    | 75.5      | 94.3                 | 72.0     | 83.15 | Ditto.             | N. W.              | ..                |
| 13    | 29.403     | 94.5         | 94.6    | 73.3      | 94.5                 | 74.0     | 84.25 | Ditto.             | N.                 | ..                |
| 14    | 29.373     | 91.5         | 91.4    | 71.0      | 92.5                 | 72.5     | 82.5  | Ditto.             | N. W.              | ..                |
| 15    | 29.409     | 92.9         | 92.9    | 72.8      | 92.8                 | 70.0     | 81.4  | Ditto.             | N. W.              | ..                |
| 16    | 29.375     | 93.0         | 92.8    | 72.4      | 92.8                 | 72.0     | 82.4  | Ditto.             | N. W.              | ..                |
| 17    | 29.399     | 93.9         | 93.5    | 73.4      | 93.5                 | 71.0     | 82.25 | Ditto.             | N. W.              | ..                |
| 18    | 29.397     | 92.8         | 91.5    | 67.5      | 92.0                 | 69.0     | 80.5  | Ditto. [zen.       | N. W.              | ..                |
| 19    | 29.393     | 91.0         | 90.4    | 73.4      | 91.4                 | 70.9     | 81.0  | ~ scattered in     | S. W.              | ..                |
| 20    | 29.429     | 90.6         | 89.5    | 71.8      | 91.0                 | 70.5     | 80.75 | Clear.             | W.                 | ..                |
| 21    | 29.473     | 90.4         | 90.6    | 72.0      | 90.5                 | 70.5     | 80.5  | Ditto.             | N. W.              | ..                |
| 22    | 29.497     | 90.5         | 89.9    | 70.0      | 90.5                 | 71.8     | 81.15 | Ditto. [zen.       | N. E.              | ..                |
| 23    | 29.405     | 90.2         | 89.5    | 67.3      | 90.0                 | 70.      | 80.0  | Scattered in       | N. W.              | ..                |
| 24    | 29.355     | 91.5         | 91.0    | 67.9      | 91.0                 | 68.5     | 79.75 | ~ scattered.       | N. W.              | ..                |
| 25    | 29.405     | 90.5         | 90.4    | 70.9      | 90.5                 | 68.0     | 79.25 | Clear.             | N. W.              | ..                |
| 26    | 29.465     | 91.5         | 91.0    | 65.5      | 91.0                 | 67.9     | 79.45 | Ditto.             | N. W.              | ..                |
| 27    | 29.403     | 91.0         | 90.5    | 67.5      | 91.5                 | 68.2     | 79.85 | ~ scattered.       | N. W.              | ..                |
| 28    | 29.381     | 80.9         | 79.4    | 64.0      | 87.5                 | 70.3     | 78.9  | ~ to E.            | N.                 | ..                |
| 29    | 29.497     | 82.5         | 81.5    | 71.0      | 82.0                 | 65.0     | 73.5  | Clear.             | N. E.              | ..                |
| 30    | 29.519     | 81.9         | 81.0    | 59.5      | 81.2                 | 61.0     | 71.1  | Ditto.             | N. W.              | ..                |
| 31    | 29.527     | 83.0         | 82.0    | 59.7      | 83.0                 | 63.5     | 73.25 | Ditto.             | W.                 | ..                |
| Mean. | 29.403     | 91.4         | 90.9    | 70.4      | 91.5                 | 71.0     | 81.28 |                    |                    |                   |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of Nov. 1855.*

Maximum pressure observed at 9.50 A. M.

| Date.  | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.      |
|--------|------------|--------------|---------|-----------|--------------------|-------------------|-------------------------|
|        |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                         |
| 1      | 29.609     | 74.0         | 74.6    | 58.8      | N. W.              | ..                | Clear.                  |
| 2      | 29.553     | 74.9         | 75.9    | 58.0      | N. W.              | ..                | Ditto.                  |
| 3      | 29.555     | 74.0         | 75.0    | 59.5      | N. E.              | ..                | Ditto.                  |
| 4      | 29.581     | 75.5         | 76.2    | 59.8      | W.                 | ..                | Ditto.                  |
| 5      | 29.605     | 75.0         | 75.9    | 62.5      | N. W.              | ..                | Ditto.                  |
| 6      | 29.555     | 75.9         | 76.8    | 73.5      | E.                 | ..                | Ditto.                  |
| 7      | 29.527     | 78.2         | 79.0    | 64.4      | S. W.              | ..                | Ditto.                  |
| 8      | 29.539     | 78.9         | 80.5    | 65.9      | N. W.              | ..                | Ditto.                  |
| 9      | 29.511     | 77.0         | 77.0    | 60.5      | N.                 | ..                | Ditto.                  |
| 10     | 29.541     | 76.8         | 77.5    | 62.9      | N. E.              | ..                | Ditto.                  |
| 11     | 29.583     | 76.0         | 76.9    | 62.4      | N.                 | ..                | Ditto.                  |
| 12     | 29.587     | 72.8         | 73.5    | 59.4      | N. E.              | ..                | Ditto.                  |
| 13     | 29.565     | 72.5         | 74.4    | 61.5      | N. W.              | ..                | Ditto.                  |
| 14     | 29.545     | 74.0         | 75.5    | 61.0      | N. W.              | ..                | Ditto.                  |
| 15     | 29.549     | 74.5         | 75.2    | 64.5      | S. W.              | ..                | Ditto.                  |
| 16     | 29.537     | 71.6         | 72.9    | 58.9      | W.                 | ..                | Ditto.                  |
| 17     | 29.555     | 70.8         | 72.0    | 59.3      | S. W.              | ..                | Ditto.                  |
| 18     | 29.537     | 73.8         | 74.8    | 58.8      | N. E.              | ..                | Ditto.                  |
| 19     | 29.513     | 71.0         | 72.2    | 60.0      | W.                 | ..                | Ditto.                  |
| 20     | 29.563     | 69.0         | 69.5    | 57.5      | W.                 | ..                | Ditto.                  |
| 21     | 29.645     | 69.9         | 71.0    | 54.9      | S.                 | ..                | ~ scattered to S. East. |
| 22     | 29.659     | 68.9         | 70.3    | 58.       | S. W.              | ..                | ~ scattered in zen.     |
| 23     | 29.615     | 72.0         | 72.0    | 59.0      | N. W.              | ..                | Clear.                  |
| 24     | 29.663     | 70.5         | 71.5    | 59.0      | S. W.              | ..                | Ditto.                  |
| 25     | 29.667     | 69.0         | 70.4    | 57.0      | W.                 | ..                | Ditto.                  |
| 26     | 29.695     | 70.9         | 72.0    | 58.2      | N. W.              | ..                | ~ scattered.            |
| 27     | 29.721     | 71.0         | 71.8    | 58.4      | S. E.              | ..                | Clear.                  |
| 28     | 29.681     | 70.8         | 70.8    | 58.5      | N. W.              | ..                | Ditto.                  |
| 29     | 29.715     | 67.5         | 68.5    | 55.0      | N. W.              | ..                | Ditto.                  |
| 30     | 29.693     | 66.2         | 67.0    | 54.5      | N. W.              | ..                | Ditto.                  |
| 29.595 |            | 72.7         | 73.6    | 60.0      |                    |                   |                         |

Barometer Observations corrected for Capillarity only.

|          |   |   |                  |
|----------|---|---|------------------|
| Symbols. | { | \ | Cirus.           |
|          | { | / | Cirro strata.    |
|          | { | > | Cumuli.          |
|          | { | ^ | Cumulo strata.   |
|          | { | ~ | Nimbi or Nimbus. |

*Note.*—The dry bulb and maximum Register do not agree, the former always reads more than the latter. The average difference is 1.0.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of Nov. 1855.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.   |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                      |
| 1     | 29.577     | 79.0         | 78.4    | 58.4      | N. W.              | ..                | Clear.               |
| 2     | 29.519     | 82.0         | 82.8    | 60.0      | N. W.              | ..                | Ditto.               |
| 3     | 29.531     | 81.9         | 83.0    | 61.0      | N. W.              | ..                | Ditto.               |
| 4     | 29.555     | 82.0         | 82.5    | 63.8      | W.                 | ..                | Ditto.               |
| 5     | 29.577     | 80.0         | 81.2    | 63.5      | N. E.              | ..                | Ditto.               |
| 6     | 29.501     | 81.9         | 82.5    | 64.5      | S. W.              | ..                | Ditto.               |
| 7     | 29.505     | 84.8         | 85.8    | 64.5      | W.                 | ..                | Ditto.               |
| 8     | 29.517     | 84.9         | 85.4    | 65.0      | N. W.              | ..                | \ scattered to West. |
| 9     | 29.487     | 81.0         | 81.6    | 61.0      | N. W.              | ..                | Clear.               |
| 10    | 29.519     | 81.5         | 82.4    | 63.5      | N. E.              | ..                | Ditto.               |
| 11    | 29.557     | 80.7         | 81.3    | 63.5      | N.                 | ..                | Ditto.               |
| 12    | 29.561     | 78.5         | 79.0    | 59.9      | N.                 | ..                | Ditto.               |
| 13    | 29.516     | 78.9         | 79.8    | 61.0      | N. W.              | ..                | Ditto.               |
| 14    | 29.517     | 80.0         | 80.0    | 61.0      | S. W.              | ..                | Ditto.               |
| 15    | 29.521     | 81.0         | 82.0    | 63.0      | W.                 | ..                | Ditto.               |
| 16    | 29.509     | 79.2         | 79.5    | 60.0      | N. W.              | ..                | Ditto.               |
| 17    | 29.517     | 78.0         | 78.5    | 59.5      | S. W.              | ..                | Ditto.               |
| 18    | 29.509     | 76.9         | 76.9    | 61.1      | N. E.              | ..                | Ditto.               |
| 19    | 29.499     | 76.5         | 78.0    | 59.0      | W.                 | ..                | Ditto.               |
| 20    | 29.539     | 72.5         | 72.8    | 56.5      | W.                 | ..                | Ditto.               |
| 21    | 29.629     | 74.0         | 74.7    | 55.5      | S. W.              | ..                | Ditto.               |
| 22    | 29.641     | 74.0         | 75.9    | 58.0      | ..                 | ..                | Ditto.               |
| 23    | 29.595     | 78.0         | 77.5    | 60.3      | N. W.              | ..                | Ditto.               |
| 24    | 29.629     | 76.0         | 77.5    | 59.6      | S. W.              | ..                | Ditto.               |
| 25    | 29.641     | 74.5         | 75.7    | 58.0      | W.                 | ..                | Ditto.               |
| 26    | 29.667     | 74.0         | 74.2    | 59.3      | S. W.              | ..                | \ scattered.         |
| 27    | 29.705     | 75.9         | 76.0    | 60.5      | S. E.              | ..                | Clear.               |
| 28    | 29.651     | 76.8         | 77.4    | 59.5      | N. W.              | ..                | Ditto.               |
| 29    | 29.677     | 71.5         | 71.2    | 57.2      | N. W.              | ..                | Ditto.               |
| 30    | 29.667     | 70.0         | 70.8    | 56.9      | N. W.              | ..                | Ditto.               |
|       | 29.571     | 78.2         | 78.8    | 60.4      |                    |                   |                      |



*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of Nov. 1855.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and minimum. |          |       | Aspect of the Sky. | Direction of Wind. | Quantity of Rain. |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------|--------------------|-------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                    |                    |                   |
| 1     | 29.509     | 84.5         | 83.5    | 61.9      | 83.5                 | 62.5     | 73.0  | Clear.             | N. W.              | ..                |
| 2     | 29.489     | 87.0         | 86.0    | 63.0      | 86.5                 | 61.5     | 74.0  | Ditto.             | N. W.              | ..                |
| 3     | 29.491     | 87.8         | 86.8    | 64.4      | 87.0                 | 61.0     | 74.0  | Ditto.             | N. W.              | ..                |
| 4     | 29.513     | 88.0         | 87.5    | 65.0      | 88.0                 | 61.5     | 74.75 | Ditto.             | W.                 | ..                |
| 5     | 29.529     | 87.0         | 86.6    | 66.0      | 87.2                 | 63.0     | 75.1  | Ditto.             | N. W.              | ..                |
| 6     | 29.459     | 88.0         | 87.5    | 67.5      | 88.0                 | 63.5     | 75.75 | Ditto.             | S. W.              | ..                |
| 7     | 29.470     | 90.0         | 89.0    | 70.5      | 90.6                 | 63.5     | 77.05 | Ditto. [west.      | N. W.              | ..                |
| 8     | 29.467     | 89.0         | 88.8    | 67.9      | 89.0                 | 65.0     | 77.0  | \ scattered to     | N. W.              | ..                |
| 9     | 29.445     | 87.0         | 86.5    | 64.0      | 86.8                 | 63.5     | 77.15 | Clear.             | N. W.              | ..                |
| 10    | 29.467     | 86.9         | 86.2    | 65.4      | 87.0                 | 69.0     | 78.0  | Ditto.             | N. W.              | ..                |
| 11    | 29.519     | 85.8         | 85.5    | 64.4      | 86.0                 | 63.5     | 74.75 | Ditto.             | N.                 | ..                |
| 12    | 29.501     | 85.0         | 84.4    | 63.5      | 85.0                 | 62.0     | 73.5  | Ditto.             | N.                 | ..                |
| 13    | 29.467     | 84.0         | 84.0    | 63.8      | 84.2                 | 61.8     | 73.0  | Ditto.             | N. W.              | ..                |
| 14    | 29.477     | 84.2         | 84.0    | 66.0      | 84.5                 | 65.0     | 74.75 | Ditto.             | S. W.              | ..                |
| 15    | 29.471     | 86.9         | 86.6    | 63.0      | 87.0                 | 62.0     | 74.5  | Ditto.             | W.                 | ..                |
| 16    | 29.449     | 83.0         | 83.0    | 63.9      | 83.5                 | 59.0     | 71.25 | Ditto.             | N. W.              | ..                |
| 17    | 29.481     | 82.0         | 81.5    | 62.6      | 82.0                 | 57.0     | 69.5  | Ditto.             | N. W.              | ..                |
| 18    | 29.449     | 82.0         | 81.8    | 64.4      | 82.0                 | 61.5     | 71.75 | Ditto.             | W.                 | ..                |
| 19    | 29.461     | 81.5         | 81.0    | 61.8      | 81.5                 | 58.5     | 70.0  | Ditto.             | N. W.              | ..                |
| 20    | 29.487     | 80.0         | 79.5    | 59.5      | 79.5                 | 58.0     | 68.75 | \ scattered.       | N. W.              | ..                |
| 21    | 29.567     | 81.0         | 80.5    | 60.1      | 81.0                 | 57.5     | 69.25 | Clear.             | W.                 | ..                |
| 22    | 29.595     | 82.9         | 82.5    | 64.5      | 83.5                 | 58.0     | 70.75 | Ditto.             | S. W.              | ..                |
| 23    | 29.539     | 83.5         | 82.5    | 62.5      | 83.5                 | 61.5     | 72.5  | Ditto.             | N. W.              | ..                |
| 24    | 29.579     | 81.9         | 80.8    | 62.5      | 82.0                 | 61.8     | 71.9  | Ditto.             | W.                 | ..                |
| 25    | 29.615     | 80.0         | 79.5    | 61.2      | 79.5                 | 57.5     | 68.5  | Ditto.             | N. W.              | ..                |
| 26    | 29.623     | 79.4         | 79.5    | 61.2      | 80.0                 | 60.0     | 70.0  | Ditto.             | N. W.              | ..                |
| 27    | 29.637     | 80.2         | 80.0    | 63.5      | 80.0                 | 60.0     | 70.0  | ..                 | S. E.              | ..                |
| 28    | 29.597     | 81.7         | 80.6    | 62.9      | 81.0                 | 59.0     | 70.0  | Clear.             | N. W.              | ..                |
| 29    | 29.623     | 75.9         | 74.5    | 60.0      | 75.0                 | 54.0     | 68.5  | Ditto.             | N. W.              | ..                |
| 30    | 29.627     | 75.6         | 74.8    | 59.4      | 75.3                 | 52.5     | 63.8  | Ditto.             | N. W.              | ..                |
|       | 29.520     | 83.7         | 83.1    | 63.5      | 83.6                 | 60.8     | 72.22 |                    |                    |                   |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of September, 1855.*

Latitude 22° 33' 1" North, Longitude 88° 20' 34" East.

Height of the cistern of the Standard Barometer above the level of the Sea, 18.11 <sup>feet.</sup>

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Faht. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempe-<br>rature during<br>the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|--------------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                             | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | °                             | °                                                | °    | °     |
| 1     | 29.624                                          | 29.693                                    | 29.531  | 0.162   | 84.9                          | 91.0                                             | 80.7 | 10.3  |
| 2     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                                  |      |       |
| 3     | .630                                            | .683                                      | .551    | .132    | 83.4                          | 87.2                                             | 80.4 | 6.8   |
| 4     | .638                                            | .690                                      | .576    | .114    | 82.8                          | 87.7                                             | 80.4 | 7.3   |
| 5     | .639                                            | .687                                      | .575    | .112    | 82.2                          | 86.0                                             | 80.2 | 5.8   |
| 6     | .595                                            | .654                                      | .523    | .131    | 81.4                          | 87.1                                             | 78.8 | 8.3   |
| 7     | .595                                            | .645                                      | .532    | .113    | 81.5                          | 87.4                                             | 78.8 | 8.6   |
| 8     | .643                                            | .726                                      | .570    | .156    | 79.3                          | 80.8                                             | 77.6 | 3.2   |
| 9     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                                  |      |       |
| 10    | .773                                            | .833                                      | .725    | .108    | 80.4                          | 83.6                                             | 79.0 | 4.6   |
| 11    | .796                                            | .856                                      | .735    | .121    | 81.1                          | 85.6                                             | 78.8 | 6.8   |
| 12    | .757                                            | .821                                      | .677    | .144    | 82.8                          | 87.6                                             | 78.6 | 9.0   |
| 13    | .722                                            | .771                                      | .662    | .109    | 81.9                          | 84.6                                             | 80.2 | 4.4   |
| 14    | .703                                            | .751                                      | .647    | .104    | 81.3                          | 85.1                                             | 79.2 | 5.9   |
| 15    | .689                                            | .748                                      | .613    | .135    | 82.2                          | 88.5                                             | 79.2 | 9.3   |
| 16    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                                  |      |       |
| 17    | .580                                            | .626                                      | .509    | .117    | 81.0                          | 85.6                                             | 79.0 | 6.6   |
| 18    | .534                                            | .580                                      | .477    | .103    | 78.7                          | 79.7                                             | 77.4 | 2.3   |
| 19    | .574                                            | .639                                      | .540    | .099    | 81.4                          | 85.0                                             | 78.6 | 6.4   |
| 20    | .594                                            | .677                                      | .539    | .138    | 83.3                          | 88.2                                             | 78.5 | 9.7   |
| 21    | .690                                            | .757                                      | .631    | .126    | 83.8                          | 87.2                                             | 79.6 | 7.6   |
| 22    | .748                                            | .828                                      | .689    | .139    | 83.9                          | 89.4                                             | 80.3 | 9.1   |
| 23    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                                  |      |       |
| 24    | .752                                            | .807                                      | .685    | .122    | 83.5                          | 89.0                                             | 80.2 | 8.8   |
| 25    | .780                                            | .851                                      | .728    | .123    | 83.8                          | 88.1                                             | 80.4 | 7.7   |
| 26    | .811                                            | .868                                      | .736    | .132    | 83.9                          | 89.8                                             | 80.2 | 9.6   |
| 27    | .797                                            | .862                                      | .713    | .149    | 84.0                          | 90.4                                             | 80.4 | 10.0  |
| 28    | .792                                            | .847                                      | .724    | .123    | 82.8                          | 89.6                                             | 79.4 | 10.2  |
| 29    | .792                                            | .852                                      | .740    | .112    | 82.1                          | 85.6                                             | 80.0 | 5.6   |
| 30    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                                  |      |       |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of September, 1855.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Va-<br>pour in a Cubic foot<br>of Air. | Additional weight of<br>vapour required for<br>complete saturation. | Mean degree of Hu-<br>midity complete sa-<br>turation being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|--------------------------------------------------------------------|
|       | °                               | °                   | °                   | °                            | Inches.                          | T. gr.                                                | T. gr.                                                              |                                                                    |
| 1     | 80.9                            | 4.0                 | 78.9                | 6.0                          | 0.967                            | 10.34                                                 | 2.15                                                                | 0.828                                                              |
| 2     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                       |                                                                     |                                                                    |
| 3     | 80.3                            | 3.1                 | 78.7                | 4.7                          | .961                             | .31                                                   | 1.65                                                                | .862                                                               |
| 4     | 80.3                            | 2.5                 | 79.0                | 3.8                          | .970                             | .42                                                   | .33                                                                 | .887                                                               |
| 5     | 80.1                            | 2.1                 | 79.0                | 3.2                          | .970                             | .44                                                   | .10                                                                 | .905                                                               |
| 6     | 79.5                            | 1.9                 | 78.5                | 2.9                          | .955                             | .29                                                   | 0.98                                                                | .913                                                               |
| 7     | 79.3                            | 2.2                 | 78.2                | 3.3                          | .946                             | .19                                                   | 1.12                                                                | .901                                                               |
| 8     | 78.3                            | 1.0                 | 77.8                | 1.5                          | .934                             | .09                                                   | 0.50                                                                | .953                                                               |
| 9     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                       |                                                                     |                                                                    |
| 10    | 79.1                            | 1.3                 | 78.4                | 2.0                          | .952                             | .27                                                   | .67                                                                 | .939                                                               |
| 11    | 79.5                            | 1.6                 | 78.7                | 2.4                          | .961                             | .37                                                   | .80                                                                 | .928                                                               |
| 12    | 80.2                            | 2.6                 | 78.9                | 3.9                          | .967                             | .39                                                   | 1.36                                                                | .884                                                               |
| 13    | 80.0                            | 1.9                 | 79.0                | 2.9                          | .970                             | .44                                                   | .00                                                                 | .913                                                               |
| 14    | 79.3                            | 2.0                 | 78.3                | 3.0                          | .949                             | .22                                                   | .02                                                                 | .909                                                               |
| 15    | 80.0                            | 2.2                 | 78.9                | 3.3                          | .967                             | .41                                                   | .13                                                                 | .902                                                               |
| 16    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                       |                                                                     |                                                                    |
| 17    | 79.0                            | 2.0                 | 78.0                | 3.0                          | .940                             | .13                                                   | .01                                                                 | .909                                                               |
| 18    | 77.6                            | 1.1                 | 77.0                | 1.7                          | .910                             | 9.85                                                  | 0.56                                                                | .946                                                               |
| 19    | 79.2                            | 2.2                 | 78.1                | 3.3                          | .943                             | 10.16                                                 | 1.11                                                                | .902                                                               |
| 20    | 80.3                            | 3.0                 | 78.8                | 4.5                          | .964                             | .34                                                   | .59                                                                 | .867                                                               |
| 21    | 81.1                            | 2.7                 | 79.7                | 4.1                          | .992                             | .63                                                   | .47                                                                 | .879                                                               |
| 22    | 80.8                            | 3.1                 | 79.2                | 4.7                          | .976                             | .45                                                   | .68                                                                 | .862                                                               |
| 23    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                       |                                                                     |                                                                    |
| 24    | 79.9                            | 3.6                 | 78.1                | 5.4                          | .943                             | .12                                                   | .88                                                                 | .843                                                               |
| 25    | 80.2                            | 3.6                 | 78.4                | 5.4                          | .952                             | .21                                                   | .89                                                                 | .844                                                               |
| 26    | 80.0                            | 3.9                 | 78.0                | 5.9                          | .940                             | .07                                                   | 2.06                                                                | .830                                                               |
| 27    | 80.4                            | 3.6                 | 78.6                | 5.4                          | .958                             | .28                                                   | 1.89                                                                | .845                                                               |
| 28    | 80.0                            | 2.8                 | 78.6                | 4.2                          | .958                             | .30                                                   | .45                                                                 | .877                                                               |
| 29    | 79.7                            | 2.4                 | 78.5                | 3.6                          | .955                             | .27                                                   | .24                                                                 | .892                                                               |
| 30    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                       |                                                                     |                                                                    |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of September, 1855.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Hour.      | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |     |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|-----|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |     |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | °                          | °                                                        | °    | °     |     |
| Mid-night. | } 29.705                                  | 29.826                                                 | 29.549  | 0.277   | 80.8                       | 82.8                                                     | 79.0 | 3.8   |     |
| 1          |                                           | .693                                                   | .826    | .545    | .281                       | 80.7                                                     | 82.0 | 79.2  | 2.8 |
| 2          |                                           | .681                                                   | .811    | .536    | .275                       | 80.6                                                     | 81.8 | 79.2  | 2.6 |
| 3          |                                           | .673                                                   | .806    | .511    | .295                       | 80.4                                                     | 81.6 | 78.9  | 2.7 |
| 4          |                                           | .667                                                   | .808    | .507    | .301                       | 80.1                                                     | 81.4 | 78.6  | 2.8 |
| 5          |                                           | .679                                                   | .811    | .517    | .294                       | 79.9                                                     | 81.3 | 78.6  | 2.7 |
| 6          |                                           | .694                                                   | .819    | .526    | .293                       | 79.9                                                     | 81.4 | 78.6  | 2.8 |
| 7          |                                           | .713                                                   | .846    | .547    | .299                       | 80.5                                                     | 82.8 | 78.6  | 4.2 |
| 8          |                                           | .734                                                   | .865    | .554    | .311                       | 82.0                                                     | 84.4 | 78.2  | 6.2 |
| 9          |                                           | .742                                                   | .863    | .564    | .299                       | 82.7                                                     | 85.8 | 78.2  | 7.6 |
| 10         |                                           | .742                                                   | .863    | .571    | .297                       | 84.2                                                     | 87.0 | 78.8  | 8.2 |
| 11         |                                           | .732                                                   | .857    | .566    | .291                       | 84.7                                                     | 87.8 | 78.4  | 9.4 |
| Noon.      | .708                                      | .831                                                   | .546    | .285    | 85.3                       | 89.0                                                     | 78.9 | 10.1  |     |
| 1          | .683                                      | .803                                                   | .521    | .282    | 85.4                       | 89.8                                                     | 78.0 | 11.8  |     |
| 2          | .659                                      | .772                                                   | .498    | .274    | 85.9                       | 91.0                                                     | 78.0 | 13.0  |     |
| 3          | .640                                      | .747                                                   | .477    | .270    | 85.1                       | 91.0                                                     | 78.2 | 12.8  |     |
| 4          | .634                                      | .751                                                   | .480    | .271    | 84.1                       | 90.4                                                     | 78.4 | 12.0  |     |
| 5          | .633                                      | .758                                                   | .482    | .276    | 83.1                       | 88.2                                                     | 77.4 | 10.8  |     |
| 6          | .646                                      | .761                                                   | .492    | .269    | 82.3                       | 86.3                                                     | 78.0 | 8.3   |     |
| 7          | .664                                      | .782                                                   | .530    | .252    | 81.9                       | 84.3                                                     | 79.0 | 5.3   |     |
| 8          | .693                                      | .803                                                   | .547    | .256    | 81.6                       | 83.8                                                     | 79.0 | 4.8   |     |
| 9          | .710                                      | .823                                                   | .570    | .253    | 81.3                       | 83.6                                                     | 79.2 | 4.4   |     |
| 10         | .720                                      | .829                                                   | .580    | .249    | 81.1                       | 83.4                                                     | 77.6 | 5.8   |     |
| 11         | .715                                      | .834                                                   | .571    | .263    | 80.8                       | 83.0                                                     | 77.7 | 5.3   |     |



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taken at the Surveyor General's Office, Calcutta,  
in the month of September, 1855.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Hour.          | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of Air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity<br>complete saturation be-<br>ing unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                  |
| Mid-<br>night. | { 79.4                          | 1.4                 | 78.7                | 2.1                          | .0961                            | 10.37                                            | 0.70                                                                    | 0.937                                                            |
| 1              | 79.5                            | 1.2                 | 78.9                | 1.8                          | .967                             | .43                                              | .61                                                                     | .945                                                             |
| 2              | 79.4                            | 1.2                 | 78.8                | 1.8                          | .964                             | .40                                              | .61                                                                     | .945                                                             |
| 3              | 79.2                            | 1.2                 | 78.6                | 1.8                          | .958                             | .34                                              | .60                                                                     | .945                                                             |
| 4              | 79.0                            | 1.1                 | 78.4                | 1.7                          | .952                             | .27                                              | .57                                                                     | .947                                                             |
| 5              | 78.9                            | 1.0                 | 78.4                | 1.5                          | .952                             | .27                                              | .51                                                                     | .953                                                             |
| 6              | 78.9                            | 1.0                 | 78.4                | 1.5                          | .952                             | .27                                              | .51                                                                     | .953                                                             |
| 7              | 79.3                            | 1.2                 | 78.7                | 1.8                          | .961                             | .37                                              | .61                                                                     | .944                                                             |
| 8              | 79.8                            | 2.2                 | 78.7                | 3.3                          | .961                             | .35                                              | 1.12                                                                    | .902                                                             |
| 9              | 80.0                            | 2.7                 | 78.6                | 4.1                          | .958                             | .30                                              | .42                                                                     | .879                                                             |
| 10             | 80.6                            | 3.6                 | 78.8                | 5.4                          | .964                             | .34                                              | .90                                                                     | .845                                                             |
| 11             | 80.6                            | 4.1                 | 78.5                | 6.2                          | .955                             | .23                                              | 2.19                                                                    | .824                                                             |
|                |                                 |                     |                     |                              |                                  |                                                  |                                                                         |                                                                  |
| Noon.          | 80.8                            | 4.5                 | 78.5                | 6.8                          | .955                             | .21                                              | .43                                                                     | .808                                                             |
| 1              | 80.6                            | 4.8                 | 78.2                | 7.2                          | .946                             | .11                                              | .57                                                                     | .797                                                             |
| 2              | 80.9                            | 5.0                 | 78.4                | 7.5                          | .952                             | .15                                              | .72                                                                     | .789                                                             |
| 3              | 80.6                            | 4.5                 | 78.3                | 6.8                          | .949                             | .14                                              | .43                                                                     | .807                                                             |
| 4              | 80.2                            | 3.9                 | 78.2                | 5.9                          | .946                             | .13                                              | .08                                                                     | .830                                                             |
| 5              | 80.0                            | 3.1                 | 78.4                | 4.7                          | .952                             | .21                                              | 1.65                                                                    | .861                                                             |
| 6              | 79.7                            | 2.6                 | 78.4                | 3.9                          | .952                             | .23                                              | .35                                                                     | .884                                                             |
| 7              | 79.7                            | 2.2                 | 78.6                | 3.3                          | .958                             | .32                                              | .12                                                                     | .902                                                             |
| 8              | 79.6                            | 2.0                 | 78.6                | 3.0                          | .958                             | .32                                              | .02                                                                     | .910                                                             |
| 9              | 79.5                            | 1.8                 | 78.6                | 2.7                          | .958                             | .32                                              | 0.92                                                                    | .918                                                             |
| 10             | 79.4                            | 1.7                 | 78.5                | 2.6                          | .955                             | .29                                              | .88                                                                     | .921                                                             |
| 11             | 79.4                            | 1.4                 | 78.7                | 2.1                          | .961                             | .37                                              | .70                                                                     | .937                                                             |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of September, 1855.*

Solar radiation, Weather, &c.

| Date. | Max Solar radiation. | Rain.   | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                      |
|-------|----------------------|---------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------|
|       | o                    | Inches. |                                   |                                                                                                                 |
| 1     | 129.8                | 0.20    | E. or S.                          | Cloudless till 5 A. M. scattered ☉ till 8 P. M. cloudless afterwards.                                           |
| 2     | <i>Sunday.</i>       | ..      | ..                                |                                                                                                                 |
| 3     | 119.0                | ..      | E. or S. E.                       | Various clouds till 7 P. M. cloudless afterwards, also drizzling at 1 A. M.                                     |
| 4     | ..                   | ..      | E. or E. S. E.                    | Cloudy. [and 1 P. M.                                                                                            |
| 5     | ..                   | ..      | E. or S. E.                       | Cloudy with drizzling between 11 A. M.                                                                          |
| 6     | ..                   | 0.20    | E.                                | Cloudy and constantly raining.                                                                                  |
| 7     | ..                   | 0.80    | E. or S. E.                       | Ditto.                                                                                                          |
| 8     | ..                   | 4.29    | E. or S. E.                       | Cloudy and raining the whole day.                                                                               |
| 9     | <i>Sunday.</i>       | 2.61    | ..                                |                                                                                                                 |
| 10    | ..                   | 0.46    | E.                                | Cloudy with little rain before sunrise.                                                                         |
| 11    | ..                   | 1.46    | E. S. E. or S. W.                 | Cloudy with rain between 3 and 5 P. M.                                                                          |
| 12    | ..                   | ..      | S. W. or N. E. or S.              | Cloudless till 5 A. M. scattered ☉ afterwards. [also at 11 A. M.                                                |
| 13    | ..                   | 0.51    | S. or E. or S. E.                 | Cloudy with rains before sunrise and                                                                            |
| 14    | ..                   | 0.62    | S. E. or W. or S.                 | Cloudy and raining between Midnight and 5 A. M. and also at 5 P. M.                                             |
| 15    | ..                   | 0.59    | Variably.                         | Cloudless till 5 A. M. cloudy afterwards, also raining at 2½ and 4 P. M.                                        |
| 16    | <i>Sunday.</i>       | 0.28    | ..                                |                                                                                                                 |
| 17    | 115.0                | 0.22    | S. E. or N. or N. E.              | Cloudy with rains between 4 and 5 P. M.                                                                         |
| 18    | ..                   | 4.15    | N. or N. W. or W.                 | Cloudy with rains the whole day.                                                                                |
| 19    | ..                   | 1.36    | N. E. or W.                       | Cloudy with much rain before sunrise.                                                                           |
| 20    | ..                   | 0.28    | W.                                | Cloudless till 3 A. M. Cloudy afterwards with little rain between 10 and 11 P. M.                               |
| 21    | 108.0                | ..      | W. or W. S. W.                    | Cloudy. [wards.                                                                                                 |
| 22    | 132.7                | ..      | S. W. or W. or E.                 | Cloudless till 5 A. M. scattered ☉ after-                                                                       |
| 23    | <i>Sunday.</i>       | ..      | ..                                | [tween 3 and 4 P. M.                                                                                            |
| 24    | 135.5                | 0.19    | S. or N. E. or S. E.              | Cloudy with a smart shower of rain be-                                                                          |
| 25    | 130.0                | 0.22    | Calm or S. E. or S. S. E.         | Scattered ☉ till 3 A. M. cloudless till 7 A. M. scattered ☉ afterwards also rain between 2 and 3 P. M.          |
| 26    | 134.0                | ..      | S. E. or S.                       | Scattered ☉.                                                                                                    |
| 27    | 136.7                | 0.47    | S. or S. W. or S.                 | ☉ at horizon till 7 A. M. scattered ☉ till 6 P. M. overcast afterwards with lightning and rain at 7 and 8 P. M. |
| 28    | 145.0                | 0.22    | S. or E.                          | Cloudy till 2 A. M. scattered ☉ and ☉ till 11 A. M. cloudy afterwards with rain at 3 P. M.                      |
| 29    | ..                   | ..      | N. E. or S. E.                    | Cloudy more or less the whole day with little drizzling at Noon.                                                |
| 30    | <i>Sunday.</i>       | 0.26    | ..                                |                                                                                                                 |

☉ Cirri, ☉ cirro strati, ☉ cumuli, ☉ cumulo strati, ☉ nimbi, —i strati, ☉ ; cirro cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of October, 1855.*

Latitude 22° 33' 1" North, Longitude 88° 20' 34" East.

Height of the Cistern of the Standard Barometer above the Level of the Sea 18.11. feet

Daily Means, &c. of the Observations, and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | 29.757                                          | 29.803                                    | 29.708  | 0.095   | 81.2                          | 88.7                                          | 78.0 | 10.7  |
| 2     | .761                                            | .818                                      | .712    | .106    | 80.9                          | 86.2                                          | 78.4 | 7.8   |
| 3     | .747                                            | .802                                      | .688    | .114    | 80.9                          | 85.0                                          | 78.4 | 6.6   |
| 4     | .748                                            | .806                                      | .688    | .118    | 83.7                          | 89.1                                          | 79.2 | 9.9   |
| 5     | .767                                            | .829                                      | .724    | .105    | 84.5                          | 90.4                                          | 80.2 | 10.2  |
| 6     | .833                                            | .893                                      | .777    | .116    | 84.2                          | 90.2                                          | 79.8 | 10.4  |
| 7     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 8     | .857                                            | .935                                      | .797    | .138    | 83.1                          | 88.8                                          | 77.8 | 11.0  |
| 9     | .816                                            | .885                                      | .755    | .130    | 83.1                          | 88.8                                          | 77.0 | 11.8  |
| 10    | .802                                            | .876                                      | .765    | .111    | 84.2                          | 89.6                                          | 78.8 | 10.8  |
| 11    | .801                                            | .864                                      | .749    | .115    | 84.6                          | 89.9                                          | 80.0 | 9.9   |
| 12    | .805                                            | .862                                      | .756    | .106    | 84.6                          | 90.1                                          | 80.6 | 9.5   |
| 13    | .850                                            | .920                                      | .811    | .109    | 85.1                          | 91.2                                          | 80.0 | 11.2  |
| 14    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 15    | .858                                            | .925                                      | .799    | .126    | 84.5                          | 90.2                                          | 80.0 | 10.2  |
| 16    | .847                                            | .930                                      | .784    | .146    | 83.0                          | 88.2                                          | 79.4 | 8.8   |
| 17    | .869                                            | .931                                      | .828    | .103    | 79.3                          | 85.0                                          | 76.2 | 8.8   |
| 18    | .875                                            | .945                                      | .822    | .123    | 78.8                          | 84.6                                          | 75.8 | 8.8   |
| 19    | .890                                            | .942                                      | .846    | .096    | 78.6                          | 84.0                                          | 76.4 | 7.6   |
| 20    | .904                                            | .963                                      | .835    | .128    | 80.4                          | 86.0                                          | 75.8 | 10.2  |
| 21    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 22    | .956                                            | 30.031                                    | .885    | .146    | 81.3                          | 88.4                                          | 78.0 | 10.4  |
| 23    | .904                                            | 29.980                                    | .813    | .167    | 80.5                          | 87.0                                          | 77.0 | 10.0  |
| 24    | .868                                            | .924                                      | .804    | .120    | 79.8                          | 86.2                                          | 76.8 | 9.4   |
| 25    | .892                                            | .941                                      | .832    | .109    | 76.2                          | 78.2                                          | 74.2 | 4.0   |
| 26    | .901                                            | .964                                      | .846    | .118    | 77.5                          | 82.2                                          | 74.0 | 8.2   |
| 27    | .879                                            | .946                                      | .822    | .124    | 78.7                          | 84.8                                          | 73.8 | 11.0  |
| 28    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 29    | .893                                            | .968                                      | .842    | .126    | 78.6                          | 85.4                                          | 72.9 | 12.5  |
| 30    | .898                                            | .955                                      | .843    | .112    | 79.1                          | 85.8                                          | 73.0 | 12.8  |
| 31    | .950                                            | 30.030                                    | .904    | .126    | 76.4                          | 84.0                                          | 70.6 | 13.4  |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of October, 1855.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| 1     | 78.6                            | 2.6                 | 77.3                | 3.9                          | 0.919                            | 9.90                                             | 1.31                                                                    | 0.883                                                               |
| 2     | 78.7                            | 2.2                 | 77.6                | 3.3                          | .928                             | 10.01                                            | .09                                                                     | .902                                                                |
| 3     | 78.6                            | 2.3                 | 77.4                | 3.5                          | .922                             | 9.93                                             | .17                                                                     | .895                                                                |
| 4     | 79.6                            | 4.1                 | 77.5                | 6.2                          | .925                             | .92                                              | 2.15                                                                    | .822                                                                |
| 5     | 80.0                            | 4.5                 | 77.7                | 6.8                          | .931                             | .96                                              | .39                                                                     | .806                                                                |
| 6     | 79.5                            | 4.7                 | 77.1                | 7.1                          | .913                             | .78                                              | .46                                                                     | .799                                                                |
| 7     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 8     | 76.4                            | 6.7                 | 73.0                | 10.1                         | .801                             | 8.58                                             | 3.28                                                                    | .723                                                                |
| 9     | 77.2                            | 5.9                 | 74.2                | 8.9                          | .832                             | .93                                              | 2.93                                                                    | .753                                                                |
| 10    | 78.4                            | 5.8                 | 75.5                | 8.7                          | .868                             | 9.29                                             | .95                                                                     | .759                                                                |
| 11    | 79.5                            | 5.1                 | 76.9                | 7.7                          | .908                             | .70                                              | .69                                                                     | .783                                                                |
| 12    | 79.6                            | 5.0                 | 77.1                | 7.5                          | .913                             | .76                                              | .63                                                                     | .788                                                                |
| 13    | 79.6                            | 5.5                 | 76.8                | 8.3                          | .905                             | .67                                              | .90                                                                     | .769                                                                |
| 14    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 15    | 79.8                            | 4.7                 | 77.4                | 7.1                          | .922                             | .87                                              | .48                                                                     | .799                                                                |
| 16    | 79.0                            | 4.0                 | 77.0                | 6.0                          | .910                             | .77                                              | .05                                                                     | .827                                                                |
| 17    | 76.8                            | 2.5                 | 75.5                | 3.8                          | .868                             | .38                                              | 1.21                                                                    | .886                                                                |
| 18    | 76.4                            | 2.4                 | 75.2                | 3.6                          | .860                             | .30                                              | .14                                                                     | .891                                                                |
| 19    | 76.2                            | 2.4                 | 75.0                | 3.6                          | .854                             | .24                                              | .14                                                                     | .890                                                                |
| 20    | 77.2                            | 3.2                 | 75.6                | 4.8                          | .871                             | .39                                              | .55                                                                     | .858                                                                |
| 21    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 22    | 78.3                            | 3.0                 | 76.8                | 4.5                          | .905                             | .73                                              | .51                                                                     | .866                                                                |
| 23    | 77.5                            | 3.0                 | 76.0                | 4.5                          | .882                             | .50                                              | .48                                                                     | .865                                                                |
| 24    | 77.1                            | 2.7                 | 75.7                | 4.1                          | .873                             | .43                                              | .32                                                                     | .877                                                                |
| 25    | 74.9                            | 1.3                 | 74.2                | 2.0                          | .832                             | .05                                              | 0.61                                                                    | .937                                                                |
| 26    | 75.0                            | 2.5                 | 73.7                | 3.8                          | .819                             | 8.89                                             | 1.15                                                                    | .885                                                                |
| 27    | 74.3                            | 4.4                 | 72.1                | 6.6                          | .778                             | .41                                              | 2.00                                                                    | .808                                                                |
| 28    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 29    | 73.7                            | 4.9                 | 71.2                | 7.4                          | .756                             | .18                                              | .20                                                                     | .788                                                                |
| 30    | 73.8                            | 5.3                 | 71.1                | 8.0                          | .753                             | .15                                              | .38                                                                     | .774                                                                |
| 31    | 69.2                            | 7.2                 | 65.6                | 10.8                         | .630                             | 6.85                                             | .87                                                                     | .705                                                                |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of October, 1855.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.      | Mean Height of the Barometer at 32° Fah. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                          | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                  | Inches.                                                | Inches. | Inches. | °                          | °                                                        | °    | °     |
| Mid-night. | 29.851                                   | 29.971                                                 | 29.752  | 0.219   | 79.0                       | 83.6                                                     | 74.8 | 8.8   |
| 1          | .843                                     | .961                                                   | .740    | .221    | 78.5                       | 83.2                                                     | 74.2 | 9.0   |
| 2          | .831                                     | .956                                                   | .726    | .230    | 78.3                       | 82.6                                                     | 73.4 | 9.2   |
| 3          | .821                                     | .947                                                   | .724    | .223    | 78.4                       | 82.4                                                     | 72.5 | 9.9   |
| 4          | .825                                     | .946                                                   | .724    | .222    | 77.9                       | 82.2                                                     | 72.0 | 10.2  |
| 5          | .836                                     | .961                                                   | .734    | .227    | 77.6                       | 81.8                                                     | 71.2 | 10.6  |
| 6          | .855                                     | .975                                                   | .752    | .223    | 77.5                       | 81.8                                                     | 70.6 | 11.2  |
| 7          | .878                                     | .999                                                   | .766    | .233    | 78.3                       | 82.6                                                     | 71.0 | 11.6  |
| 8          | .898                                     | 30.015                                                 | .783    | .232    | 80.6                       | 84.2                                                     | 74.6 | 9.6   |
| 9          | .912                                     | .031                                                   | .802    | .229    | 82.3                       | 85.6                                                     | 76.2 | 9.4   |
| 10         | .910                                     | .030                                                   | .800    | .230    | 83.5                       | 87.2                                                     | 77.4 | 9.8   |
| 11         | .894                                     | .013                                                   | .787    | .226    | 84.8                       | 88.6                                                     | 77.2 | 11.4  |
| Noon.      | .866                                     | 29.979                                                 | .756    | .223    | 85.2                       | 89.6                                                     | 74.2 | 15.4  |
| 1          | .838                                     | .952                                                   | .727    | .225    | 85.8                       | 90.5                                                     | 74.4 | 16.1  |
| 2          | .816                                     | .923                                                   | .708    | .215    | 85.8                       | 90.0                                                     | 75.4 | 14.6  |
| 3          | .800                                     | .913                                                   | .688    | .225    | 85.0                       | 91.2                                                     | 75.0 | 16.2  |
| 4          | .799                                     | .912                                                   | .688    | .224    | 84.5                       | 90.4                                                     | 75.8 | 14.6  |
| 5          | .806                                     | .914                                                   | .690    | .224    | 83.5                       | 88.8                                                     | 75.8 | 13.0  |
| 6          | .814                                     | .925                                                   | .700    | .225    | 82.0                       | 86.8                                                     | 75.6 | 11.2  |
| 7          | .833                                     | .929                                                   | .720    | .209    | 81.1                       | 86.0                                                     | 75.4 | 10.6  |
| 8          | .853                                     | .958                                                   | .748    | .210    | 80.3                       | 85.0                                                     | 74.4 | 10.6  |
| 9          | .865                                     | .971                                                   | .767    | .204    | 79.9                       | 84.5                                                     | 73.6 | 10.9  |
| 10         | .866                                     | .977                                                   | .767    | .210    | 79.5                       | 83.8                                                     | 73.0 | 10.8  |
| 11         | .860                                     | .966                                                   | .761    | .205    | 79.2                       | 83.3                                                     | 72.2 | 11.1  |

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taken at the Surveyor General's Office, Calcutta,  
in the month of October, 1855.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Hour.          | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of Air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity<br>complete saturation be-<br>ing unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                  |
| Mid-<br>night. | 76.9                            | 2.1                 | 75.8                | 3.2                          | 0.876                            | 9.48                                             | 1.02                                                                    | 0.903                                                            |
| 1              | 76.6                            | 1.9                 | 75.6                | 2.9                          | .871                             | .42                                              | 0.93                                                                    | .910                                                             |
| 2              | 76.6                            | 1.7                 | 75.7                | 2.6                          | .873                             | .45                                              | .83                                                                     | .919                                                             |
| 3              | 76.6                            | 1.8                 | 75.7                | 2.7                          | .873                             | .45                                              | .86                                                                     | .917                                                             |
| 4              | 76.3                            | 1.6                 | 75.5                | 2.4                          | .868                             | .42                                              | .74                                                                     | .927                                                             |
| 5              | 76.1                            | 1.6                 | 75.3                | 2.4                          | .862                             | .36                                              | .74                                                                     | .927                                                             |
| 6              | 76.0                            | 1.5                 | 75.2                | 2.3                          | .860                             | .33                                              | .71                                                                     | .929                                                             |
| 7              | 76.4                            | 1.9                 | 75.4                | 2.9                          | .865                             | .37                                              | .91                                                                     | .911                                                             |
| 8              | 77.3                            | 3.3                 | 75.6                | 5.0                          | .871                             | .39                                              | 1.62                                                                    | .853                                                             |
| 9              | 77.6                            | 4.6                 | 75.4                | 6.9                          | .865                             | .30                                              | 2.28                                                                    | .803                                                             |
| 10             | 77.8                            | 5.7                 | 74.9                | 8.6                          | .851                             | .11                                              | .89                                                                     | .759                                                             |
| 11             | 78.2                            | 6.6                 | 74.9                | 9.9                          | .851                             | .09                                              | 3.37                                                                    | .730                                                             |
|                |                                 |                     |                     |                              |                                  |                                                  |                                                                         |                                                                  |
| Noon.          | 78.2                            | 7.0                 | 74.7                | 10.5                         | .846                             | .03                                              | .58                                                                     | .716                                                             |
| 1              | 78.4                            | 7.4                 | 74.7                | 11.1                         | .846                             | .03                                              | .80                                                                     | .704                                                             |
| 2              | 78.2                            | 7.6                 | 74.4                | 11.4                         | .838                             | 8.95                                             | .88                                                                     | .698                                                             |
| 3              | 77.6                            | 7.4                 | 73.9                | 11.1                         | .824                             | .81                                              | .72                                                                     | .703                                                             |
| 4              | 77.4                            | 7.1                 | 73.8                | 10.7                         | .822                             | .78                                              | .57                                                                     | .711                                                             |
| 5              | 77.4                            | 6.1                 | 74.3                | 9.2                          | .835                             | .96                                              | .04                                                                     | .747                                                             |
| 6              | 77.7                            | 4.3                 | 75.5                | 6.5                          | .868                             | 9.33                                             | 2.14                                                                    | .813                                                             |
| 7              | 77.5                            | 3.6                 | 75.7                | 5.4                          | .873                             | .41                                              | 1.76                                                                    | .842                                                             |
| 8              | 77.4                            | 2.9                 | 75.9                | 4.4                          | .879                             | .49                                              | .42                                                                     | .870                                                             |
| 9              | 77.1                            | 2.8                 | 75.7                | 4.2                          | .873                             | .43                                              | .35                                                                     | .875                                                             |
| 10             | 77.0                            | 2.5                 | 75.7                | 3.8                          | .873                             | .43                                              | .23                                                                     | .885                                                             |
| 11             | 76.9                            | 2.3                 | 75.7                | 3.5                          | .873                             | .43                                              | .13                                                                     | .893                                                             |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of October, 1855.*

Solar radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain.   | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                         |
|-------|-----------------------|---------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------|
|       | °                     | Inches. |                                   |                                                                                                                    |
| 1     | 133.2                 | 0.72    | E. or N. E. or N.                 | Scattered ☁i and ☂i till 7 A. M. only scattered ☂i till 11 A. M. cloudy afterwards with rain between 3 and 6 P. M. |
| 2     | 130.6                 | ..      | N. E.                             | Scattered ☂i till 2 A. M. cloudless till 6 A. M. cloudy afterwards with drizzling after sunset.                    |
| 3     | ..                    | 0.09    | N. E. or N.                       | Cloudy with little drizzling at 9 A. M.                                                                            |
| 4     | 145.0                 | ..      | S. E. or N. W. or W.              | Cloudless till 3 A. M. more or less scattered ☁i till 6 P. M. cloudless afterwards.                                |
| 5     | 146.0                 | ..      | S. W. or W.                       | Cloudless till 6 A. M. clouds of various kinds till 6 P. M. cloudless afterwards.                                  |
| 6     | 141.0                 | ..      | Calm or W.                        | Cloudless till 3 A. M. scattered ☁i till 6 P. M. cloudless afterwards.                                             |
| 7     | <i>Sunday.</i>        | ..      | ..                                | Cloudless.                                                                                                         |
| 8     | 142.0                 | ..      | N.                                | Cloudless nearly the whole day.                                                                                    |
| 9     | 144.0                 | ..      | N. W.                             | Ditto.                                                                                                             |
| 10    | 144.0                 | ..      | N. W.                             | Cloudless till 9 A. M. variable clouds till 7 P. M. cloudless afterwards.                                          |
| 11    | 142.0                 | ..      | N. W.                             | Cloudless till 5 A. M. variable clouds till 5 P. M. cloudless afterwards.                                          |
| 12    | 139.0                 | ..      | N. W. or W.                       | Cloudless till 10 A. M. scattered ☁i till 6 P. M. cloudless afterwards.                                            |
| 13    | 145.0                 | ..      | W. or N. W. or N. E.              | [wards, Scattered ☁i till 6 P. M. cloudless afterwards.                                                            |
| 14    | <i>Sunday.</i>        | ..      | S. or N.                          | Cloudless till 3 A. M. scattered ☁i till 3 P. M. scattered ☂i and ☁i afterwards.                                   |
| 15    | 136.0                 | ..      | N.                                | Cloudless till 6 A. M. cloudy afterwards with rain between Noon and 4 P. M.                                        |
| 16    | 138.0                 | ..      | N.                                | Cloudless till 6 A. M. cloudy afterwards with rain at 3 and 4 P. M.                                                |
| 17    | ..                    | 0.16    | N. N. E. or S.                    | Cloudless till 4 A. M. cloudy afterwards with rain between 3 and 7 P. M.                                           |
| 18    | ..                    | 1.06    | S. or E.                          | Cloudy the whole day also drizzling between 7 and 9 P. M.                                                          |
| 19    | ..                    | ..      | N. or N. E. or S. W.              |                                                                                                                    |
| 20    | 118.0                 | 0.38    | W. or E. N. E.                    |                                                                                                                    |

☂i Cirri, ☂i Cirro-strati, ☁i Cumuli, ☂i Cumulo-strati, ☂i Nimbi, —i Strati, ☂i Cirro-cumuli.

*Abstract of the Result of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of October, 1855.*

Solar radiation, Weather, &c.

| Date.      | Max. Solar radiation. | Rain.   | Prevailing direction of the Wind. | General Aspect of the Sky.                                                         |
|------------|-----------------------|---------|-----------------------------------|------------------------------------------------------------------------------------|
|            | o                     | Inches. |                                   |                                                                                    |
| 21 Sunday. | 0.14                  | ..      | ..                                |                                                                                    |
| 22         | 140.0                 | ..      | S. or E. N. E. or W. or N.        | Clouds of various kinds, also rain at 6 P. M.                                      |
| 23         | 134.0                 | ..      | S.                                | Cloudy more or less the whole day.                                                 |
| 24         | 129.0                 | ..      | S.                                | Cloudy the whole day: also drizzling at 3 and 7 and 8 P. M.                        |
| 25         | ..                    | 0.83    | N. E.                             | Cloudy, also drizzling between 7 A. M. and 3 P. M.                                 |
| 26         | ..                    | ..      | N.                                | Cloudy.                                                                            |
| 27         | 142.0                 | ..      | N. W. or N.                       | Variable clouds.                                                                   |
| 28 Sunday. | ..                    | ..      | ..                                |                                                                                    |
| 29         | 142.0                 | ..      | N. W. or N.                       | Cloudless till 10 A. M. clouds of various kinds till 6 P. M. cloudless afterwards. |
| 30         | 136.0                 | ..      | Calm or N. W. or W.               | Cloudless nearly the whole day.                                                    |
| 31         | 141.0                 | ..      | N. W. or N. or N. N. W.           | Ditto.                                                                             |





*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of November, 1855.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet  
Height of the Cistern of the Standard Barometer above the level of the Sea, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Faht. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | c    | o     |
| 1     | 29.956                                          | 30.031                                    | 29.907  | 0.124   | 75.3                          | 83.4                                          | 68.4 | 15.0  |
| 2     | .917                                            | 29.970                                    | .850    | .120    | 76.8                          | 84.4                                          | 69.8 | 14.6  |
| 3     | .919                                            | .982                                      | .865    | .117    | 78.2                          | 84.0                                          | 72.4 | 11.6  |
| 4     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 5     | .990                                            | 30.059                                    | .946    | .113    | 79.1                          | 85.3                                          | 73.6 | 11.7  |
| 6     | .951                                            | .009                                      | .902    | .107    | 76.9                          | 84.2                                          | 70.5 | 13.7  |
| 7     | .950                                            | .017                                      | .904    | .113    | 77.4                          | 84.4                                          | 72.1 | 12.3  |
| 8     | .950                                            | .032                                      | .895    | .137    | 77.5                          | 85.0                                          | 72.4 | 12.6  |
| 9     | .916                                            | 29.981                                    | .857    | .124    | 78.5                          | 87.0                                          | 72.4 | 14.6  |
| 10    | .934                                            | 30.003                                    | .882    | .121    | 78.7                          | 86.8                                          | 74.4 | 12.4  |
| 11    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 12    | .982                                            | .070                                      | .926    | .144    | 75.0                          | 83.6                                          | 67.9 | 15.7  |
| 13    | .947                                            | .020                                      | .889    | .131    | 74.1                          | 82.6                                          | 67.2 | 15.4  |
| 14    | .945                                            | .030                                      | .880    | .150    | 74.7                          | 83.5                                          | 67.6 | 15.9  |
| 15    | .954                                            | .025                                      | .909    | .116    | 74.1                          | 82.6                                          | 67.2 | 15.4  |
| 16    | .955                                            | .020                                      | .899    | .121    | 74.1                          | 83.5                                          | 67.2 | 16.3  |
| 17    | .955                                            | .030                                      | .898    | .132    | 73.6                          | 83.0                                          | 67.0 | 16.0  |
| 18    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 19    | .947                                            | .021                                      | .897    | .124    | 72.7                          | 83.6                                          | 64.8 | 18.8  |
| 20    | .957                                            | .026                                      | .902    | .124    | 73.9                          | 83.2                                          | 66.2 | 17.0  |
| 21    | 30.031                                          | .108                                      | .966    | .142    | 73.8                          | 82.6                                          | 67.8 | 14.8  |
| 22    | .043                                            | .123                                      | .998    | .125    | 71.8                          | 80.4                                          | 65.0 | 15.4  |
| 23    | .031                                            | .088                                      | .965    | .123    | 70.7                          | 80.0                                          | 62.8 | 17.2  |
| 24    | .036                                            | .109                                      | .957    | .152    | 71.0                          | 80.6                                          | 63.6 | 17.0  |
| 25    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 26    | .063                                            | .129                                      | 30.022  | .107    | 71.8                          | 80.6                                          | 65.0 | 15.6  |
| 27    | .090                                            | .158                                      | .028    | .130    | 71.8                          | 81.5                                          | 65.4 | 16.1  |
| 28    | .082                                            | .141                                      | .018    | .123    | 71.8                          | 81.2                                          | 64.6 | 16.6  |
| 29    | .088                                            | .155                                      | .030    | .125    | 71.0                          | 79.8                                          | 64.4 | 15.4  |
| 30    | .090                                            | .156                                      | .039    | .117    | 69.8                          | 80.4                                          | 61.2 | 19.2  |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of November, 1855.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|       | °                               | °                   | °                   | °                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| 1     | 69.0                            | 6.3                 | 65.8                | 9.5                          | 0.634                            | 6.90                                             | 2.50                                                                    | 0.734                                                               |
| 2     | 71.0                            | 5.8                 | 68.1                | 8.7                          | .684                             | 7.41                                             | .42                                                                     | .754                                                                |
| 3     | 72.6                            | 5.6                 | 69.8                | 8.4                          | .722                             | .82                                              | .43                                                                     | .763                                                                |
| 4     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 5     | 72.6                            | 6.5                 | 69.3                | 9.8                          | .711                             | .67                                              | .86                                                                     | .728                                                                |
| 6     | 71.4                            | 5.5                 | 68.6                | 8.3                          | .695                             | .55                                              | .31                                                                     | .766                                                                |
| 7     | 71.7                            | 5.7                 | 68.8                | 8.6                          | .699                             | .57                                              | .44                                                                     | .756                                                                |
| 8     | 72.0                            | 5.5                 | 69.2                | 8.3                          | .708                             | .69                                              | .35                                                                     | .766                                                                |
| 9     | 73.3                            | 5.2                 | 70.7                | 7.8                          | .744                             | 8.05                                             | .30                                                                     | .778                                                                |
| 10    | 73.4                            | 5.3                 | 70.7                | 8.0                          | .744                             | .05                                              | .36                                                                     | .773                                                                |
| 11    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 12    | 68.7                            | 6.3                 | 65.5                | 9.5                          | .628                             | 6.84                                             | .47                                                                     | .735                                                                |
| 13    | 67.9                            | 6.2                 | 64.8                | 9.3                          | .613                             | .71                                              | .36                                                                     | .740                                                                |
| 14    | 68.4                            | 6.3                 | 65.2                | 9.5                          | .621                             | .77                                              | .46                                                                     | .733                                                                |
| 15    | 66.3                            | 7.8                 | 62.4                | 11.7                         | .567                             | .18                                              | .89                                                                     | .681                                                                |
| 16    | 67.3                            | 6.8                 | 63.9                | 10.2                         | .595                             | .50                                              | .57                                                                     | .717                                                                |
| 17    | 67.3                            | 6.3                 | 64.1                | 9.5                          | .599                             | .54                                              | .39                                                                     | .732                                                                |
| 18    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 19    | 66.7                            | 6.0                 | 63.7                | 9.0                          | .591                             | .47                                              | .21                                                                     | .745                                                                |
| 20    | 68.6                            | 5.3                 | 65.9                | 8.0                          | .636                             | .95                                              | .06                                                                     | .772                                                                |
| 21    | 67.8                            | 6.0                 | 64.8                | 9.0                          | .613                             | .71                                              | .27                                                                     | .747                                                                |
| 22    | 65.6                            | 6.2                 | 62.5                | 9.3                          | .568                             | .24                                              | .21                                                                     | .738                                                                |
| 23    | 65.1                            | 5.6                 | 62.3                | 8.4                          | .565                             | .21                                              | 1.97                                                                    | .759                                                                |
| 24    | 65.1                            | 5.9                 | 62.1                | 8.9                          | .561                             | .16                                              | 2.09                                                                    | .747                                                                |
| 25    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 26    | 66.9                            | 4.9                 | 64.4                | 7.4                          | .605                             | .65                                              | 1.80                                                                    | .787                                                                |
| 27    | 66.5                            | 5.3                 | 63.8                | 8.0                          | .593                             | .50                                              | .95                                                                     | .769                                                                |
| 28    | 65.7                            | 6.1                 | 62.6                | 9.2                          | .570                             | .26                                              | 2.19                                                                    | .741                                                                |
| 29    | 65.2                            | 5.8                 | 62.3                | 8.7                          | .565                             | .20                                              | .05                                                                     | .752                                                                |
| 30    | 63.0                            | 6.8                 | 59.6                | 10.2                         | .516                             | 5.68                                             | .27                                                                     | .714                                                                |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of November, 1855.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Hour.      | Mean Height of the Barometer at 32° Faht. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | °                          | °                                                        | °    | °     |
| Mid-night. | 29.985                                    | 30.096                                                 | 29.904  | 0.192   | 70.7                       | 76.6                                                     | 66.2 | 10.4  |
| 1          | .978                                      | .093                                                   | .906    | .187    | 70.1                       | 76.4                                                     | 65.0 | 11.4  |
| 2          | .971                                      | .089                                                   | .889    | .200    | 69.6                       | 76.4                                                     | 64.8 | 11.6  |
| 3          | .962                                      | .081                                                   | .893    | .188    | 69.3                       | 76.2                                                     | 64.0 | 12.2  |
| 4          | .966                                      | .078                                                   | .891    | .187    | 68.8                       | 75.6                                                     | 63.6 | 12.0  |
| 5          | .975                                      | .092                                                   | .905    | .187    | 68.2                       | 75.1                                                     | 62.6 | 12.5  |
| 6          | .991                                      | .100                                                   | .917    | .183    | 67.8                       | 75.3                                                     | 61.2 | 14.1  |
| 7          | 30.015                                    | .118                                                   | .947    | .171    | 68.1                       | 75.0                                                     | 61.4 | 13.6  |
| 8          | .038                                      | .149                                                   | .961    | .188    | 71.6                       | 77.9                                                     | 65.8 | 12.1  |
| 9          | .055                                      | .158                                                   | .970    | .188    | 74.9                       | 79.8                                                     | 69.5 | 10.3  |
| 10         | .055                                      | .156                                                   | .969    | .187    | 76.9                       | 81.2                                                     | 73.4 | 7.8   |
| 11         | .037                                      | .135                                                   | .941    | .194    | 79.1                       | 83.0                                                     | 75.6 | 7.4   |
| Noon.      | .010                                      | .108                                                   | .925    | .183    | 81.1                       | 85.0                                                     | 77.8 | 7.2   |
| 1          | 29.976                                    | .077                                                   | .895    | .182    | 82.2                       | 86.3                                                     | 78.6 | 7.7   |
| 2          | .953                                      | .063                                                   | .860    | .203    | 82.8                       | 87.0                                                     | 79.6 | 7.4   |
| 3          | .938                                      | .040                                                   | .850    | .190    | 82.7                       | 86.8                                                     | 79.4 | 7.4   |
| 4          | .934                                      | .041                                                   | .852    | .189    | 80.6                       | 85.0                                                     | 77.0 | 8.0   |
| 5          | .944                                      | .061                                                   | .861    | .200    | 78.7                       | 83.0                                                     | 74.4 | 8.6   |
| 6          | .953                                      | .072                                                   | .865    | .207    | 76.6                       | 81.0                                                     | 72.4 | 8.6   |
| 7          | .974                                      | .091                                                   | .888    | .203    | 75.0                       | 79.4                                                     | 70.2 | 9.2   |
| 8          | .990                                      | .100                                                   | .908    | .192    | 73.9                       | 78.8                                                     | 69.4 | 9.4   |
| 9          | 30.000                                    | .110                                                   | .920    | .190    | 72.8                       | 79.0                                                     | 67.7 | 11.3  |
| 10         | .006                                      | .113                                                   | .919    | .194    | 72.1                       | 78.6                                                     | 66.6 | 12.0  |
| 11         | 29.998                                    | .114                                                   | .911    | .203    | 71.2                       | 77.8                                                     | 65.6 | 12.2  |



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taken at the Surveyor General's Office, Calcutta,  
in the month of November, 1855.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Hour.          | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of Air. | Additional weight of va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity,<br>complete saturation be-<br>ing unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                   |
| Mid-<br>night. | 67.6                            | 3.1                 | 66.0                | 4.7                          | 0.638                            | 7.01                                             | 1.17                                                                    | 0.857                                                             |
| 1              | 67.2                            | 2.9                 | 65.7                | 4.4                          | .632                             | 6.96                                             | .07                                                                     | .867                                                              |
| 2              | 66.7                            | 2.9                 | 65.2                | 4.4                          | .621                             | .85                                              | .05                                                                     | .867                                                              |
| 3              | 66.5                            | 2.8                 | 65.1                | 4.2                          | .619                             | .83                                              | .00                                                                     | .872                                                              |
| 4              | 66.0                            | 2.8                 | 64.6                | 4.2                          | .609                             | .73                                              | 0.98                                                                    | .873                                                              |
| 5              | 65.6                            | 2.6                 | 64.0                | 4.2                          | .597                             | .60                                              | .98                                                                     | .871                                                              |
| 6              | 65.3                            | 2.5                 | 63.8                | 4.0                          | .593                             | .56                                              | .92                                                                     | .877                                                              |
| 7              | 65.6                            | 2.5                 | 64.1                | 4.0                          | .599                             | .62                                              | .93                                                                     | .877                                                              |
| 8              | 67.4                            | 4.2                 | 65.3                | 6.3                          | .623                             | .85                                              | 1.55                                                                    | .815                                                              |
| 9              | 68.5                            | 6.4                 | 65.3                | 9.6                          | .623                             | .79                                              | 2.49                                                                    | .732                                                              |
| 10             | 69.3                            | 7.6                 | 65.5                | 11.4                         | .628                             | .83                                              | 3.03                                                                    | .693                                                              |
| 11             | 70.0                            | 9.1                 | 65.4                | 13.7                         | .626                             | .76                                              | .77                                                                     | .642                                                              |
| Noon.          | 70.4                            | 10.7                | 65.0                | 16.1                         | .617                             | .65                                              | 4.52                                                                    | .595                                                              |
| 1              | 70.6                            | 11.6                | 64.8                | 17.4                         | .613                             | .60                                              | .94                                                                     | .572                                                              |
| 2              | 70.8                            | 12.0                | 64.8                | 18.0                         | .613                             | .58                                              | 5.17                                                                    | .560                                                              |
| 3              | 70.4                            | 12.3                | 64.2                | 18.5                         | .601                             | .44                                              | .28                                                                     | .549                                                              |
| 4              | 69.7                            | 10.9                | 64.2                | 16.4                         | .601                             | .48                                              | 4.53                                                                    | .588                                                              |
| 5              | 70.2                            | 8.5                 | 65.9                | 12.8                         | .636                             | .88                                              | 3.53                                                                    | .661                                                              |
| 6              | 70.2                            | 6.4                 | 67.0                | 9.6                          | .659                             | 7.15                                             | 2.62                                                                    | .732                                                              |
| 7              | 69.8                            | 5.2                 | 67.2                | 7.8                          | .664                             | .23                                              | .08                                                                     | .777                                                              |
| 8              | 69.3                            | 4.6                 | 67.0                | 6.9                          | .659                             | .20                                              | 1.81                                                                    | .799                                                              |
| 9              | 68.8                            | 4.0                 | 66.8                | 6.0                          | .655                             | .17                                              | .54                                                                     | .823                                                              |
| 10             | 68.3                            | 3.8                 | 66.4                | 5.7                          | .646                             | .08                                              | .45                                                                     | .830                                                              |
| 11             | 67.9                            | 3.3                 | 66.2                | 5.0                          | .642                             | .05                                              | .25                                                                     | .849                                                              |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of November, 1855.*

Solar radiation, Weather, &c.

| Date. | Max Solar radiation. | Rain.  | Prevailing direction of the Wind. | General Aspect of the Sky.                                                 |
|-------|----------------------|--------|-----------------------------------|----------------------------------------------------------------------------|
|       | °                    | Inches |                                   |                                                                            |
| 1     | 136.0                | ..     | N. W. or W.                       | Cloudless till 4 A. M. scattered ☽ or ☾ afterwards.                        |
| 2     | 144.0                | ..     | N. W. or N.                       | Scattered ☽ and ☾ till 6 P. M. cloudless afterwards.                       |
| 3     | 141.2                | ..     | N. or N.E. or N.N.W.              | Cloudless till 10 A. M. scattered ☽ and ☾ afterwards.                      |
| 4     | <i>Sunday.</i>       | ..     | ..                                |                                                                            |
| 5     | 142.0                | ..     | N. W. or N.                       | Scattered ☽ or ☾ till 9 A. M. cloudless afterwards.                        |
| 6     | 138.0                | ..     | W.                                | Cloudless.                                                                 |
| 7     | 139.2                | ..     | N. W. or W.                       | Cloudless.                                                                 |
| 8     | 139.0                | ..     | W.                                | Cloudless nearly the whole day.                                            |
| 9     | 141.0                | ..     | W.                                | Cloudless.                                                                 |
| 10    | 144.0                | ..     | W.                                | Cloudless.                                                                 |
| 11    | <i>Sunday.</i>       | ..     | ..                                |                                                                            |
| 12    | 142.0                | ..     | W.                                | Cloudless.                                                                 |
| 13    | 136.5                | ..     | W.                                | Cloudless.                                                                 |
| 14    | 137.4                | ..     | W.                                | Cloudless.                                                                 |
| 15    | 142.0                | ..     | W.                                | Cloudless.                                                                 |
| 16    | 147.0                | ..     | W. or W. N. W. N. W.              | Cloudless.                                                                 |
| 17    | 136.5                | ..     | W.                                | Cloudless.                                                                 |
| 18    | <i>Sunday.</i>       | ..     | ..                                |                                                                            |
| 19    | 139.0                | ..     | W. or S. W.                       | Cloudless.                                                                 |
| 20    | 142.0                | ..     | W. or S. W.                       | Cloudless.                                                                 |
| 21    | 137.9                | ..     | S. E. or N. E. or W.              | Cloudless.                                                                 |
| 22    | 140.0                | ..     | W.                                | Cloudless.                                                                 |
| 23    | 135.0                | ..     | W. or N.                          | Cloudless.                                                                 |
| 24    | 137.2                | ..     | N. W. or W.                       | Cloudless.                                                                 |
| 25    | <i>Sunday.</i>       | ..     | ..                                |                                                                            |
| 26    | 134.0                | ..     | W. or N. W.                       | Cloudless till 2 A. M. various clouds till 5 P. M. cloudless afterwards.   |
| 27    | 140.0                | ..     | Calm or N. W. or N.               | Cloudless till 9 A. M. scattered ☽ or ☾ till 6 P. M. cloudless afterwards. |
| 28    | 135.6                | ..     | N. or N. N. W.                    | Cloudless.                                                                 |
| 29    | 135.0                | ..     | N. W. or N.                       | Cloudless till Noon scattered ☽ till 6 P. M. cloudless afterwards.         |
| 30    | 141.0                | ..     | N. or N. N. W.                    | Cloudless till 7 A. M. scattered ☽ or ☾ till 7 P. M. cloudless afterwards. |

☽ Cirri, ☾ cirro strati, ☽ cumuli, ☾ cumulo strati, ☽ nimbi, ☾ strati,  
☽ cirro cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of December, 1855.*

Latitude 22° 33' 1" North, Longitude 88° 20' 34" East.

Height of the cistern of the Standard Barometer above the Level of the Sea 18.11. feet

Daily Means, &c. of the Observations, and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | °                             | °                                             | °    | °     |
| 1     | 30.111                                          | 30.176                                    | 30.049  | 0.127   | 69.4                          | 78.4                                          | 62.1 | 16.3  |
| 2     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 3     | .106                                            | .169                                      | .044    | .125    | 69.2                          | 77.9                                          | 62.4 | 15.5  |
| 4     | .117                                            | .182                                      | .065    | .117    | 69.9                          | 79.4                                          | 63.6 | 15.8  |
| 5     | .106                                            | .194                                      | .043    | .151    | 70.1                          | 80.5                                          | 61.8 | 18.7  |
| 6     | .068                                            | .147                                      | .005    | .142    | 69.9                          | 80.0                                          | 61.8 | 18.2  |
| 7     | .026                                            | .116                                      | 29.972  | .144    | 68.8                          | 79.2                                          | 61.2 | 18.0  |
| 8     | .031                                            | .126                                      | .977    | .149    | 68.1                          | 78.2                                          | 60.2 | 18.0  |
| 9     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 10    | .008                                            | .097                                      | .947    | .150    | 65.1                          | 75.0                                          | 57.0 | 18.0  |
| 11    | .039                                            | .118                                      | .981    | .137    | 65.8                          | 76.2                                          | 57.0 | 19.2  |
| 12    | .013                                            | .092                                      | .949    | .143    | 65.4                          | 75.6                                          | 57.6 | 18.0  |
| 13    | 29.965                                          | .033                                      | .902    | .131    | 65.2                          | 75.0                                          | 57.4 | 17.6  |
| 14    | .981                                            | .056                                      | .924    | .132    | 65.3                          | 74.8                                          | 57.8 | 17.0  |
| 15    | 30.003                                          | .078                                      | .951    | .127    | 65.9                          | 76.2                                          | 58.0 | 18.2  |
| 16    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 17    | .042                                            | .132                                      | .977    | .155    | 65.7                          | 76.4                                          | 57.3 | 19.1  |
| 18    | .049                                            | .130                                      | 30.001  | .129    | 65.0                          | 75.6                                          | 57.2 | 18.4  |
| 19    | .052                                            | .139                                      | 29.986  | .153    | 66.8                          | 77.0                                          | 59.6 | 17.4  |
| 20    | .067                                            | .145                                      | 30.012  | .133    | 68.1                          | 78.4                                          | 59.8 | 18.6  |
| 21    | .068                                            | .142                                      | .008    | .134    | 68.5                          | 79.2                                          | 60.4 | 18.8  |
| 22    | .038                                            | .110                                      | 29.969  | .141    | 68.5                          | 78.8                                          | 60.6 | 18.2  |
| 23    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 24    | 29.981                                          | .065                                      | .920    | .145    | 66.5                          | 76.7                                          | 58.2 | 18.5  |
| 25    | <i>Xtmas.</i>                                   |                                           |         |         |                               |                                               |      |       |
| 26    | .995                                            | .088                                      | .945    | .143    | 64.6                          | 75.4                                          | 56.0 | 19.4  |
| 27    | 30.002                                          | .088                                      | .933    | .155    | 65.2                          | 76.1                                          | 57.0 | 19.1  |
| 28    | 29.998                                          | .081                                      | .947    | .134    | 65.4                          | 76.6                                          | 56.6 | 20.0  |
| 29    | .954                                            | .028                                      | .906    | .122    | 66.9                          | 79.4                                          | 56.6 | 22.8  |
| 30    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 31    | 30.044                                          | .128                                      | .997    | .131    | 64.2                          | 74.4                                          | 56.2 | 18.2  |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of December, 1855.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Date. | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of Air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity<br>complete saturation be-<br>ing unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                  |
| 1     | 63.8                            | 5.6                 | 61.0                | 8.4                          | 0.541                            | 5.96                                             | 1.90                                                                    | 0.758                                                            |
| 2     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                  |
| 3     | 64.3                            | 4.9                 | 61.8                | 7.4                          | .555                             | 6.12                                             | .69                                                                     | .784                                                             |
| 4     | 64.8                            | 5.1                 | 62.2                | 7.7                          | .563                             | .19                                              | .79                                                                     | .776                                                             |
| 5     | 64.1                            | 6.0                 | 61.1                | 9.0                          | .543                             | 5.97                                             | 2.06                                                                    | .743                                                             |
| 6     | 64.1                            | 5.8                 | 61.2                | 8.7                          | .544                             | .99                                              | 1.99                                                                    | .751                                                             |
| 7     | 62.5                            | 6.3                 | 59.3                | 9.5                          | .511                             | .63                                              | 2.08                                                                    | .730                                                             |
| 8     | 62.3                            | 5.8                 | 58.8                | 9.3                          | .503                             | .55                                              | .00                                                                     | .735                                                             |
| 9     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                  |
| 10    | 58.7                            | 6.4                 | 54.9                | 10.2                         | .441                             | 4.90                                             | 1.99                                                                    | .711                                                             |
| 11    | 59.8                            | 6.0                 | 56.2                | 9.6                          | .461                             | 5.11                                             | .93                                                                     | .726                                                             |
| 12    | 59.9                            | 5.5                 | 56.6                | 8.8                          | .467                             | .18                                              | .77                                                                     | .747                                                             |
| 13    | 59.7                            | 5.5                 | 56.4                | 8.8                          | .464                             | .15                                              | .76                                                                     | .745                                                             |
| 14    | 60.2                            | 5.1                 | 57.1                | 8.2                          | .475                             | .27                                              | .66                                                                     | .760                                                             |
| 15    | 60.5                            | 5.4                 | 57.3                | 8.6                          | .478                             | .29                                              | .77                                                                     | .749                                                             |
| 16    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                  |
| 17    | 59.7                            | 6.0                 | 56.1                | 9.6                          | .459                             | .10                                              | .92                                                                     | .726                                                             |
| 18    | 59.9                            | 5.1                 | 56.8                | 8.2                          | .470                             | .23                                              | .64                                                                     | .761                                                             |
| 19    | 61.3                            | 5.5                 | 58.0                | 8.8                          | .489                             | .41                                              | .85                                                                     | .745                                                             |
| 20    | 62.7                            | 5.4                 | 59.5                | 8.6                          | .515                             | .68                                              | .87                                                                     | .752                                                             |
| 21    | 62.4                            | 6.1                 | 59.3                | 9.2                          | .511                             | .64                                              | 2.01                                                                    | .737                                                             |
| 22    | 62.6                            | 5.9                 | 59.6                | 8.9                          | .516                             | .70                                              | 1.95                                                                    | .745                                                             |
| 23    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                  |
| 24    | 60.4                            | 6.1                 | 56.7                | 9.8                          | .469                             | .18                                              | 2.01                                                                    | .720                                                             |
| 25    | <i>Xtmas.</i>                   |                     |                     |                              |                                  |                                                  |                                                                         |                                                                  |
| 26    | 59.0                            | 5.6                 | 55.6                | 9.0                          | .452                             | .03                                              | 1.75                                                                    | .742                                                             |
| 27    | 60.0                            | 5.2                 | 56.9                | 8.3                          | .472                             | .23                                              | .68                                                                     | .757                                                             |
| 28    | 59.4                            | 6.0                 | 55.8                | 9.6                          | .455                             | .05                                              | .90                                                                     | .727                                                             |
| 29    | 60.5                            | 6.4                 | 56.7                | 10.2                         | .469                             | .18                                              | 2.10                                                                    | .712                                                             |
| 30    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                  |
| 31    | 56.8                            | 7.4                 | 51.6                | 12.6                         | .394                             | 4.38                                             | .31                                                                     | .655                                                             |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of December, 1855.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Faht. | Range of the Barometer<br>for each hour during<br>the month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Temperature<br>for each hour during<br>the month. |      |       |
|----------------|-------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|----------------------------------------------------------------|------|-------|
|                |                                                 | Max.                                                         | Min.    | Diff.   |                               | Max.                                                           | Min. | Diff. |
|                | Inches.                                         | Inches.                                                      | Inches. | Inches. | °                             | °                                                              | °    | °     |
| Mid-<br>night. | } 30.034                                        | 30.119                                                       | 29.946  | 0.173   | 62.6                          | 66.2                                                           | 60.1 | 6.1   |
| 1              | .027                                            | .114                                                         | .944    | .170    | 62.0                          | 65.2                                                           | 59.4 | 5.8   |
| 2              | .019                                            | .102                                                         | .930    | .172    | 61.3                          | 64.8                                                           | 58.8 | 6.0   |
| 3              | .013                                            | .092                                                         | .924    | .168    | 60.7                          | 64.4                                                           | 58.2 | 6.2   |
| 4              | .009                                            | .088                                                         | .919    | .169    | 60.1                          | 64.0                                                           | 57.2 | 6.8   |
| 5              | .022                                            | .108                                                         | .930    | .178    | 59.6                          | 63.8                                                           | 56.6 | 7.2   |
| 6              | .039                                            | .129                                                         | .944    | .185    | 59.1                          | 63.6                                                           | 56.2 | 7.4   |
| 7              | .065                                            | .148                                                         | .974    | .174    | 59.1                          | 63.6                                                           | 56.0 | 7.6   |
| 8              | .092                                            | .180                                                         | .998    | .182    | 62.0                          | 67.2                                                           | 57.5 | 9.7   |
| 9              | .113                                            | .194                                                         | 30.028  | .166    | 66.2                          | 70.6                                                           | 62.6 | 8.0   |
| 10             | .111                                            | .186                                                         | .025    | .161    | 69.3                          | 73.8                                                           | 65.8 | 8.0   |
| 11             | .090                                            | .168                                                         | .008    | .160    | 72.2                          | 76.2                                                           | 69.0 | 7.2   |
| Noon.          | .057                                            | .143                                                         | 29.983  | .160    | 74.8                          | 78.2                                                           | 71.4 | 6.8   |
| 1              | .025                                            | .140                                                         | .951    | .189    | 76.3                          | 79.4                                                           | 73.6 | 5.8   |
| 2              | .000                                            | .086                                                         | .926    | .160    | 77.2                          | 80.5                                                           | 74.0 | 6.5   |
| 3              | 29.985                                          | .065                                                         | .912    | .153    | 76.9                          | 80.0                                                           | 74.2 | 5.8   |
| 4              | .980                                            | .066                                                         | .902    | .164    | 74.6                          | 77.7                                                           | 72.0 | 5.7   |
| 5              | .986                                            | .083                                                         | .911    | .172    | 72.7                          | 75.8                                                           | 70.0 | 5.8   |
| 6              | .994                                            | .101                                                         | .914    | .187    | 70.4                          | 77.2                                                           | 67.0 | 10.2  |
| 7              | 30.011                                          | .119                                                         | .927    | .192    | 68.2                          | 71.1                                                           | 64.8 | 6.3   |
| 8              | .028                                            | .131                                                         | .942    | .189    | 66.8                          | 69.8                                                           | 63.2 | 6.6   |
| 9              | .041                                            | .145                                                         | .955    | .190    | 65.6                          | 69.0                                                           | 62.4 | 6.6   |
| 10             | .044                                            | .144                                                         | .963    | .181    | 64.5                          | 67.6                                                           | 61.4 | 6.2   |
| 11             | .039                                            | .141                                                         | .964    | .177    | 63.8                          | 68.1                                                           | 61.6 | 6.5   |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of December, 1855.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Hour.          | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of Air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity,<br>complete saturation be-<br>ing unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                   |
| Mid-<br>night. | 59.8                            | 2.8                 | 57.8                | 4.8                          | 0.486                            | 5.43                                             | 0.94                                                                    | 0.852                                                             |
| 1              | 59.3                            | 2.7                 | 57.4                | 4.6                          | .480                             | .36                                              | .89                                                                     | .858                                                              |
| 2              | 58.7                            | 2.6                 | 56.6                | 4.7                          | .467                             | .23                                              | .89                                                                     | .855                                                              |
| 3              | 58.0                            | 2.7                 | 55.8                | 4.9                          | .455                             | .10                                              | .90                                                                     | .850                                                              |
| 4              | 57.6                            | 2.5                 | 55.6                | 4.5                          | .452                             | .07                                              | .82                                                                     | .861                                                              |
| 5              | 57.3                            | 2.3                 | 55.5                | 4.1                          | .450                             | .06                                              | .74                                                                     | .872                                                              |
| 6              | 56.9                            | 2.2                 | 55.1                | 4.0                          | .444                             | .00                                              | .71                                                                     | .876                                                              |
| 7              | 57.0                            | 2.1                 | 55.3                | 3.8                          | .447                             | .03                                              | .68                                                                     | .881                                                              |
| 8              | 58.7                            | 3.3                 | 56.4                | 5.6                          | .464                             | .18                                              | 1.07                                                                    | .829                                                              |
| 9              | 60.9                            | 5.3                 | 57.7                | 8.5                          | .485                             | .36                                              | .76                                                                     | .753                                                              |
| 10             | 62.2                            | 7.1                 | 58.6                | 10.7                         | .499                             | .50                                              | 2.33                                                                    | .702                                                              |
| 11             | 63.5                            | 8.7                 | 59.1                | 13.1                         | .508                             | .56                                              | .99                                                                     | .650                                                              |
| Noon.          | 64.2                            | 10.6                | 58.9                | 15.9                         | .504                             | .49                                              | 3.77                                                                    | .593                                                              |
| 1              | 64.4                            | 11.9                | 58.4                | 17.9                         | .496                             | .38                                              | 4.31                                                                    | .555                                                              |
| 2              | 64.8                            | 12.4                | 58.6                | 18.6                         | .499                             | .41                                              | .54                                                                     | .544                                                              |
| 3              | 64.4                            | 12.5                | 58.1                | 18.8                         | .491                             | .32                                              | .54                                                                     | .540                                                              |
| 4              | 63.4                            | 11.2                | 57.8                | 16.8                         | .486                             | .29                                              | 3.91                                                                    | .575                                                              |
| 5              | 63.9                            | 8.8                 | 59.5                | 13.2                         | .515                             | .63                                              | .05                                                                     | .649                                                              |
| 6              | 64.0                            | 6.4                 | 60.8                | 9.6                          | .537                             | .90                                              | 2.20                                                                    | .728                                                              |
| 7              | 63.1                            | 5.1                 | 60.0                | 8.2                          | .523                             | .78                                              | 1.80                                                                    | .763                                                              |
| 8              | 62.4                            | 4.4                 | 59.8                | 7.0                          | .520                             | .75                                              | .51                                                                     | .792                                                              |
| 9              | 61.8                            | 3.8                 | 59.5                | 6.1                          | .515                             | .71                                              | .29                                                                     | .816                                                              |
| 10             | 61.2                            | 3.3                 | 59.2                | 5.3                          | .509                             | .67                                              | .09                                                                     | .839                                                              |
| 11             | 60.7                            | 3.1                 | 58.5                | 5.3                          | .498                             | .54                                              | .07                                                                     | .838                                                              |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of December, 1855.*

Solar radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain.  | Prevailing direction of the Wind. | General Aspect of the Sky.                                                     |
|-------|-----------------------|--------|-----------------------------------|--------------------------------------------------------------------------------|
|       | o.                    | Inches |                                   |                                                                                |
| 1     | 127.0                 | ..     | Calm or N. or N. W.               | Cloudless till 6 A. M. scattered $\searrow$ and $\swarrow$ afterwards.         |
| 2     | <i>Sunday.</i>        |        |                                   |                                                                                |
| 3     | 137.7                 | ..     | N. or N. E.                       | Cloudless till 5 A. M. scattered $\searrow$ till 7 P. M. cloudless afterwards. |
| 4     | 129.6                 | ..     | N. E. or N.                       | Cloudless and foggy till 5 A. M. scattered $\searrow$ afterwards.              |
| 5     | 139.7                 | ..     | N.W. or N.N.E. or N.              | Cloudless nearly the whole day.                                                |
| 6     | 137.2                 | ..     | N.                                | Cloudless till 8 A. M. scattered $\searrow$ afterwards.                        |
| 7     | 139.0                 | ..     | N. or N. W.                       | Cloudless.                                                                     |
| 8     | 131.0                 | ..     | N. W. or N.                       | Cloudless.                                                                     |
| 9     | <i>Sunday.</i>        |        |                                   |                                                                                |
| 10    | 135.0                 | ..     | Calm or N. W. or W.               | Cloudless.                                                                     |
| 11    | 137.0                 | ..     | Calm or W. or N.                  | Cloudless.                                                                     |
| 12    | 130.0                 | ..     | N. or W. or N. W.                 | Cloudless.                                                                     |
| 13    | 127.0                 | ..     | N. or W. or N. W.                 | Cloudless.                                                                     |
| 14    | 129.0                 | ..     | W. or N. W.                       | Cloudless till 11 A. M. scattered $\circ$ till 6 P. M. cloudless afterwards.   |
| 15    | 130.6                 | ..     | Calm or N. W. or W.               | Cloudless.                                                                     |
| 16    | <i>Sunday.</i>        |        |                                   |                                                                                |
| 17    | 134.6                 | ..     | Calm or N. or N. W.               | Cloudless.                                                                     |
| 18    | 129.0                 | ..     | N. W.                             | Cloudless.                                                                     |
| 19    | 132.0                 | ..     | N. W. or N.                       | Cloudless nearly the whole day.                                                |
| 20    | 131.7                 | ..     | N.                                | Scattered clouds of various kinds.                                             |
| 21    | 137.0                 | ..     | Variable winds.                   | Cloudless nearly the whole day.                                                |
| 22    | 134.0                 | ..     | N. N. W. or N.                    | Cloudless.                                                                     |
| 23    | <i>Sunday.</i>        |        |                                   |                                                                                |
| 24    | 131.0                 | ..     | W. or N. or N. W.                 | Cloudless.                                                                     |
| 25    | christmas             |        |                                   |                                                                                |
| 26    | 128.0                 | ..     | N.N.W. or W. or N. W.             | Cloudless nearly the whole day.                                                |
| 27    | 131.5                 | ..     | N. W. or W.                       | Cloudless.                                                                     |
| 28    | 134.0                 | ..     | W.                                | Cloudless.                                                                     |
| 29    | 138.0                 | ..     | W. or W. N. W.                    | Cloudless.                                                                     |
| 30    | <i>Sunday.</i>        |        |                                   |                                                                                |
| 31    | 133.0                 | ..     | N.                                | Cloudless.                                                                     |

$\searrow$  Cirri,  $\swarrow$  Cirro-strati,  $\circ$  Cumuli,  $\sim$  Cumulo-strati,  $\wedge$  Nimbi, — Strati,  $\wedge$  Cirro-cumuli.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of January, 1856.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.     |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                        |
| 1     | 29.657     | 63.5         | 64.2    | 52.0      | N. W.              | ..                | Clear.                 |
| 2     | 29.647     | 62.7         | 64.4    | 52.2      | N. W.              | ..                | Ditto.                 |
| 3     | 29.617     | 62.8         | 64.5    | 54.5      | N. W.              | ..                | Ditto.                 |
| 4     | 29.623     | 65.8         | 69.0    | 56.9      | N. W.              | ..                | ✓ scattered all over.  |
| 5     | 29.547     | 66.0         | 66.0    | 57.0      | E.                 | ..                | ✓ scattered.           |
| 6     | 29.617     | 65.5         | 66.2    | 56.9      | N. W.              | ..                | Clear.                 |
| 7     | 29.697     | 61.2         | 61.9    | 50.4      | W.                 | ..                | Ditto.                 |
| 8     | 29.659     | 60.5         | 61.3    | 49.4      | W.                 | ..                | Ditto.                 |
| 9     | 29.741     | 63.7         | 63.4    | 50.0      | N. W.              | ..                | Ditto.                 |
| 10    | 29.757     | 63.8         | 64.5    | 53.0      | S. E.              | ..                | ✓ scattered.           |
| 11    | 29.707     | 66.9         | 68.0    | 56.9      | N.                 | ..                | Clear.                 |
| 12    | 29.685     | 66.5         | 67.5    | 58.2      | N. E.              | ..                | Ditto.                 |
| 13    | 29.653     | 66.0         | 67.1    | 57.9      | N. W.              | ..                | ✓ scattered.           |
| 14    | 29.687     | 65.8         | 66.2    | 54.5      | N. W.              | ..                | ✓ ditto.               |
| 15    | 29.671     | 60.2         | 61.1    | 53.5      | N.                 | ..                | Clear.                 |
| 16    | 29.725     | 61.0         | 62.4    | 53.0      | N. W.              | ..                | Ditto.                 |
| 17    | 29.671     | 65.0         | 65.7    | 54.0      | S. W.              | ..                | Ditto.                 |
| 18    | 29.641     | 65.0         | 66.0    | 56.0      | W.                 | ..                | Ditto.                 |
| 19    | 29.629     | 67.9         | 68.4    | 57.4      | S. E.              | ..                | ✓ scattd. towards hor. |
| 20    | 29.691     | 69.5         | 70.0    | 60.2      | E.                 | ..                | ✓ scattered.           |
| 21    | 29.675     | 69.0         | 69.0    | 60.5      | E.                 | ..                | Clear.                 |
| 22    | 29.635     | 65.5         | 65.7    | 58.2      | W.                 | ..                | ✓ scattered to S. E.   |
| 23    | 29.605     | 64.5         | 65.5    | 57.2      | N. W.              | ..                | ✓ scattered.           |
| 24    | 29.573     | 64.5         | 64.9    | 58.5      | N. W.              | ..                | ✓ ditto.               |
| 25    | 29.577     | 65.0         | 65.3    | 55.2      | E.                 | ..                | ✓ all over.            |
| 26    | 29.551     | 65.9         | 65.5    | 60.2      | N. E.              | ..                | ✓ scattered.           |
| 27    | 29.531     | 61.5         | 62.2    | 58.4      | N. W.              | ..                | ✓ ditto.               |
| 28    | 29.569     | 58.8         | 60.0    | 53.4      | N. W.              | ..                | ✓ ditto.               |
| 29    | 29.509     | 63.0         | 63.0    | 54.0      | N.                 | ..                | ✓ ditto.               |
| 30    | 29.521     | 60.0         | 60.5    | 59.4      | E.                 | 0.47              | ✓ all over.            |
| 31    | 29.493     | 57.0         | 56.5    | 55.9      | N. E.              | ..                | ✓ ditto.               |
| Mean. | 29.631     | 64.0         | 64.7    | 55.6      |                    | 0.47              |                        |

Barometer Observations corrected for Capillarity only.

Symbols. {  
 \ Cirrus.  
 \ Cirro strata.  
 > Cumuli.  
 > Cumulo strata.  
 ~ Nimbi or Nimbus.

*Note.*—The dry bulb and maximum Register do not agree; the former always reads more than the latter. The average difference is 1.6.



*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of January, 1856.*

| Observations at apparent Noon. |            |              |         |           |                    |                   |                         |
|--------------------------------|------------|--------------|---------|-----------|--------------------|-------------------|-------------------------|
| Date.                          | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.      |
|                                |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                         |
| 1                              | 29.621     | 67.5         | 69.0    | 54.0      | N. W.              | ..                | Clear.                  |
| 2                              | 29.615     | 69.0         | 69.3    | 55.2      | N. W.              | ..                | Ditto.                  |
| 3                              | 29.589     | 69.0         | 70.4    | 54.9      | N. W.              | ..                | Ditto.                  |
| 4                              | 29.583     | 70.5         | 70.5    | 57.8      | W.                 | ..                | ✓ scattered all over.   |
| 5                              | 29.501     | 69.9         | 70.2    | 57.5      | S. W.              | ..                | ✓ scattered.            |
| 6                              | 29.583     | 69.7         | 70.5    | 57.8      | N. W.              | ..                | Clear.                  |
| 7                              | 29.679     | 67.6         | 67.6    | 52.7      | W.                 | ..                | Ditto.                  |
| 8                              | 29.639     | 66.9         | 67.5    | 51.4      | N. W.              | ..                | ✓ scattd. towards S. E. |
| 9                              | 29.697     | 67.8         | 67.4    | 53.0      | N. W.              | ..                | ✓ scattered.            |
| 10                             | 29.715     | 67.0         | 68.4    | 53.7      | N. W.              | ..                | ✓ Do. towards horizon.  |
| 11                             | 29.677     | 70.2         | 70.2    | 55.5      | N.                 | ..                | Clear.                  |
| 12                             | 29.641     | 72.2         | 73.0    | 59.4      | N. E.              | ..                | Ditto.                  |
| 13                             | 29.611     | 71.8         | 72.4    | 59.4      | N. W.              | ..                | ✓ scattered.            |
| 14                             | 29.641     | 71.0         | 71.4    | 59.5      | N. W.              | ..                | ✓ ditto.                |
| 15                             | 29.635     | 66.8         | 66.9    | 53.9      | W.                 | ..                | Clear.                  |
| 16                             | 29.707     | 67.8         | 68.4    | 54.5      | N. W.              | ..                | Ditto.                  |
| 17                             | 29.629     | 69.9         | 69.9    | 54.9      | N. W.              | ..                | Ditto.                  |
| 18                             | 29.615     | 68.9         | 69.4    | 56.5      | W.                 | ..                | ✓ scattered.            |
| 19                             | 29.593     | 72.8         | 72.2    | 58.5      | S. W.              | ..                | ✓ ditto.                |
| 20                             | 29.662     | 74.0         | 74.0    | 61.0      | E.                 | ..                | ✓ ditto.                |
| 21                             | 29.657     | 74.0         | 73.9    | 62.0      | E.                 | ..                | Clear.                  |
| 22                             | 29.587     | 70.8         | 71.0    | 60.5      | W.                 | ..                | Ditto.                  |
| 23                             | 29.577     | 70.8         | 71.2    | 57.5      | N. W.              | ..                | ✓ scattered.            |
| 24                             | 29.549     | 69.4         | 69.4    | 59.5      | N. W.              | ..                | ✓ ditto.                |
| 25                             | 29.557     | 71.9         | 71.4    | 56.0      | E.                 | ..                | ✓ to W. ✓ scattered.    |
| 26                             | 29.511     | 69.9         | 70.4    | 59.3      | N. E.              | ..                | ✓ scattered.            |
| 27                             | 29.491     | 65.6         | 65.9    | 59.0      | N. W.              | ..                | ✓ ditto.                |
| 28                             | 29.441     | 65.0         | 65.5    | 55.2      | N. W.              | ..                | ✓ ditto.                |
| 29                             | 29.475     | 68.8         | 68.8    | 58.2      | N.                 | ..                | ✓ all over.             |
| 30                             | 29.503     | 62.9         | 62.5    | 59.5      | S. E.              | ..                | ✓ ditto.                |
| 31                             | 29.493     | 59.0         | 59.3    | 58.0      | N. W.              | ..                | ✓ ditto.                |
| Mean.                          | 29.596     | 68.9         | 69.2    | 56.9      |                    |                   |                         |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of January, 1856.*

Minimum pressure observed at 4 p. m.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky. | Direction of Wind. | Quantity of Rain. | Total Rain. |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------|--------------------|-------------------|-------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                    |                    |                   |             |
| 1     | 29.543     | 75.5         | 74.2    | 55.7      | 74.5                 | 49.0     | 61.75 | Clear.             | N. W.              | ..                | ..          |
| 2     | 29.557     | 76.7         | 75.5    | 58.6      | 76.0                 | 49.0     | 62.5  | Ditto.             | N. W.              | ..                | ..          |
| 3     | 29.527     | 75.9         | 74.5    | 59.9      | 75.0                 | 51.8     | 63.4  | ✓ scattered.       | N. W.              | ..                | ..          |
| 4     | 29.533     | 75.5         | 74.5    | 60.4      | 75.0                 | 54.8     | 64.9  | ✓ toward W.        | W.                 | ..                | ..          |
| 5     | 29.471     | 75.9         | 75.3    | 62.0      | 75.5                 | 54.0     | 64.75 | ✓ scattered.       | W.                 | ..                | ..          |
| 6     | 29.        | 76.3         | 75.5    | 61.2      | 75.8                 | 51.8     | 63.8  | Clear.             | N. W.              | ..                | ..          |
| 7     | 29.611     | 71.8         | 70.5    | 54.0      | 71.5                 | 50.0     | 60.75 | Ditto. [s.e.       | W.                 | ..                | ..          |
| 8     | 29.585     | 65.0         | 65.0    | 52.0      | 69.0                 | 47.8     | 58.4  | ✓ scatd. twds.     | N. W.              | ..                | ..          |
| 9     | 29.671     | 72.8         | 72.5    | 53.9      | 72.8                 | 49.0     | 60.9  | ✓ scattered.       | N. W.              | ..                | ..          |
| 10    | 29.675     | 71.7         | 71.0    | 59.0      | 72.0                 | 52.5     | 62.25 | ✓ all over.        | N.                 | ..                | ..          |
| 11    | 29.633     | 76.0         | 75.4    | 60.0      | 75.5                 | 56.0     | 65.75 | Clear.             | N. E.              | ..                | ..          |
| 12    | 29.577     | 77.8         | 77.0    | 62.5      | 77.5                 | 54.0     | 65.75 | ✓ scattered.       | N. W.              | ..                | ..          |
| 13    | 29.571     | 74.8         | 73.9    | 61.4      | 74.5                 | 54.5     | 64.5  | Clear.             | N. W.              | ..                | ..          |
| 14    | 29.577     | 75.8         | 75.5    | 61.0      | 75.5                 | 56.5     | 66.0  | Ditto.             | N. W.              | ..                | ..          |
| 15    | 29.579     | 73.5         | 72.4    | 57.4      | 73.0                 | 52.0     | 62.5  | Ditto.             | W.                 | ..                | ..          |
| 16    | 29.663     | 74.9         | 73.9    | 56.8      | 74.3                 | 50.0     | 62.15 | ✓ scatd. twds. s.  | N. W.              | ..                | ..          |
| 17    | 29.533     | 75.0         | 74.2    | 56.0      | 75.0                 | 54.0     | 63.0  | Clear.             | N. W.              | ..                | ..          |
| 18    | 29.549     | 76.0         | 75.5    | 60.6      | 75.0                 | 51.0     | 63.25 | Ditto.             | W.                 | ..                | ..          |
| 19    | 29.539     | 77.0         | 76.1    | 61.0      | 77.0                 | 55.0     | 66.0  | ✓ scattered.       | S. W.              | ..                | ..          |
| 20    | 29.617     | 78.8         | 78.0    | 64.2      | 78.0                 | 55.0     | 66.5  | Clear.             | E.                 | ..                | ..          |
| 21    | 29.615     | 79.4         | 79.2    | 63.6      | 79.4                 | 56.0     | 67.7  | Ditto.             | S. W.              | ..                | ..          |
| 22    | 29.541     | 76.0         | 75.4    | 62.4      | 76.5                 | 56.0     | 66.25 | ✓ scattered.       | N. W.              | ..                | ..          |
| 23    | 29.535     | 75.0         | 74.2    | 60.5      | 76.5                 | 55.5     | 66.0  | ✓ ditto.           | N. W.              | ..                | ..          |
| 24    | 29.503     | 74.9         | 73.9    | 58.5      | 76.0                 | 55.8     | 65.9  | ✓ ditto.           | W.                 | ..                | ..          |
| 25    | 29.475     | 74.6         | 74.2    | 58.3      | 75.0                 | 56.0     | 65.5  | ✓ to w. ✓ scat.    | E.                 | ..                | ..          |
| 26    | 29.455     | 74.0         | 73.9    | 64.4      | 74.5                 | 57.0     | 65.75 | ✓ scattered.       | N. E.              | ..                | ..          |
| 27    | 29.459     | 71.0         | 70.5    | 58.0      | 71.0                 | 52.5     | 61.75 | ✓ ditto.           | N. W.              | ..                | ..          |
| 28    | 29.465     | 69.5         | 69.0    | 59.2      | 69.5                 | 50.0     | 59.75 | ✓ ditto.           | N. W.              | ..                | ..          |
| 29    | 29.421     | 69.9         | 69.2    | 58.9      | 70.0                 | 50.0     | 60.0  | ✓ all over.        | N.                 | ..                | ..          |
| 30    | 29.425     | 66.0         | 66.0    | 61.5      | 66.0                 | 57.5     | 61.75 | ✓ scattered all    | S. E.              | ..                | ..          |
| 31    | 29.417     | 64.0         | 63.8    | 60.5      | 64.0                 | 52.0     | 58.0  | Clear. [over.      | N. W.              | ..                | ..          |
| Mean. | 29.527     | 73.9         | 73.2    | 59.3      | 73.9                 | 53.0     | 63.45 |                    |                    |                   |             |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of February, 1856.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky. |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|--------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                    |
| 1     | 29.533     | 65.5         | 57.5    | 58.5      | S. W.              | ..                | ✓ scattered.       |
| 2     | 29.595     | 59.8         | 60.8    | 55.9      | S. W.              | ..                | Clear.             |
| 3     | 29.531     | 68.8         | 69.0    | 56.5      | E.                 | ..                | ✓ scattered        |
| 4     | 29.601     | 62.8         | 64.0    | 54.0      | S. W.              | ..                | Clear.             |
| 5     | 29.689     | 62.7         | 63.9    | 55.0      | N. W.              | ..                | Ditto.             |
| 6     | 29.643     | 65.9         | 67.0    | 53.0      | N. W.              | ..                | Ditto.             |
| 7     | 29.617     | 65.5         | 66.0    | 56.0      | N. W.              | ..                | Ditto.             |
| 8     | 29.573     | 68.0         | 68.9    | 56.5      | S. W.              | ..                | Ditto.             |
| 9     | 29.527     | 70.0         | 70.0    | 58.0      | S.                 | ..                | Ditto.             |
| 10    | 29.516     | 69.7         | 70.3    | 57.0      | N. W.              | ..                | Ditto.             |
| 11    | 29.505     | 69.3         | 70.5    | 56.0      | N. W.              | ..                | Ditto.             |
| 12    | 29.465     | 70.5         | 71.5    | 58.0      | N. W.              | ..                | Ditto.             |
| 13    | 29.421     | 73.0         | 73.4    | 59.8      | N.                 | ..                | Ditto.             |
| 14    | 29.573     | 69.5         | 70.0    | 56.1      | N. W.              | ..                | Hazy.              |
| 15    | 29.569     | 65.8         | 67.0    | 53.5      | N. W.              | ..                | Clear.             |
| 16    | 29.601     | 65.2         | 65.2    | 52.5      | N. W.              | ..                | Ditto.             |
| 17    | 29.643     | 67.0         | 68.0    | 53.5      | N. W.              | ..                | Ditto.             |
| 18    | 29.619     | 67.0         | 67.8    | 54.0      | W.                 | ..                | Ditto.             |
| 19    | 29.647     | 67.0         | 68.5    | 55.0      | N. W.              | ..                | Ditto.             |
| 20    | 29.665     | 69.2         | 70.8    | 56.5      | N. W.              | ..                | Ditto.             |
| 21    | 29.627     | 67.8         | 69.0    | 56.5      | N. W.              | ..                | Ditto.             |
| 22    | 29.579     | 73.0         | 74.0    | 56.6      | W.                 | ..                | Ditto.             |
| 23    | 29.555     | 73.5         | 73.9    | 59.4      | W.                 | ..                | ✓ scattered.       |
| 24    | 29.525     | 74.7         | 74.8    | 59.5      | N. E.              | ..                | ✓ ditto.           |
| 25    | 29.495     | 75.9         | 75.7    | 60.9      | E.                 | ..                | ✓ all over.        |
| 26    | 29.535     | 74.9         | 75.0    | 59.5      | N. W.              | ..                | ✓ scattered        |
| 27    | 29.487     | 70.2         | 71.0    | 55.5      | N. W.              | ..                | Clear.             |
| 28    | 29.531     | 71.0         | 71.2    | 56.0      | N. W.              | ..                | Ditto.             |
| 29    | 29.603     | 73.0         | 73.5    | 57.5      | N. W.              | ..                | Ditto.             |
| Mean. | 29.568     | 68.8         | 69.2    | 56.4      |                    |                   |                    |

Barometer Observations corrected for Capillarity only.

|          |   |                  |
|----------|---|------------------|
| Symbols. | ✓ | Cirrus.          |
|          | ✓ | Cirro strata.    |
|          | ✓ | Cumuli.          |
|          | ✓ | Cumulo strata.   |
|          | ✓ | Nimbi or Nimbus. |

*Note.*—The dry bulb and maximum Register do not agree, the former always reads more than the latter. The average difference is 1.6.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of February, 1856.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.     |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                        |
| 1     | 29.509     | 60.7         | 62.4    | 59.0      | S. W.              | ..                | Clear.                 |
| 2     | 29.575     | 65.0         | 65.2    | 56.8      | S. W.              | ..                | Ditto.                 |
| 3     | 29.531     | 68.8         | 69.0    | 56.5      | E.                 | ..                | ✓ scattered.           |
| 4     | 29.581     | 68.0         | 68.7    | 54.0      | N. W.              | ..                | Clear.                 |
| 5     | 29.577     | 69.2         | 69.5    | 53.0      | N. W.              | ..                | Ditto.                 |
| 6     | 29.611     | 69.5         | 69.5    | 54.6      | N. W.              | ..                | Ditto.                 |
| 7     | 29.597     | 70.0         | 70.0    | 55.5      | W.                 | ..                | ✓ scattered in zenith. |
| 8     | 29.547     | 72.0         | 71.9    | 56.5      | S. W.              | ..                | Clear.                 |
| 9     | 29.505     | 73.8         | 73.0    | 58.5      | S.                 | ..                | Ditto.                 |
| 10    | 29.492     | 75.2         | 75.5    | 58.0      | N. W.              | ..                | Ditto.                 |
| 11    | 29.479     | 76.5         | 77.5    | 57.5      | N. W.              | ..                | Ditto.                 |
| 12    | 29.445     | 77.0         | 77.9    | 58.8      | N. W.              | ..                | Ditto.                 |
| 13    | 29.387     | 76.0         | 77.0    | 59.5      | N.                 | ..                | Ditto.                 |
| 14    | 29.559     | 72.8         | 71.9    | 54.4      | N. W.              | ..                | Hazy.                  |
| 15    | 29.561     | 72.0         | 72.2    | 55.4      | W.                 | ..                | Clear.                 |
| 16    | 29.581     | 72.0         | 72.0    | 53.5      | N. W.              | ..                | Ditto.                 |
| 17    | 29.607     | 73.0         | 73.9    | 54.2      | N. W.              | ..                | Ditto.                 |
| 18    | 29.597     | 74.0         | 74.3    | 53.8      | W.                 | ..                | Ditto.                 |
| 19    | 29.639     | 73.5         | 74.9    | 56.0      | N. W.              | ..                | Ditto.                 |
| 20    | 29.635     | 74.8         | 75.2    | 57.0      | W.                 | ..                | Ditto.                 |
| 21    | 29.617     | 75.9         | 76.5    | 58.0      | W.                 | ..                | Ditto.                 |
| 22    | 29.549     | 79.0         | 79.5    | 58.2      | W.                 | ..                | Ditto.                 |
| 23    | 29.535     | 79.0         | 79.5    | 59.8      | W.                 | ..                | ✓ scattered.           |
| 24    | 29.505     | 79.5         | 80.0    | 60.0      | N. E.              | ..                | ✓ ditto.               |
| 25    | 29.491     | 80.8         | 80.2    | 63.5      | E.                 | ..                | ✓ all over.            |
| 26    | 29.523     | 80.5         | 80.6    | 60.6      | N. W.              | ..                | ✓ scattered.           |
| 27    | 29.467     | 76.5         | 76.5    | 56.0      | N. W.              | ..                | Clear.                 |
| 28    | 29.511     | 76.5         | 76.4    | 58.5      | N. W.              | ..                | Ditto.                 |
| 29    | 29.595     | 78.3         | 79.5    | 58.4      | N. W.              | ..                | Ditto.                 |
| Mean. | 29.545     | 73.7         | 74.1    | 57.1      |                    |                   |                        |



*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of February, 1856.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky. | Direction of Wind. | Quantity of Rain. |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------|--------------------|-------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                    |                    |                   |
| 1     | 29.465     | 68.8         | 68.9    | 57.9      | 68.5                 | 49.0     | 58.75 | Clear.             | N. W.              | ..                |
| 2     | 29.545     | 71.0         | 70.5    | 58.0      | 70.0                 | 48.8     | 59.4  | Ditto.             | S. W.              | ..                |
| 3     | 29.499     | 71.5         | 71.0    | 55.0      | 71.0                 | 53.0     | 62.0  | ~ scattered.       | E.                 | ..                |
| 4     | 29.513     | 74.8         | 74.3    | 58.5      | 74.5                 | 51.0     | 62.75 | Clear.             | N. W.              | ..                |
| 5     | 29.527     | 74.8         | 74.4    | 55.8      | 74.5                 | 52.0     | 63.25 | Ditto.             | N. W.              | ..                |
| 6     | 29.559     | 75.0         | 74.8    | 57.5      | 74.8                 | 52.0     | 63.4  | Ditto.             | N. W.              | ..                |
| 7     | 29.507     | 76.0         | 75.8    | 61.4      | 76.0                 | 52.0     | 64.0  | Ditto.             | N. W.              | ..                |
| 8     | 29.461     | 76.8         | 76.0    | 57.3      | 76.5                 | 53.8     | 65.15 | Ditto.             | W.                 | ..                |
| 9     | 29.427     | 77.5         | 77.0    | 60.5      | 77.0                 | 56.5     | 66.75 | Ditto.             | S. W.              | ..                |
| 10    | 29.421     | 80.4         | 80.3    | 60.0      | 80.5                 | 55.0     | 67.75 | Ditto.             | N. W.              | ..                |
| 11    | 29.415     | 83.8         | 83.5    | 59.5      | 83.5                 | 54.0     | 68.75 | Ditto.             | N. W.              | ..                |
| 12    | 29.365     | 85.5         | 85.4    | 65.2      | 85.4                 | 59.5     | 72.45 | Ditto.             | W.                 | ..                |
| 13    | 29.323     | 83.9         | 83.5    | 63.0      | 84.0                 | 59.5     | 71.75 | Ditto.             | W.                 | ..                |
| 14    | 29.507     | 77.0         | 75.9    | 54.6      | 76.5                 | 63.8     | 70.15 | Ditto.             | N. W.              | ..                |
| 15    | 29.467     | 76.9         | 76.5    | 55.0      | 76.5                 | 54.5     | 65.5  | Ditto.             | N. W.              | ..                |
| 16    | 29.523     | 77.9         | 77.4    | 58.0      | 77.8                 | 55.0     | 66.4  | Ditto.             | N. W.              | ..                |
| 17    | 29.549     | 78.0         | 77.9    | 61.0      | 78.0                 | 52.5     | 65.25 | Ditto.             | N. W.              | ..                |
| 18    | 29.529     | 80.2         | 80.0    | 56.0      | 80.0                 | 52.0     | 66.0  | Ditto.             | N. W.              | ..                |
| 19    | 29.587     | 81.0         | 80.5    | 58.6      | 81.0                 | 54.0     | 67.5  | Ditto.             | N. W.              | ..                |
| 20    | 29.565     | 82.0         | 82.0    | 58.0      | 82.0                 | 58.0     | 70.0  | Ditto.             | W.                 | ..                |
| 21    | 29.533     | 83.8         | 83.2    | 60.0      | 83.5                 | 60.0     | 71.75 | Ditto.             | N. W.              | ..                |
| 22    | 29.479     | 86.0         | 85.9    | 61.2      | 86.0                 | 61.0     | 73.5  | Ditto.             | W.                 | ..                |
| 23    | 29.481     | 85.5         | 86.4    | 61.0      | 86.5                 | 63.5     | 75.0  | ~ scattered.       | W.                 | ..                |
| 24    | 29.491     | 86.8         | 87.0    | 61.5      | 87.0                 | 65.0     | 76.0  | ~ ditto.           | W.                 | ..                |
| 25    | 29.445     | 82.5         | 82.0    | 64.4      | 83.0                 | 67.0     | 75.0  | ~ all over.        | S. W.              | ..                |
| 26    | 29.437     | 86.5         | 85.8    | 64.9      | 86.5                 | 65.5     | 76.0  | ~ scattered.       | N. W.              | ..                |
| 27    | 29.387     | 81.9         | 81.4    | 58.5      | 81.5                 | 59.0     | 70.25 | Clear.             | N. W.              | ..                |
| 28    | 29.453     | 81.7         | 81.1    | 60.5      | 81.5                 | 58.0     | 69.75 | Ditto.             | N. W.              | ..                |
| 29    | 29.523     | 84.0         | 84.9    | 62.2      | 84.2                 | 61.0     | 72.6  | Ditto.             | N. W.              | ..                |
| Mean. | 29.482     | 79.7         | 79.4    | 59.4      | 79.5                 | 56.7     | 68.16 |                    |                    |                   |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January, 1856.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet  
Height of the Cistern of the Standard Barometer above the level of the Sea, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | New year's day.                                 |                                           |         |         |                               |                                               |      |       |
| 2     | 30.038                                          | 30.129                                    | 29.973  | 0.156   | 64.1                          | 75.6                                          | 55.6 | 20.0  |
| 3     | .048                                            | .133                                      | 30.003  | .130    | 63.7                          | 74.4                                          | 55.0 | 19.4  |
| 4     | .062                                            | .154                                      | .011    | .143    | 64.9                          | 77.0                                          | 55.2 | 21.8  |
| 5     | .007                                            | .087                                      | 29.940  | .147    | 67.3                          | 78.0                                          | 60.5 | 17.5  |
| 6     | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 7     | .051                                            | .125                                      | 30.012  | .113    | 70.7                          | 80.0                                          | 64.0 | 16.0  |
| 8     | .106                                            | .189                                      | .041    | .148    | 66.8                          | 75.5                                          | 59.6 | 15.9  |
| 9     | .151                                            | .239                                      | .109    | .130    | 64.4                          | 74.4                                          | 55.6 | 18.8  |
| 10    | .154                                            | .243                                      | .080    | .163    | 65.5                          | 75.8                                          | 57.4 | 18.4  |
| 11    | .119                                            | .204                                      | .070    | .134    | 66.2                          | 74.4                                          | 58.6 | 15.8  |
| 12    | .074                                            | .161                                      | .020    | .141    | 66.7                          | 76.2                                          | 60.4 | 15.8  |
| 13    | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 14    | .060                                            | .149                                      | .001    | .148    | 70.5                          | 80.6                                          | 62.6 | 18.0  |
| 15    | .058                                            | .141                                      | 29.994  | .147    | 70.8                          | 81.9                                          | 61.0 | 20.9  |
| 16    | .092                                            | .166                                      | 30.033  | .133    | 71.2                          | 79.8                                          | 66.0 | 13.8  |
| 17    | .085                                            | .167                                      | .012    | .155    | 69.1                          | 77.8                                          | 62.4 | 15.4  |
| 18    | .083                                            | .172                                      | .020    | .152    | 67.8                          | 78.3                                          | 58.2 | 20.1  |
| 19    | .084                                            | .148                                      | .017    | .131    | 69.5                          | 79.5                                          | 60.6 | 18.9  |
| 20    | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 21    | .103                                            | .194                                      | .042    | .152    | 70.8                          | 80.2                                          | 63.9 | 16.3  |
| 22    | 29.999                                          | .071                                      | 29.921  | .150    | 71.5                          | 82.1                                          | 63.2 | 18.9  |
| 23    | .984                                            | .083                                      | .934    | .149    | 71.7                          | 81.0                                          | 66.8 | 14.2  |
| 24    | .995                                            | .071                                      | .952    | .119    | 69.0                          | 79.0                                          | 61.1 | 17.9  |
| 25    | 30.031                                          | .121                                      | .978    | .143    | 70.5                          | 81.2                                          | 62.6 | 18.6  |
| 26    | 29.954                                          | .044                                      | .877    | .167    | 71.8                          | 82.2                                          | 62.2 | 20.0  |
| 27    | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 28    | .988                                            | .075                                      | .919    | .156    | 74.1                          | 82.0                                          | 68.0 | 14.0  |
| 29    | 30.035                                          | .126                                      | .965    | .161    | 70.8                          | 79.2                                          | 64.8 | 14.4  |
| 30    | 29.992                                          | .077                                      | .898    | .179    | 68.8                          | 80.3                                          | 63.2 | 17.1  |
| 31    | .918                                            | 29.981                                    | .867    | .114    | 66.1                          | 71.7                                          | 62.8 | 8.9   |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January, 1856.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Va-<br>pour in a Cubic foot<br>of Air. | Additional weight of<br>vapour required for<br>complete saturation. | Mean degree of Hu-<br>midity complete sa-<br>turation being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|--------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                                | T. gr.                                                              |                                                                    |
| 1     | New year's day.                 |                     |                     |                              |                                  |                                                       |                                                                     |                                                                    |
| 2     | 58.2                            | 5.9                 | 54.1                | 10.0                         | .429                             | 4.78                                                  | 1.89                                                                | .72                                                                |
| 3     | 57.8                            | 5.9                 | 53.7                | 10.0                         | .423                             | .72                                                   | .87                                                                 | .72                                                                |
| 4     | 58.8                            | 6.1                 | 55.1                | 9.8                          | .444                             | .94                                                   | .91                                                                 | .72                                                                |
| 5     | 62.5                            | 4.8                 | 59.6                | 7.7                          | .516                             | 5.71                                                  | .66                                                                 | .78                                                                |
| 6     | Sunday.                         |                     |                     |                              |                                  |                                                       |                                                                     |                                                                    |
| 7     | 65.0                            | 5.7                 | 62.1                | 8.6                          | .561                             | 6.16                                                  | 2.02                                                                | .75                                                                |
| 8     | 59.4                            | 7.4                 | 55.0                | 11.8                         | .442                             | 4.90                                                  | .36                                                                 | .68                                                                |
| 9     | 57.0                            | 7.4                 | 51.8                | 12.6                         | .397                             | .41                                                   | .33                                                                 | .65                                                                |
| 10    | 59.8                            | 5.7                 | 56.4                | 9.1                          | .464                             | 5.15                                                  | 1.83                                                                | .74                                                                |
| 11    | 61.3                            | 4.9                 | 58.4                | 7.8                          | .496                             | .49                                                   | .63                                                                 | .77                                                                |
| 12    | 61.1                            | 5.6                 | 57.7                | 9.0                          | .485                             | .36                                                   | .87                                                                 | .74                                                                |
| 13    | Sunday.                         |                     |                     |                              |                                  |                                                       |                                                                     |                                                                    |
| 14    | 64.6                            | 5.9                 | 61.6                | 8.9                          | .552                             | 6.06                                                  | 2.07                                                                | .75                                                                |
| 15    | 65.0                            | 5.8                 | 62.1                | 8.7                          | .561                             | .16                                                   | .04                                                                 | .75                                                                |
| 16    | 68.2                            | 3.0                 | 66.7                | 4.5                          | .653                             | 7.16                                                  | 1.14                                                                | .86                                                                |
| 17    | 61.9                            | 7.2                 | 58.3                | 10.8                         | .494                             | 5.44                                                  | 2.34                                                                | .70                                                                |
| 18    | 60.8                            | 7.0                 | 56.6                | 11.2                         | .467                             | .16                                                   | .32                                                                 | .69                                                                |
| 19    | 64.2                            | 5.3                 | 61.5                | 8.0                          | .550                             | 6.06                                                  | 1.82                                                                | .77                                                                |
| 20    | Sunday.                         |                     |                     |                              |                                  |                                                       |                                                                     |                                                                    |
| 21    | 66.6                            | 4.2                 | 64.5                | 6.3                          | .607                             | .68                                                   | .52                                                                 | .82                                                                |
| 22    | 65.8                            | 5.7                 | 62.9                | 8.6                          | .576                             | .31                                                   | 2.07                                                                | .75                                                                |
| 23    | 66.0                            | 5.7                 | 63.1                | 8.6                          | .580                             | .35                                                   | .08                                                                 | .75                                                                |
| 24    | 61.7                            | 7.3                 | 58.0                | 11.0                         | .489                             | 5.39                                                  | .37                                                                 | .70                                                                |
| 25    | 64.1                            | 6.4                 | 60.9                | 9.6                          | .539                             | .92                                                   | .21                                                                 | .73                                                                |
| 26    | 66.0                            | 5.8                 | 63.1                | 8.7                          | .580                             | 6.35                                                  | .10                                                                 | .75                                                                |
| 27    | Sunday.                         |                     |                     |                              |                                  |                                                       |                                                                     |                                                                    |
| 28    | 68.8                            | 5.3                 | 66.1                | 8.0                          | .640                             | .99                                                   | .08                                                                 | .77                                                                |
| 29    | 65.5                            | 5.3                 | 62.8                | 8.0                          | .574                             | .31                                                   | 1.89                                                                | .77                                                                |
| 30    | 65.0                            | 3.8                 | 63.1                | 5.7                          | .580                             | .39                                                   | .32                                                                 | .83                                                                |
| 31    | 63.9                            | 2.2                 | 62.6                | 3.5                          | .570                             | .32                                                   | 0.78                                                                | .89                                                                |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Hour.      | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | o                          | o                                                        | o    | o     |
| Mid-night. | 30.053                                    | 30.179                                                 | 29.944  | 0.235   | 65.2                       | 74.0                                                     | 59.2 | 14.8  |
| 1          | .048                                      | .169                                                   | .962    | .207    | 64.6                       | 73.6                                                     | 58.4 | 15.2  |
| 2          | .038                                      | .164                                                   | .910    | .254    | 63.9                       | 73.4                                                     | 57.4 | 16.0  |
| 3          | .030                                      | .154                                                   | .924    | .230    | 63.2                       | 72.4                                                     | 57.0 | 15.4  |
| 4          | .024                                      | .150                                                   | .868    | .282    | 62.9                       | 71.8                                                     | 56.2 | 15.6  |
| 5          | .024                                      | .121                                                   | .870    | .251    | 62.5                       | 71.6                                                     | 55.5 | 16.1  |
| 6          | .044                                      | .173                                                   | .925    | .248    | 61.9                       | 69.9                                                     | 55.0 | 14.9  |
| 7          | .073                                      | .204                                                   | .911    | .293    | 61.5                       | 70.2                                                     | 55.0 | 15.2  |
| 8          | .105                                      | .223                                                   | .939    | .284    | 63.2                       | 70.5                                                     | 57.0 | 13.5  |
| 9          | .129                                      | .243                                                   | .964    | .279    | 66.9                       | 71.0                                                     | 61.3 | 9.7   |
| 10         | .128                                      | .235                                                   | .981    | .254    | 69.7                       | 73.9                                                     | 64.6 | 9.3   |
| 11         | .107                                      | .205                                                   | .972    | .233    | 72.3                       | 77.6                                                     | 66.3 | 11.3  |
| Noon.      | .075                                      | .174                                                   | .947    | .227    | 75.0                       | 79.6                                                     | 68.0 | 11.6  |
| 1          | .040                                      | .148                                                   | .909    | .239    | 76.8                       | 81.0                                                     | 69.2 | 11.8  |
| 2          | .014                                      | .129                                                   | .883    | .246    | 77.9                       | 82.0                                                     | 71.6 | 10.4  |
| 3          | .000                                      | .117                                                   | .871    | .246    | 78.2                       | 82.2                                                     | 71.7 | 10.5  |
| 4          | 29.994                                    | .109                                                   | .867    | .242    | 76.6                       | 81.0                                                     | 70.9 | 10.1  |
| 5          | .999                                      | .115                                                   | .877    | .238    | 74.5                       | 78.6                                                     | 69.2 | 9.4   |
| 6          | 30.008                                    | .111                                                   | .891    | .220    | 71.8                       | 75.6                                                     | 67.2 | 8.4   |
| 7          | .025                                      | .123                                                   | .897    | .226    | 69.9                       | 74.0                                                     | 65.0 | 9.0   |
| 8          | .043                                      | .138                                                   | .918    | .220    | 68.5                       | 72.7                                                     | 63.5 | 9.2   |
| 9          | .055                                      | .152                                                   | .924    | .228    | 67.3                       | 72.0                                                     | 62.2 | 9.8   |
| 10         | .056                                      | .160                                                   | .933    | .227    | 66.2                       | 71.6                                                     | 61.2 | 10.4  |
| 11         | .051                                      | .175                                                   | .927    | .248    | 65.5                       | 71.4                                                     | 59.0 | 12.4  |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Hour.          | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of Air. | Additional weight of va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity,<br>complete saturation be-<br>ing unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                   |
| Mid-<br>night. | 62.3                            | 2.9                 | 60.6                | 4.6                          | 0.534                            | 5.92                                             | 0.99                                                                    | 0.86                                                              |
| 1              | 61.8                            | 2.8                 | 60.1                | 4.5                          | .525                             | .83                                              | .95                                                                     | .86                                                               |
| 2              | 61.3                            | 2.6                 | 59.5                | 4.4                          | .515                             | .73                                              | .90                                                                     | .86                                                               |
| 3              | 60.7                            | 2.5                 | 58.9                | 4.3                          | .504                             | .62                                              | .87                                                                     | .87                                                               |
| 4              | 60.4                            | 2.5                 | 58.6                | 4.3                          | .499                             | .58                                              | .85                                                                     | .87                                                               |
| 5              | 60.3                            | 2.2                 | 58.8                | 3.7                          | .503                             | .60                                              | .75                                                                     | .88                                                               |
| 6              | 59.7                            | 2.2                 | 58.2                | 3.7                          | .493                             | .51                                              | .72                                                                     | .88                                                               |
| 7              | 59.3                            | 2.2                 | 57.8                | 3.7                          | .486                             | .44                                              | .72                                                                     | .88                                                               |
| 8              | 60.6                            | 2.6                 | 58.8                | 4.4                          | .503                             | .60                                              | .89                                                                     | .86                                                               |
| 9              | 62.4                            | 4.5                 | 59.7                | 7.2                          | .518                             | .74                                              | 1.54                                                                    | .79                                                               |
| 10             | 63.9                            | 5.8                 | 61.0                | 8.7                          | .541                             | .95                                              | .98                                                                     | .75                                                               |
| 11             | 64.8                            | 7.5                 | 61.0                | 11.3                         | .541                             | .93                                              | 2.65                                                                    | .69                                                               |
| Noon.          | 65.6                            | 9.4                 | 60.9                | 14.1                         | .539                             | .87                                              | 3.44                                                                    | .63                                                               |
| 1              | 65.7                            | 11.1                | 60.1                | 16.7                         | .525                             | .69                                              | 4.14                                                                    | .58                                                               |
| 2              | 66.0                            | 11.9                | 60.0                | 17.9                         | .523                             | .66                                              | .50                                                                     | .56                                                               |
| 3              | 65.9                            | 12.3                | 59.7                | 18.5                         | .518                             | .60                                              | .65                                                                     | .55                                                               |
| 4              | 65.2                            | 11.4                | 59.5                | 17.1                         | .515                             | .58                                              | .19                                                                     | .57                                                               |
| 5              | 65.3                            | 9.2                 | 60.7                | 13.8                         | .536                             | .83                                              | 3.35                                                                    | .64                                                               |
| 6              | 65.2                            | 6.6                 | 61.9                | 9.9                          | .557                             | 6.11                                             | 2.34                                                                    | .72                                                               |
| 7              | 64.5                            | 5.4                 | 61.8                | 8.1                          | .555                             | .11                                              | 1.87                                                                    | .77                                                               |
| 8              | 63.8                            | 4.7                 | 61.4                | 7.1                          | .548                             | .05                                              | .60                                                                     | .79                                                               |
| 9              | 63.2                            | 4.1                 | 60.7                | 6.6                          | .536                             | 5.92                                             | .45                                                                     | .80                                                               |
| 10             | 62.5                            | 3.7                 | 60.3                | 5.9                          | .528                             | .86                                              | .26                                                                     | .82                                                               |
| 11             | 62.2                            | 3.3                 | 60.2                | 5.3                          | .527                             | .85                                              | .13                                                                     | .84                                                               |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January, 1856.*

Solar radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain.   | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                         |
|-------|-----------------------|---------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------|
|       | o                     | Inches. |                                   |                                                                                                                    |
| 1     | New year's day.       |         |                                   | [P. M.                                                                                                             |
| 2     | 133.5                 | ..      | W. or W. N. W.                    | Cloudless also foggy between 8 & 11                                                                                |
| 3     | 133.0                 | ..      | W. or N. W.                       | Cloudless. [P. M.                                                                                                  |
| 4     | 133.0                 | ..      | N. or W.                          | Cloudless, also slightly foggy at 8 & 9                                                                            |
| 5     | 132.8                 | ..      | Calm or W. or N. W.               | Cloudless, also foggy before sunrise and [during the night.                                                        |
| 6     | Sunday.               |         |                                   |                                                                                                                    |
| 7     | 131.4                 | ..      | S. or S. W.                       | Scattered thin clouds till 7 A. M. cloud-                                                                          |
| 8     | 131.0                 | ..      | S. W. or W.                       | Cloudless. [less afterwards.                                                                                       |
| 9     | 129.0                 | ..      | W. or S. W.                       | Cloudless, also slightly foggy during the night.                                                                   |
| 10    | 131.0                 | ..      | W. or S. W.                       | Cloudless till 9 A. M. scattered \i till 4 P. M. cloudless afterwards.                                             |
| 11    | 114.8                 | ..      | S. W. or W.                       | Cloudless till 6 A. M. principally scattered \i till 6 P. M. cloudless afterwards.                                 |
| 12    | 131.0                 | ..      | W. or S. W.                       | Cloudless till 11 A. M. scattered \i till 7 P. M. cloudless afterwards, and also [slightly foggy.                  |
| 13    | Sunday.               |         |                                   |                                                                                                                    |
| 14    | 136.0                 | ..      | S. W.                             | Cloudless till 7 A. M. and foggy towards the morning, scattered \i & \i till 7 P. M. cloudless & foggy afterwards. |
| 15    | 138.0                 | ..      | S. W. or S.                       | Cloudless the whole day, also slightly foggy from midnight till sunrise.                                           |
| 16    | 135.0                 | ..      | S. or S. W.                       | Cloudless till 7 A. M. cloudy till Noon,                                                                           |
| 17    | 135.7                 | ..      | S. W. or W.                       | Cloudless. [cloudless afterwards.                                                                                  |
| 18    | 135.0                 | ..      | S. W.                             | Ditto.                                                                                                             |
| 19    | 130.9                 | ..      | W. or S. or S. W.                 | Cloudless till 10 A. M. scattered \i till [7 P. M. cloudless afterwards.                                           |
| 20    | Sunday.               |         |                                   |                                                                                                                    |
| 21    | 130.8                 | ..      | S. W. or W.                       | Cloudless till 10 A. M. scattered \i till 3 P. M. cloudless afterwards.                                            |
| 22    | 138.8                 | ..      | W. or S. W.                       | Cloudless.                                                                                                         |
| 23    | 134.0                 | ..      | S. W. or W.                       | Ditto.                                                                                                             |
| 24    | 133.0                 | ..      | W. or S. W.                       | Scattered \i till 8 A. M. scattered \i till 5 P. M. cloudless afterwards.                                          |
| 25    | 137.0                 | ..      | S. W.                             | Cloudless till 6 A. M. scattered \i or \i                                                                          |
| 26    | 132.8                 | ..      | S. W. or S.                       | Various clouds. [afterwards.                                                                                       |
| 27    | Sunday.               |         |                                   | [drizzling at 6 A. M.                                                                                              |
| 28    | 135.0                 | ..      | S. or S. S. E.                    | Cloudy the whole day, also thundering &                                                                            |
| 29    | 133.0                 | ..      | S. W. or variable.                | Various clouds. [sunset.                                                                                           |
| 30    | 135.0                 | ..      | N. E. or variable.                | Cloudy, also thundering & raining after                                                                            |
| 31    | 125.0                 | 1.06    | N. or N. W.                       | Cloudy, also thundering & raining before sunrise.                                                                  |

\i Cirri, \i cirro strati, \i cumuli, \i cumulo strati, \i nimbi, —i strati, \i i cirro cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January, 1856.*

MONTHLY RESULTS.

|                                                                |    |      | Inches. |
|----------------------------------------------------------------|----|------|---------|
| Mean height of the Barometer for the month,                    | .. | .... | 30.049  |
| Max. height of the Barometer occurred at 9 A. M. on the 10th,  |    | .... | 30.243  |
| Min. height of the Barometer, occurred at 4 P. M. on the 31st, |    | .... | 29.867  |
| Extreme Range of the Barometer, during the month,              | .. | .... | 0.376   |

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|                                                     |    |      | °    |
|-----------------------------------------------------|----|------|------|
| Mean Dry Bulb Thermometer for the month,            | .. | .... | 68.6 |
| Max. Temperature occurred at 3 P. M. on the 26th,   | .. | .... | 82.2 |
| Min. Temperature, occurred at 6 A. M. on the 3rd,   | .. | .... | 55.0 |
| Extreme Range of the Temperature, during the month, | .. | .... | 27.2 |

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|                                                                        |    |      |      |
|------------------------------------------------------------------------|----|------|------|
| Mean Wet Bulb Thermometer for the month,                               | .. | .... | 63.1 |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer,....         |    |      | 5.5  |
| Computed Mean Dew Point for the month,                                 | .. | .... | 60.3 |
| Mean Dry Bulb Thermometer above computed Mean Dew Point for the month, |    |      | 8.3  |

|                                             |    |      | Inches. |
|---------------------------------------------|----|------|---------|
| Mean elastic force of vapour for the month, | .. | .... | 0.528   |

|                                                                        |    |      | Troy grains. |
|------------------------------------------------------------------------|----|------|--------------|
| Mean weight of vapour for the month,                                   | .. | .... | 5.84         |
| Additional weight of vapour required for complete saturation.          |    | .... | 1.83         |
| Mean degree of Humidity for the month complete saturation being unity, |    |      | 0.76         |

|                                                   |    |      | Inches. |
|---------------------------------------------------|----|------|---------|
| Rained 2 days. Max. fall of Rain during 24 hours, | .. | .... | 1.06    |
| Total amount of rain during the month,            | .. | .... | 1.06    |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February, 1856.*

Latitude 22° 33' 1" North, Longitude 88° 20' 34" East.

Height of the cistern of the Standard Barometer above the Level of the Sea 18.11. feet.

Daily Means, &c. of the Observations, and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | °                             | °                                             | °    | °     |
| 1     | 29.961                                          | 30.048                                    | 29.887  | 0.161   | 68.2                          | 76.7                                          | 62.2 | 14.5  |
| 2     | 30.034                                          | .117                                      | .975    | .142    | 68.6                          | 76.4                                          | 62.4 | 14.0  |
| 3     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 4     | 29.980                                          | .057                                      | .923    | .134    | 70.1                          | 75.4                                          | 67.0 | 8.4   |
| 5     | 30.000                                          | .086                                      | .952    | .134    | 70.5                          | 78.0                                          | 65.2 | 12.8  |
| 6     | .033                                            | .120                                      | .985    | .135    | 68.4                          | 78.0                                          | 60.6 | 17.4  |
| 7     | .017                                            | .096                                      | .962    | .134    | 67.3                          | 77.6                                          | 58.4 | 19.2  |
| 8     | 29.994                                          | .095                                      | .935    | .160    | 67.2                          | 79.0                                          | 56.8 | 22.2  |
| 9     | .949                                            | .006                                      | .894    | .112    | 68.7                          | 78.8                                          | 59.3 | 19.5  |
| 10    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 11    | .934                                            | .019                                      | .865    | .154    | 72.0                          | 81.4                                          | 65.0 | 16.4  |
| 12    | .879                                            | 29.958                                    | .794    | .164    | 71.8                          | 83.3                                          | 64.0 | 19.3  |
| 13    | .884                                            | .943                                      | .838    | .105    | 73.8                          | 84.8                                          | 64.8 | 20.0  |
| 14    | .908                                            | .994                                      | .856    | .138    | 75.6                          | 86.2                                          | 66.6 | 19.6  |
| 15    | .933                                            | 30.011                                    | .883    | .128    | 74.3                          | 82.6                                          | 67.9 | 14.7  |
| 16    | 30.013                                          | .100                                      | .957    | .143    | 70.9                          | 82.1                                          | 61.0 | 21.1  |
| 17    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 18    | 29.999                                          | .073                                      | .943    | .130    | 74.6                          | 82.3                                          | 68.8 | 14.0  |
| 19    | 30.054                                          | .143                                      | 30.003  | .140    | 71.2                          | 82.0                                          | 61.0 | 21.0  |
| 20    | .032                                            | .121                                      | 29.965  | .156    | 71.0                          | 82.2                                          | 60.2 | 22.0  |
| 21    | .016                                            | .104                                      | .948    | .156    | 71.6                          | 83.6                                          | 61.6 | 22.0  |
| 22    | 29.976                                          | .047                                      | .903    | .144    | 72.6                          | 84.6                                          | 62.4 | 22.2  |
| 23    | .962                                            | .034                                      | .896    | .138    | 74.3                          | 85.6                                          | 64.2 | 21.4  |
| 24    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 25    | .944                                            | .031                                      | .884    | .147    | 77.6                          | 88.8                                          | 69.8 | 19.0  |
| 26    | .885                                            | 29.979                                    | .792    | .187    | 78.1                          | 89.2                                          | 69.8 | 19.4  |
| 27    | .823                                            | .904                                      | .762    | .142    | 80.2                          | 91.8                                          | 71.0 | 20.8  |
| 28    | .893                                            | .967                                      | .811    | .156    | 80.4                          | 89.4                                          | 72.6 | 16.8  |
| 29    | .981                                            | 30.074                                    | .923    | .151    | 79.5                          | 86.8                                          | 76.0 | 10.8  |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February, 1856.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Date. | Mean Wet Bulb Thermometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew Point. | Mean Elastic force of Vapour. | Mean Weight of Vapour in a cubic foot of Air. | Additional Weight of Vapour required for complete saturation. | Mean degree of Humidity complete saturation being unity. |
|-------|----------------------------|---------------------|---------------------|---------------------------|-------------------------------|-----------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------|
|       | °                          | °                   | °                   | °                         | Inches.                       | T. gr                                         | T. gr.                                                        |                                                          |
| 1     | 64.3                       | 3.9                 | 62.0                | 6.2                       | 0.559                         | 6.18                                          | 1.40                                                          | 0.82                                                     |
| 2     | 63.7                       | 4.9                 | 61.2                | 7.4                       | .544                          | .01                                           | .66                                                           | .78                                                      |
| 3     | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                          |
| 4     | 66.4                       | 3.7                 | 64.5                | 5.6                       | .607                          | .68                                           | .35                                                           | .83                                                      |
| 5     | 65.0                       | 5.5                 | 62.2                | 8.3                       | .563                          | .19                                           | .94                                                           | .76                                                      |
| 6     | 61.5                       | 6.9                 | 57.4                | 11.0                      | .480                          | 5.29                                          | 2.33                                                          | .69                                                      |
| 7     | 59.5                       | 7.8                 | 54.8                | 12.5                      | .440                          | 4.85                                          | .52                                                           | .66                                                      |
| 8     | 59.8                       | 7.4                 | 55.4                | 11.8                      | .449                          | .96                                           | .39                                                           | .68                                                      |
| 9     | 61.9                       | 6.8                 | 58.5                | 10.2                      | .498                          | 5.49                                          | .20                                                           | .71                                                      |
| 10    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                          |
| 11    | 64.1                       | 7.9                 | 60.1                | 11.9                      | .525                          | .75                                           | .75                                                           | .68                                                      |
| 12    | 64.5                       | 7.3                 | 60.8                | 11.0                      | .537                          | .89                                           | .56                                                           | .70                                                      |
| 13    | 66.1                       | 7.7                 | 62.2                | 11.6                      | .563                          | 6.14                                          | .84                                                           | .68                                                      |
| 14    | 71.0                       | 4.6                 | 68.7                | 6.9                       | .697                          | 7.58                                          | 1.90                                                          | .80                                                      |
| 15    | 64.7                       | 9.6                 | 59.9                | 14.4                      | .521                          | 5.69                                          | 3.43                                                          | .62                                                      |
| 16    | 61.4                       | 9.5                 | 56.6                | 14.3                      | .467                          | .13                                           | .10                                                           | .62                                                      |
| 17    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                          |
| 18    | 65.7                       | 8.9                 | 61.2                | 13.4                      | .544                          | .94                                           | .26                                                           | .65                                                      |
| 19    | 61.2                       | 10.0                | 56.2                | 15.0                      | .461                          | .05                                           | .25                                                           | .61                                                      |
| 20    | 62.3                       | 8.7                 | 57.9                | 13.1                      | .488                          | .35                                           | 2.90                                                          | .65                                                      |
| 21    | 62.8                       | 8.8                 | 58.4                | 13.2                      | .496                          | .43                                           | .97                                                           | .65                                                      |
| 22    | 63.6                       | 9.0                 | 59.1                | 13.5                      | .508                          | .55                                           | 3.11                                                          | .64                                                      |
| 23    | 65.6                       | 8.7                 | 61.2                | 13.1                      | .544                          | .94                                           | .18                                                           | .65                                                      |
| 24    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                          |
| 25    | 70.7                       | 6.9                 | 67.2                | 10.4                      | .664                          | 7.20                                          | 2.87                                                          | .72                                                      |
| 26    | 72.6                       | 5.5                 | 69.8                | 8.3                       | .722                          | .82                                           | .40                                                           | .77                                                      |
| 27    | 72.1                       | 8.1                 | 68.0                | 12.2                      | .681                          | .35                                           | 3.58                                                          | .68                                                      |
| 28    | 72.5                       | 7.9                 | 68.5                | 11.9                      | .692                          | .47                                           | .47                                                           | .68                                                      |
| 29    | 74.9                       | 4.6                 | 72.6                | 6.9                       | .790                          | 8.54                                          | 2.12                                                          | .80                                                      |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Hour.      | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | °                          | °                                                        | °    | °     |
| Mid-night. | 29.962                                    | 30.042                                                 | 29.832  | 0.210   | 68.4                       | 77.0                                                     | 62.3 | 14.7  |
| 1          | .956                                      | .031                                                   | .819    | .212    | 67.7                       | 76.8                                                     | 60.6 | 16.2  |
| 2          | .943                                      | .022                                                   | .808    | .214    | 67.2                       | 77.0                                                     | 59.6 | 17.4  |
| 3          | .934                                      | .017                                                   | .792    | .225    | 66.6                       | 76.5                                                     | 58.9 | 17.6  |
| 4          | .925                                      | .012                                                   | .788    | .224    | 66.2                       | 76.0                                                     | 58.0 | 18.0  |
| 5          | .941                                      | .036                                                   | .799    | .237    | 65.2                       | 76.2                                                     | 57.6 | 18.6  |
| 6          | .961                                      | .048                                                   | .816    | .232    | 65.1                       | 76.4                                                     | 56.8 | 19.6  |
| 7          | .984                                      | .087                                                   | .848    | .239    | 64.9                       | 76.2                                                     | 57.2 | 19.0  |
| 8          | 30.010                                    | .110                                                   | .879    | .231    | 67.4                       | 77.0                                                     | 61.2 | 15.8  |
| 9          | .036                                      | .138                                                   | .893    | .245    | 71.5                       | 79.1                                                     | 67.2 | 11.9  |
| 10         | .045                                      | .143                                                   | .904    | .239    | 74.2                       | 81.8                                                     | 69.0 | 12.8  |
| 11         | .033                                      | .133                                                   | .894    | .239    | 77.0                       | 84.2                                                     | 70.6 | 13.6  |
| Noon.      | .006                                      | .103                                                   | .863    | .240    | 79.5                       | 87.8                                                     | 72.4 | 15.4  |
| 1          | 29.972                                    | .069                                                   | .824    | .245    | 81.2                       | 90.0                                                     | 74.2 | 15.8  |
| 2          | .941                                      | .033                                                   | .797    | .236    | 82.1                       | 91.4                                                     | 74.8 | 16.6  |
| 3          | .920                                      | .013                                                   | .776    | .237    | 82.6                       | 91.8                                                     | 74.9 | 16.9  |
| 4          | .910                                      | .003                                                   | .762    | .241    | 81.9                       | 91.4                                                     | 73.9 | 17.5  |
| 5          | .911                                      | .004                                                   | .768    | .236    | 80.5                       | 87.6                                                     | 73.2 | 14.4  |
| 6          | .918                                      | .011                                                   | .773    | .238    | 77.2                       | 85.5                                                     | 70.9 | 14.6  |
| 7          | .931                                      | .026                                                   | .783    | .243    | 74.6                       | 83.4                                                     | 69.1 | 14.3  |
| 8          | .955                                      | .047                                                   | .820    | .227    | 72.7                       | 81.0                                                     | 67.0 | 14.0  |
| 9          | .970                                      | .059                                                   | .830    | .229    | 71.4                       | 80.0                                                     | 65.4 | 14.6  |
| 10         | .978                                      | .068                                                   | .840    | .228    | 70.1                       | 78.4                                                     | 64.0 | 14.4  |
| 11         | .974                                      | .066                                                   | .837    | .229    | 69.4                       | 77.6                                                     | 63.0 | 14.6  |

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taken at the Surveyor General's Office, Calcutta,  
in the month of February, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dew<br>Bulb above<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of Air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity,<br>complete saturation be-<br>ing unity. |
|----------------|---------------------------------|---------------------|---------------------|-----------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                           | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                   |
| Mid-<br>night. | { 64.9                          | 3.5                 | 62.8                | 5.6                         | 0.574                            | 6.33                                             | 1.29                                                                    | 0.83                                                              |
| 1              | 64.6                            | 3.1                 | 62.7                | 5.0                         | .572                             | .33                                              | .13                                                                     | .85                                                               |
| 2              | 64.3                            | 2.9                 | 62.6                | 4.6                         | .570                             | .31                                              | .04                                                                     | .86                                                               |
| 3              | 63.8                            | 2.8                 | 62.1                | 4.5                         | .561                             | .21                                              | .00                                                                     | .86                                                               |
| 4              | 63.5                            | 2.7                 | 61.9                | 4.3                         | .557                             | .18                                              | 0.94                                                                    | .87                                                               |
| 5              | 62.7                            | 2.5                 | 61.2                | 4.0                         | .544                             | .05                                              | .86                                                                     | .88                                                               |
| 6              | 62.6                            | 2.5                 | 61.1                | 4.0                         | .543                             | .03                                              | .86                                                                     | .88                                                               |
| 7              | 62.3                            | 2.6                 | 60.7                | 4.2                         | .536                             | 5.95                                             | .90                                                                     | .87                                                               |
| 8              | 63.6                            | 3.8                 | 61.3                | 6.1                         | .546                             | 6.05                                             | 1.34                                                                    | .82                                                               |
| 9              | 65.2                            | 6.3                 | 62.0                | 9.5                         | .559                             | .13                                              | 2.25                                                                    | .73                                                               |
| 10             | 65.4                            | 8.8                 | 61.0                | 13.2                        | .541                             | 5.90                                             | 3.19                                                                    | .65                                                               |
| 11             | 66.2                            | 10.8                | 60.8                | 16.2                        | .537                             | .83                                              | 4.06                                                                    | .59                                                               |
|                |                                 |                     |                     |                             |                                  |                                                  |                                                                         |                                                                   |
| Noon.          | 66.8                            | 12.7                | 60.4                | 19.1                        | .530                             | .72                                              | .94                                                                     | .54                                                               |
| 1              | 67.2                            | 14.0                | 60.2                | 21.0                        | .527                             | .66                                              | 5.55                                                                    | .51                                                               |
| 2              | 67.7                            | 14.4                | 60.5                | 21.6                        | .532                             | .71                                              | .80                                                                     | .50                                                               |
| 3              | 67.9                            | 14.7                | 60.5                | 22.1                        | .532                             | .71                                              | .97                                                                     | .49                                                               |
| 4              | 67.6                            | 14.3                | 60.4                | 21.5                        | .530                             | .69                                              | .75                                                                     | .50                                                               |
| 5              | 67.7                            | 12.8                | 61.3                | 19.2                        | .546                             | .89                                              | .09                                                                     | .54                                                               |
| 6              | 67.8                            | 9.4                 | 63.1                | 14.1                        | .580                             | 6.29                                             | 3.66                                                                    | .63                                                               |
| 7              | 67.1                            | 7.5                 | 63.3                | 11.3                        | .584                             | .37                                              | 2.83                                                                    | .69                                                               |
| 8              | 66.7                            | 6.0                 | 63.7                | 9.0                         | .591                             | .47                                              | .21                                                                     | .75                                                               |
| 9              | 66.2                            | 5.2                 | 63.6                | 7.8                         | .590                             | .46                                              | 1.89                                                                    | .77                                                               |
| 10             | 65.6                            | 4.5                 | 63.3                | 6.8                         | .584                             | .42                                              | .61                                                                     | .80                                                               |
| 11             | 65.2                            | 4.2                 | 63.1                | 6.3                         | .580                             | .39                                              | .47                                                                     | .81                                                               |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February, 1856.*

Solar radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain.   | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                  |
|-------|-----------------------|---------|-----------------------------------|---------------------------------------------------------------------------------------------|
|       | o                     | Inches. |                                   |                                                                                             |
| 1     | 132.0                 | ..      | N. W.                             | Cloudless till 11 A. M. scattered ci till 6 P. M. cloudless afterwards.                     |
| 2     | 133.0                 | ..      | N. W.                             | Cloudless.                                                                                  |
| 3     | <i>Sunday.</i>        |         |                                   |                                                                                             |
| 4     | ..                    | ..      | E. or N. W.                       | Cloudy and drizzling till sunrise, also continues cloudy till 4 P. M. cloudless afterwards. |
| 5     | 124.0                 | ..      | N. W. or N.                       | Various clouds till Noon, scattered ci till 6 P. M. cloudless afterwards.                   |
| 6     | 135.2                 | ..      | N. or W.                          | Cloudless.                                                                                  |
| 7     | 136.0                 | ..      | W. or N. W.                       | Cloudless.                                                                                  |
| 8     | 139.0                 | ..      | N. W. or N.                       | Cloudless.                                                                                  |
| 9     | 135.0                 | ..      | Calm or W. or N. W.               | Cloudless.                                                                                  |
| 10    | <i>Sunday.</i>        |         |                                   |                                                                                             |
| 11    | 140.2                 | ..      | W.                                | Cloudless.                                                                                  |
| 12    | 138.0                 | ..      | W.                                | Cloudless.                                                                                  |
| 13    | 138.0                 | ..      | W.                                | Cloudless.                                                                                  |
| 14    | 141.2                 | ..      | W. or S. W. or S.                 | Cloudless till 4 A. M. cloudy till 10 A. M.                                                 |
| 15    | 140.0                 | ..      | S. or S. W.                       | Cloudless. [cloudless afterwards,                                                           |
| 16    | 140.0                 | ..      | S. W. or W.                       | Cloudless.                                                                                  |
| 17    | <i>Sunday.</i>        |         |                                   |                                                                                             |
| 18    | 134.0                 | ..      | W. or N. W.                       | Cloudless.                                                                                  |
| 19    | 136.3                 | ..      | N. or W. N. W.                    | Cloudless.                                                                                  |
| 20    | 135.0                 | ..      | W. or N. W.                       | Cloudless.                                                                                  |
| 21    | 140.0                 | ..      | W.                                | Cloudless.                                                                                  |
| 22    | 145.0                 | ..      | N. W. or W.                       | Cloudless.                                                                                  |
| 23    | 138.0                 | ..      | N. W. or W.                       | Cloudless.                                                                                  |
| 24    | <i>Sunday.</i>        |         |                                   |                                                                                             |
| 25    | 137.0                 | ..      | W.                                | Cloudless.                                                                                  |
| 26    | 139.0                 | ..      | W. or S.                          | Cloudless till 10 A. M. scattered ci till 5 P. M. cloudless afterwards.                     |
| 27    | 140.0                 | ..      | S.                                | Cloudless.                                                                                  |
| 28    | 138.5                 | ..      | S. or E.                          | Cloudless till 5 A. M. scattered ci and ci till 7 P. M. cloudless afterwards.               |
| 29    | 135.0                 | ..      | S.                                | Cloudy.                                                                                     |

ci Cirri, ci Cirro-strati, ci Cumuli, ci Cumulo-strati, ci Nimbi, —i Strati, ci Cirro-cumuli.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February, 1856.*

MONTHLY RESULTS.

|                                                                 |    |    | Inches. |
|-----------------------------------------------------------------|----|----|---------|
| Mean height of the Barometer, for the month,                    | .. | .. | 29.963  |
| Max. height of the Barometer, occurred at 10 A. M. on the 19th, | .. | .. | 30.143  |
| Min. height of the Barometer, occurred at 4 P. M. on the 27th,  | .. | .. | 29.762  |
| Extreme Range of the Barometer, during the month,               | .. | .. | 0.381   |

---

|                                                     |    |    | o    |
|-----------------------------------------------------|----|----|------|
| Mean dry bulb Thermometer for the month,            | .. | .. | 72.7 |
| Max. Temperature occurred at 3 P. M. on the 27th,   | .. | .. | 91.8 |
| Min. Temperature, occurred at 6 A. M. on the 8th,   | .. | .. | 56.8 |
| Extreme Range of the Temperature, during the month, | .. | .. | 35.0 |

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|                                                                         |      |    |              |
|-------------------------------------------------------------------------|------|----|--------------|
| Mean wet bulb Thermometer for the month,                                | ..   | .. | 65.5         |
| Mean dry bulb Thermometer above Mean wet bulb Thermometer,              | ..   | .. | 7.2          |
| Computed Mean dew point for the month,                                  | ..   | .. | 61.9         |
| Mean dry bulb Thermometer above computed Mean Dew point for the month,  | 10.8 |    |              |
|                                                                         |      |    | Inches.      |
| Mean elastic force of vapour for the month,                             | ..   | .. | 0.557        |
|                                                                         |      |    | Troy grains. |
| Mean weight of vapour for the month,                                    | ..   | .. | 6.09         |
| Additional weight of vapour required for complete saturation,           | ..   | .. | 2.59         |
| Mean degree of humidity for the month, complete saturation being unity. | ..   | .. | 0.70         |
|                                                                         |      |    | Inches.      |
| Total amount of Rain during the month,                                  | ..   | .. | 0.00         |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1856.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.  
Height of the Cistern of the Standard Barometer above the level of the Sea, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | 30.017                                          | 30.076                                    | 29.963  | 0.113   | 79.4                          | 86.8                                          | 75.2 | 11.6  |
| 2     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 3     | 29.995                                          | .080                                      | .913    | .167    | 79.7                          | 88.8                                          | 73.6 | 15.2  |
| 4     | .977                                            | .042                                      | .910    | .132    | 80.3                          | 88.4                                          | 73.8 | 14.6  |
| 5     | .949                                            | .030                                      | .874    | .156    | 81.7                          | 91.1                                          | 75.4 | 15.7  |
| 6     | .924                                            | .002                                      | .852    | .150    | 81.3                          | 90.6                                          | 74.6 | 16.0  |
| 7     | .897                                            | 29.978                                    | .825    | .153    | 81.9                          | 92.0                                          | 74.6 | 17.4  |
| 8     | .878                                            | .942                                      | .799    | .143    | 81.6                          | 92.0                                          | 74.0 | 18.0  |
| 9     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 10    | .835                                            | .906                                      | .769    | .137    | 80.5                          | 89.8                                          | 74.8 | 15.0  |
| 11    | .849                                            | .918                                      | .795    | .123    | 79.9                          | 88.2                                          | 73.6 | 14.6  |
| 12    | .868                                            | .935                                      | .791    | .144    | 79.2                          | 87.2                                          | 71.7 | 15.5  |
| 13    | .888                                            | .965                                      | .809    | .156    | 79.5                          | 88.9                                          | 72.2 | 16.7  |
| 14    | .966                                            | 30.032                                    | .896    | .136    | 75.7                          | 82.4                                          | 72.6 | 9.8   |
| 15    | .960                                            | .029                                      | .883    | .146    | 74.5                          | 82.7                                          | 70.0 | 12.7  |
| 16    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 17    | .904                                            | 29.992                                    | .847    | .145    | 76.5                          | 83.2                                          | 71.6 | 11.6  |
| 18    | .877                                            | .963                                      | .799    | .164    | 78.1                          | 86.3                                          | 71.0 | 15.3  |
| 19    | .778                                            | .858                                      | .644    | .214    | 79.7                          | 89.8                                          | 71.4 | 18.4  |
| 20    | .742                                            | 29.853                                    | .665    | .188    | 74.9                          | 83.8                                          | 67.6 | 16.2  |
| 21    | <i>Good Friday.</i>                             |                                           |         |         |                               |                                               |      |       |
| 22    | .810                                            | .888                                      | .751    | .137    | 80.8                          | 89.6                                          | 73.0 | 16.6  |
| 23    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 24    | .708                                            | .782                                      | .645    | .137    | 81.9                          | 88.6                                          | 76.1 | 12.5  |
| 25    | .674                                            | .744                                      | .619    | .125    | 82.3                          | 89.0                                          | 77.3 | 11.7  |
| 26    | .736                                            | .802                                      | .675    | .127    | 82.9                          | 92.0                                          | 75.6 | 16.4  |
| 27    | .794                                            | .855                                      | .744    | .111    | 82.8                          | 90.4                                          | 76.4 | 14.0  |
| 28    | .836                                            | .907                                      | .776    | .131    | 82.6                          | 90.6                                          | 76.4 | 14.2  |
| 29    | .830                                            | .927                                      | .753    | .174    | 82.4                          | 91.7                                          | 75.4 | 16.3  |
| 30    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 31    | .810                                            | .886                                      | .750    | .136    | 84.7                          | 95.6                                          | 75.5 | 20.1  |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1856.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Wet Bulb Thermometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew Point. | Mean Elastic force of Vapour. | Mean Weight of Vapour in a cubic foot of air. | Additional weight of Vapour required for complete saturation. | Mean degree of Humidity, complete saturation being unity. |
|-------|----------------------------|---------------------|---------------------|---------------------------|-------------------------------|-----------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------|
| 1     | 74.9                       | 4.5                 | 72.6                | 6.8                       | Inches.<br>0.790              | T. gr.<br>8.54                                | T. gr.<br>2.08                                                | 0.80                                                      |
| 2     | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 3     | 74.5                       | 5.2                 | 71.9                | 7.8                       | .773                          | .34                                           | .38                                                           | .78                                                       |
| 4     | 75.5                       | 4.8                 | 73.1                | 7.2                       | .803                          | .67                                           | .24                                                           | .80                                                       |
| 5     | 74.9                       | 6.8                 | 71.5                | 10.2                      | .763                          | .21                                           | 3.16                                                          | .72                                                       |
| 6     | 75.5                       | 5.8                 | 72.6                | 8.7                       | .790                          | .50                                           | 2.74                                                          | .76                                                       |
| 7     | 75.5                       | 6.4                 | 72.3                | 9.6                       | .783                          | .41                                           | 3.03                                                          | .74                                                       |
| 8     | 73.9                       | 7.7                 | 70.0                | 11.6                      | .727                          | 7.81                                          | .53                                                           | .69                                                       |
| 9     | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 10    | 75.5                       | 5.0                 | 73.0                | 7.5                       | .801                          | 8.62                                          | 2.36                                                          | .79                                                       |
| 11    | 74.6                       | 5.3                 | 71.9                | 8.0                       | .773                          | .34                                           | .44                                                           | .77                                                       |
| 12    | 73.6                       | 5.6                 | 70.8                | 8.4                       | .746                          | .07                                           | .49                                                           | .76                                                       |
| 13    | 73.2                       | 6.3                 | 70.0                | 9.5                       | .727                          | 7.84                                          | .82                                                           | .74                                                       |
| 14    | 72.5                       | 3.2                 | 70.9                | 4.8                       | .748                          | 8.15                                          | 1.36                                                          | .86                                                       |
| 15    | 70.6                       | 3.9                 | 68.6                | 5.9                       | .695                          | 7.58                                          | .60                                                           | .83                                                       |
| 16    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 17    | 73.1                       | 3.4                 | 71.4                | 5.1                       | .761                          | 8.27                                          | .48                                                           | .85                                                       |
| 18    | 73.4                       | 4.7                 | 71.0                | 7.1                       | .751                          | .13                                           | 2.09                                                          | .80                                                       |
| 19    | 75.4                       | 4.3                 | 73.2                | 6.5                       | .806                          | .70                                           | .02                                                           | .81                                                       |
| 20    | 70.1                       | 4.8                 | 67.7                | 7.2                       | .674                          | 7.36                                          | 1.92                                                          | .79                                                       |
| 21    | <i>Good Friday.</i>        |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 22    | 75.3                       | 5.5                 | 72.5                | 8.3                       | .787                          | 8.49                                          | 2.58                                                          | .77                                                       |
| 23    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 24    | 77.9                       | 4.0                 | 75.9                | 6.0                       | .879                          | 9.46                                          | 1.98                                                          | .83                                                       |
| 25    | 78.0                       | 4.3                 | 75.8                | 6.5                       | .876                          | .41                                           | 2.17                                                          | .81                                                       |
| 26    | 76.5                       | 6.4                 | 73.3                | 9.6                       | .809                          | 8.66                                          | 3.13                                                          | .74                                                       |
| 27    | 76.8                       | 6.0                 | 73.8                | 9.0                       | .822                          | .82                                           | 2.93                                                          | .75                                                       |
| 28    | 76.5                       | 6.1                 | 73.4                | 9.2                       | .811                          | .71                                           | .97                                                           | .75                                                       |
| 29    | 76.1                       | 6.3                 | 72.9                | 9.5                       | .797                          | .56                                           | 3.05                                                          | .74                                                       |
| 30    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 31    | 78.3                       | 6.4                 | 75.1                | 9.6                       | .857                          | 9.15                                          | .27                                                           | .74                                                       |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Faht. | Range of the Barometer<br>for each hour during<br>the month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Temperature<br>for each hour during<br>the month. |      |       |
|----------------|-------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|----------------------------------------------------------------|------|-------|
|                |                                                 | Max.                                                         | Min.    | Diff.   |                               | Max.                                                           | Min. | Diff. |
|                | Inches.                                         | Inches.                                                      | Inches. | Inches. | o                             | o                                                              | o    | o     |
| Mid-<br>night. | } 29.870                                        | 30.025                                                       | 29.693  | 0.332   | 76.1                          | 80.0                                                           | 69.8 | 10.2  |
| 1              | .856                                            | .019                                                         | .683    | .336    | 75.6                          | 79.0                                                           | 68.6 | 10.4  |
| 2              | .846                                            | .010                                                         | .663    | .347    | 75.4                          | 78.8                                                           | 69.6 | 9.2   |
| 3              | .835                                            | .001                                                         | .648    | .353    | 74.9                          | 78.0                                                           | 69.9 | 8.1   |
| 4              | .830                                            | 29.993                                                       | .633    | .360    | 74.7                          | 77.6                                                           | 70.0 | 7.6   |
| 5              | .846                                            | .987                                                         | .645    | .342    | 74.4                          | 77.6                                                           | 70.3 | 7.3   |
| 6              | .864                                            | 30.012                                                       | .669    | .343    | 74.2                          | 77.3                                                           | 70.4 | 6.9   |
| 7              | .887                                            | .042                                                         | .697    | .345    | 74.6                          | 77.9                                                           | 70.4 | 7.5   |
| 8              | .914                                            | .056                                                         | .721    | .335    | 77.1                          | 80.5                                                           | 72.2 | 8.3   |
| 9              | .930                                            | .077                                                         | .744    | .333    | 79.8                          | 83.6                                                           | 74.6 | 9.0   |
| 10             | .930                                            | .080                                                         | .743    | .337    | 82.5                          | 86.6                                                           | 77.1 | 9.5   |
| 11             | .917                                            | .071                                                         | .737    | .334    | 84.4                          | 89.2                                                           | 77.6 | 11.6  |
| Noon.          | .891                                            | .064                                                         | .712    | .352    | 86.3                          | 91.4                                                           | 79.9 | 11.5  |
| 1              | .862                                            | .034                                                         | .678    | .356    | 87.4                          | 93.4                                                           | 80.0 | 13.4  |
| 2              | .830                                            | .001                                                         | .663    | .338    | 88.1                          | 94.7                                                           | 75.2 | 19.5  |
| 3              | .809                                            | 29.984                                                       | .646    | .338    | 88.2                          | 95.6                                                           | 74.3 | 21.3  |
| 4              | .798                                            | .967                                                         | .633    | .334    | 87.4                          | 95.5                                                           | 73.6 | 21.9  |
| 5              | .798                                            | .976                                                         | .629    | .347    | 85.8                          | 94.2                                                           | 73.8 | 20.4  |
| 6              | .809                                            | .980                                                         | .619    | .361    | 83.6                          | 91.6                                                           | 74.2 | 17.4  |
| 7              | .829                                            | .997                                                         | .658    | .339    | 81.3                          | 87.6                                                           | 73.8 | 13.8  |
| 8              | .852                                            | 30.032                                                       | .667    | .365    | 79.8                          | 85.1                                                           | 73.0 | 12.1  |
| 9              | .874                                            | .054                                                         | .660    | .394    | 78.4                          | 83.1                                                           | 68.5 | 14.6  |
| 10             | .877                                            | .063                                                         | .653    | .410    | 77.5                          | 82.0                                                           | 67.6 | 14.4  |
| 11             | .885                                            | .064                                                         | .684    | .380    | 76.6                          | 81.4                                                           | 69.0 | 12.4  |



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taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of Air. | Additional weight of va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity,<br>complete saturation be-<br>ing unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                   |
| Mid-<br>night. | 73.7                            | 2.4                 | 72.5                | 3.6                          | 0.787                            | 8.56                                             | 1.07                                                                    | 0.89                                                              |
| 1              | 73.5                            | 2.1                 | 72.4                | 3.2                          | .785                             | .55                                              | 0.93                                                                    | .90                                                               |
| 2              | 73.4                            | 2.0                 | 72.4                | 3.0                          | .785                             | .55                                              | .88                                                                     | .91                                                               |
| 3              | 73.1                            | 1.8                 | 72.2                | 2.7                          | .781                             | .50                                              | .78                                                                     | .92                                                               |
| 4              | 72.9                            | 1.8                 | 72.0                | 2.7                          | .776                             | .45                                              | .78                                                                     | .92                                                               |
| 5              | 72.6                            | 1.8                 | 71.7                | 2.7                          | .768                             | .38                                              | .77                                                                     | .92                                                               |
| 6              | 72.6                            | 1.6                 | 71.8                | 2.4                          | .771                             | .42                                              | .67                                                                     | .93                                                               |
| 7              | 72.9                            | 1.7                 | 72.0                | 2.6                          | .776                             | .43                                              | .75                                                                     | .92                                                               |
| 8              | 74.4                            | 2.7                 | 73.0                | 4.1                          | .801                             | .69                                              | 1.23                                                                    | .88                                                               |
| 9              | 75.7                            | 4.1                 | 73.6                | 6.2                          | .817                             | .82                                              | .93                                                                     | .82                                                               |
| 10             | 76.3                            | 6.2                 | 73.2                | 9.3                          | .806                             | .66                                              | 2.98                                                                    | .74                                                               |
| 11             | 76.7                            | 7.7                 | 72.8                | 11.6                         | .795                             | .50                                              | 3.81                                                                    | .69                                                               |
| Noon.          | 77.1                            | 9.2                 | 72.5                | 13.8                         | .787                             | .39                                              | 4.63                                                                    | .64                                                               |
| 1              | 77.1                            | 10.3                | 71.9                | 15.5                         | .773                             | .21                                              | 5.24                                                                    | .61                                                               |
| 2              | 76.7                            | 11.4                | 71.0                | 17.1                         | .751                             | 7.97                                             | .75                                                                     | .58                                                               |
| 3              | 76.5                            | 11.7                | 70.6                | 17.6                         | .741                             | .86                                              | .90                                                                     | .57                                                               |
| 4              | 76.4                            | 11.0                | 70.9                | 16.5                         | .748                             | .95                                              | .50                                                                     | .59                                                               |
| 5              | 76.3                            | 9.5                 | 71.5                | 14.3                         | .763                             | 8.15                                             | 4.68                                                                    | .64                                                               |
| 6              | 75.9                            | 7.7                 | 72.0                | 11.6                         | .776                             | .30                                              | 3.73                                                                    | .69                                                               |
| 7              | 75.4                            | 5.9                 | 72.4                | 8.9                          | .785                             | .45                                              | 2.79                                                                    | .75                                                               |
| 8              | 75.2                            | 4.6                 | 72.9                | 6.9                          | .797                             | .61                                              | .14                                                                     | .80                                                               |
| 9              | 74.6                            | 3.8                 | 72.7                | 5.7                          | .792                             | .58                                              | 1.73                                                                    | .83                                                               |
| 10             | 74.2                            | 3.3                 | 72.5                | 5.0                          | .787                             | .54                                              | .50                                                                     | .85                                                               |
| 11             | 73.8                            | 2.8                 | 72.4                | 4.2                          | .785                             | .53                                              | .24                                                                     | .87                                                               |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1856.*

Solar radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain.   | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                             |
|-------|-----------------------|---------|-----------------------------------|--------------------------------------------------------------------------------------------------------|
|       | o                     | Inches. |                                   |                                                                                                        |
| 1     | 130.0                 | ...     | S. or S. E.                       | Cloudy till 8 A. M. scattered ☾i and ☾i [till 5 P. M. cloudless afterwards.                            |
| 2     | <i>Sunday.</i>        |         |                                   | [cloudless afterwards.                                                                                 |
| 3     | 132.3                 | ...     | S.                                | Cloudless till 6 A. M. cloudy till 4 P. M.                                                             |
| 4     | 134.7                 | ...     | S.                                | Cloudless till 8 A. M. cloudy till 6 P. M. [cloudless afterwards.                                      |
| 5     | 142.7                 | ...     | S. or S. W.                       | Cloudless till 6 A. M. scattered ☾i till 6 [P. M. cloudless afterwards.                                |
| 6     | 135.0                 | ...     | S.                                | Scattered clouds.                                                                                      |
| 7     | 136.6                 | ...     | S.                                | Cloudless.                                                                                             |
| 8     | 139.0                 | ...     | S.                                | Ditto.                                                                                                 |
| 9     | <i>Sunday.</i>        |         |                                   | [6 P. M. cloudless afterwards.                                                                         |
| 10    | 135.0                 | ...     | S.                                | Cloudless till 10 A. M. scattered ☾i till                                                              |
| 11    | 138.7                 | ...     | S.                                | Cloudless till 8 A. M. scattered ☾i till 4 [P. M. cloudless afterwards.                                |
| 12    | 132.0                 | ...     | S. or S. E.                       | Cloudless till 7 A. M. scattered ☾i till 6 [P. M. cloudless afterwards. [wards.                        |
| 13    | 134.9                 | ...     | S. E. or S.                       | Cloudless till 8 A. M. scattered ☾i after-                                                             |
| 14    | ...                   | 0.16    | E. or S. W.                       | Cloudless till 5 A. M. cloudy afterwards, also raining & thundering & lightning between 2 & 4 P. M.    |
| 15    | 126.6                 | 0.41    | S. E. or E.                       | Cloudy with drizzling before sunrise and [also rain at 4 P. M.                                         |
| 16    | <i>Sunday.</i>        | 0.52    |                                   | [rain between 5 & 6 P. M.                                                                              |
| 17    | 138.0                 | 0.17    | E. or N. E. or N. or W.           | Cloudy or scattered ☾i also a shower of                                                                |
| 18    | 130.0                 | ...     | W. or N. E. or S.                 | Clouds of various kinds.                                                                               |
| 19    | 135.0                 | 0.47    | S. or S. W.                       | Ditto ditto, (also a N. W. gale between 10h. 15m. & 10h. 47m. and rain afterwards.                     |
| 20    | 133.5                 | 0.50    | S.                                | Cloudy with rain after 8 P. M.                                                                         |
| 21    | <i>Good Friday.</i>   |         |                                   |                                                                                                        |
| 22    | 142.0                 | ...     | S. E. or E. or S. W.              | Cloudless till 3 A. M., cloudy or scattered ☾i till 5 P. M. cloudless till 9 P. M. [cloudy afterwards. |
| 23    | <i>Sunday.</i>        |         |                                   | Cloudy. [scattered ☾i afterwards.                                                                      |
| 24    | 124.0                 | ...     | S.                                | Cloudy till 9 A. M. scattered ☾i till 4 P. M.                                                          |
| 25    | 128.0                 | ...     | S.                                | Cloudless till 8 A. M. scattered ☾i till 7 [P. M. cloudless afterwards.                                |
| 26    | 148.4                 | ...     | S. or S. E. or N. E.              | Cloudless till 1 P. M. scattered ☾i after- [wards. [P. M. cloudless afterwards.                        |
| 27    | 132.0                 | ...     | S. E. or S. W. or S.              | Cloudless till 11 A. M. scattered ☾i till 4                                                            |
| 28    | 145.0                 | ...     | S. or S. W. or S.                 | Cloudless till 11 A. M. scattered ☾i till 4                                                            |
| 29    | 147.0                 | ...     | S. or S. W.                       | Cloudless till 2 A. M. cloudy till 8 A. M. [cloudless afterwards.                                      |
| 30    | <i>Sunday.</i>        |         |                                   |                                                                                                        |
| 31    | 149.0                 | ...     | S.                                | Cloudless.                                                                                             |

☾i Cirri, ☾i Cirro Strati, ☾i Cumuli, ☾i Cumulo Strati, ☾i Nimbi. —i Strati, ☾i Cirro Cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office Calcutta,  
in the month of March, 1856.*

MONTHLY RESULTS.

|                                                               |    |    | Inches. |
|---------------------------------------------------------------|----|----|---------|
| Mean height of the Barometer for the month,                   | .. | .. | 29.860  |
| Max. height of the Barometer occurred at 10 A. M. on the 3d,  | .. | .. | 30.080  |
| Min. height of the Barometer occurred at 6 P. M. on the 25th, | .. | .. | 29.619  |
| Extreme range of the Barometer during the month,              | .. | .. | 0.461   |

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|                                                    |    |    | °    |
|----------------------------------------------------|----|----|------|
| Mean dry bulb Thermometer for the month,           | .. | .. | 80.2 |
| Max. Temperature occurred at 3 P. M. on the 31st,  | .. | .. | 95.6 |
| Min. Temperature occurred at 10 P. M. on the 20th, | .. | .. | 67.6 |
| Extreme range of the Temperature during the month, | .. | .. | 28.0 |

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|                                                            |    |    |      |
|------------------------------------------------------------|----|----|------|
| Mean wet bulb Thermometer for the month,                   | .. | .. | 74.9 |
| Mean dry bulb Thermometer above mean wet bulb Thermometer, | .. | .. | 5.3  |
| Computed mean dew point for the month,                     | .. | .. | 72.2 |
| Mean dry bulb Thermometer above computed mean dew point,   | .. | .. | 8.0  |

|                                             |    |    | Inches. |
|---------------------------------------------|----|----|---------|
| Mean elastic force of vapour for the month, | .. | .. | 0.781   |

|                                                                         |    |    | Troy grains. |
|-------------------------------------------------------------------------|----|----|--------------|
| Mean weight of vapour for the month,                                    | .. | .. | 8.41         |
| Additional weight of vapour required for complete saturation,           | .. | .. | 2.47         |
| Mean degree of humidity, for the month complete saturation being unity, | .. | .. | 0.77         |

|                                                   |    |    | Inches. |
|---------------------------------------------------|----|----|---------|
| Rained 6 days.—Max. fall of rain during 24 hours, | .. | .. | 0 52    |
| Total amount of rain during the month,            | .. | .. | 2.23    |

Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of March, 1856.

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky. |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|--------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                    |
| 1     | 29.649     | 74.0         | 74.4    | 59.0      | N. W.              | ..                | Clear.             |
| 2     | 29.655     | 78.5         | 79.5    | 59.0      | S. W.              | ..                | Ditto.             |
| 3     | 29.623     | 75.9         | 77.0    | 60.0      | N. W.              | ..                | Ditto.             |
| 4     | 29.587     | 79.5         | 80.5    | 59.5      | W.                 | ..                | Ditto.             |
| 5     | 29.581     | 81.5         | 82.2    | 61.5      | N. W.              | ..                | Ditto.             |
| 6     | 29.545     | 82.9         | 84.1    | 62.6      | N. W.              | ..                | Ditto.             |
| 7     | 29.505     | 82.9         | 84.0    | 64.0      | S. W.              | ..                | Ditto.             |
| 8     | 29.475     | 84.8         | 85.2    | 66.4      | S. E.              | ..                | Ditto.             |
| 9     | 29.405     | 85.5         | 86.6    | 68.5      | S. E.              | ..                | Ditto.             |
| 10    | 29.383     | 87.0         | 87.0    | 67.0      | S. E.              | ..                | Ditto.             |
| 11    | 29.413     | 87.5         | 89.0    | 69.9      | W.                 | ..                | Ditto.             |
| 12    | 29.423     | 88.0         | 89.5    | 65.0      | N. W.              | ..                | Ditto.             |
| 13    | 29.443     | 85.0         | 85.0    | 71.0      | S. E.              | ..                | Ditto.             |
| 14    | 29.551     | 87.0         | 87.0    | 74.0      | E.                 | ..                | Ditto.             |
| 15    | 29.569     | 82.3         | 82.0    | 67.5      | E.                 | ..                | Ditto.             |
| 16    | 29.479     | 82.5         | 83.6    | 69.0      | E.                 | ..                | W scattered.       |
| 17    | 29.505     | 84.0         | 85.5    | 68.5      | E.                 | ..                | Clear.             |
| 18    | 29.475     | 85.1         | 85.9    | 69.3      | S. E.              | ..                | Ditto.             |
| 19    | 29.359     | 85.4         | 86.0    | 65.5      | W.                 | ..                | Ditto.             |
| 20    | 29.325     | 80.0         | 80.2    | 60.5      | N. W.              | ..                | Ditto.             |
| 21    | 29.341     | 84.9         | 85.5    | 60.0      | N. W.              | ..                | Ditto.             |
| 22    | 29.455     | 86.0         | 87.0    | 60.0      | E.                 | ..                | Scattered.         |
| 23    | 29.468     | 86.5         | 87.2    | 61.0      | S. W.              | ..                | Clear.             |
| 24    | 29.279     | 86.9         | 87.5    | 64.0      | W.                 | ..                | Hazy.              |
| 25    | 29.357     | 79.3         | 80.0    | 55.0      | W.                 | ..                | Ditto.             |
| 26    | 29.389     | 79.2         | 80.4    | 57.9      | W.                 | ..                | Clear.             |
| 27    | 29.417     | 80.6         | 82.0    | 59.0      | W.                 | ..                | Ditto.             |
| 28    | 29.413     | 83.0         | 85.5    | 62.0      | W.                 | ..                | Ditto.             |
| 29    | 29.313     | 90.8         | 93.0    | 62.0      | E.                 | ..                | Ditto.             |
| 30    | 29.375     | 85.0         | 85.7    | 64.0      | W.                 | ..                | Ditto.             |
| 31    | 29.483     | 87.0         | 89.0    | 64.5      | W.                 | ..                | Ditto.             |
| Mean. | 29.459     | 83.5         | 84.5    | 63.7      |                    |                   |                    |

Barometer Observations corrected for Capillarity only.

Symbols. { \ Cirrus.  
 \ Cirro strata.  
 > Cumuli.  
 ^ Cumulo strata.  
 W Nimbi or Nimbus.

Note.—The dry bulb and maximum Register do not agree, the former always reads more than the latter. The average difference is 1.6.



*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of March, 1856.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky. |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|--------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                    |
| 1     | 29.639     | 80.5         | 82.5    | 59.5      | N. W.              | ..                | Clear.             |
| 2     | 29.629     | 81.9         | 82.2    | 60.0      | S. W.              | ..                | ✓ scattered.       |
| 3     | 29.599     | 82.0         | 83.0    | 61.0      | N. W.              | ..                | Clear.             |
| 4     | 29.561     | 85.5         | 86.2    | 62.0      | W.                 | ..                | Ditto.             |
| 5     | 29.543     | 86.8         | 86.7    | 63.8      | N. W.              | ..                | Ditto.             |
| 6     | 29.525     | 88.3         | 90.0    | 64.5      | N. W.              | ..                | Ditto.             |
| 7     | 29.483     | 88.7         | 88.5    | 65.0      | N. W.              | ..                | Ditto.             |
| 8     | 29.449     | 89.9         | 89.5    | 67.0      |                    | ..                | Ditto.             |
| 9     | 29.387     | 90.5         | 91.0    | 69.0      | S. E.              | ..                | Ditto.             |
| 10    | 29.363     | 91.2         | 91.9    | 68.5      | S.                 | ..                | Ditto.             |
| 11    | 29.393     | 93.0         | 94.5    | 70.4      | W.                 | ..                | Ditto.             |
| 12    | 29.403     | 95.2         | 96.4    | 64.4      | N. W.              | ..                | Ditto.             |
| 13    | 29.443     | 89.9         | 91.0    | 72.0      | S. E.              | ..                | Ditto.             |
| 14    | 29.525     | 90.5         | 90.6    | 74.5      | E.                 | ..                | ^ very few in zen. |
| 15    | 29.521     | 86.5         | 87.4    | 71.0      | S. E.              | ..                | Clear.             |
| 16    | 29.455     | 85.0         | 85.8    | 69.9      | E.                 | ..                | ^ scattered.       |
| 17    | 29.473     | 87.5         | 88.9    | 69.0      | S. E.              | ..                | Clear.             |
| 18    | 29.427     | 90.8         | 90.9    | 69.5      | S. W.              | ..                | Ditto.             |
| 19    | 29.347     | 90.2         | 90.5    | 66.5      | W.                 | ..                | Ditto.             |
| 20    | 29.293     | 84.0         | 84.4    | 61.3      | N. W.              | ..                | Ditto.             |
| 21    | 29.319     | 90.5         | 90.5    | 60.2      | N. W.              | ..                | Ditto.             |
| 22    | 29.407     | 88.0         | 91.3    | 61.5      | E.                 | ..                | ✓ scattered        |
| 23    | 29.451     | 89.7         | 89.9    | 62.5      | S. W.              | ..                | Clear.             |
| 24    | 29.259     | 90.5         | 90.9    | 64.2      | W.                 | ..                | Hazy.              |
| 25    | 29.247     | 84.0         | 84.0    | 56.0      | W.                 | ..                | Ditto.             |
| 26    | 29.381     | 85.2         | 85.6    | 57.5      | W.                 | ..                | Clear.             |
| 27    | 29.403     | 88.1         | 88.8    | 59.2      | W.                 | ..                | Ditto.             |
| 28    | 29.403     | 89.0         | 89.4    | 62.5      | W.                 | ..                | Ditto.             |
| 29    | 29.281     | 94.4         | 95.2    | 65.5      | E.                 | ..                | Ditto.             |
| 30    | 29.355     | 88.0         | 88.5    | 65.0      | W.                 | ..                | Ditto.             |
| 31    | 29.473     | 90.5         | 91.6    | 64.5      | W.                 | ..                | Ditto.             |
| Mean. | 29.435     | 88.2         | 88.9    | 64.4      |                    |                   |                    |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of March, 1856.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and minimum. |          |       | Aspect of the Sky. | Direction of Wind. | Quantity of Rain. |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------|--------------------|-------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                    |                    |                   |
| 1     | 29.563     | 85.8         | 85.8    | 63.2      | 85.8                 | 62.5     | 74.15 | Clear.             | W.                 | ..                |
| 2     | 29.549     | 86.5         | 86.0    | 63.0      | 86.0                 | 63.8     | 74.9  | ^ scattered.       | N. W.              | ..                |
| 3     | 29.521     | 88.5         | 89.0    | 64.5      | 88.6                 | 64.9     | 76.75 | Clear.             | W.                 | ..                |
| 4     | 29.493     | 94.0         | 93.4    | 63.0      | 93.5                 | 66.5     | 80.0  | Ditto.             | N. W.              | ..                |
| 5     | 29.451     | 94.0         | 94.2    | 64.4      | 94.0                 | 68.0     | 81.0  | Ditto.             | N. W.              | ..                |
| 6     | 29.437     | 95.5         | 95.8    | 66.5      | 95.5                 | 69.5     | 82.5  | Ditto.             | N. W.              | ..                |
| 7     | 29.399     | 94.5         | 94.9    | 68.9      | 95.0                 | 72.0     | 83.5  | Ditto.             | N. W.              | ..                |
| 8     | 29.355     | 94.8         | 94.9    | 70.5      | 94.5                 | 68.5     | 81.5  | Ditto.             | S. W.              | ..                |
| 9     | 29.323     | 95.0         | 95.9    | 69.5      | 96.0                 | 70.5     | 83.25 | Ditto.             | S. E.              | ..                |
| 10    | 29.293     | 99.0         | 98.6    | 68.5      | 99.5                 | 75.9     | 87.7  | Ditto.             | W.                 | ..                |
| 11    | 29.335     | 100.5        | 101.0   | 70.0      | 100.5                | 76.8     | 88.65 | Ditto.             | N. W.              | ..                |
| 12    | 29.335     | 101.0        | 101.0   | 66.5      | 100.5                | 75.0     | 87.75 | Ditto.             | N. W.              | ..                |
| 13    | 29.367     | 94.8         | 94.2    | 71.2      | 95.0                 | 70.5     | 82.75 | Ditto.             | E.                 | ..                |
| 14    | 29.425     | 93.7         | 93.5    | 71.5      | 93.5                 | 70.5     | 82.0  | Ditto.             | S. E.              | ..                |
| 15    | 29.425     | 90.0         | 90.4    | 71.6      | 90.2                 | 70.5     | 80.35 | Ditto.             | E.                 | ..                |
| 16    | 29.379     | 89.5         | 90.5    | 71.5      | 90.5                 | 72.0     | 81.25 | ^ scattered.       | S. E.              | ..                |
| 17    | 29.385     | 93.0         | 94.2    | 70.5      | 93.2                 | 71.5     | 82.35 | Clear.             | S. W.              | ..                |
| 18    | 29.321     | 96.8         | 96.6    | 68.9      | 97.0                 | 71.8     | 84.4  | Ditto.             | S. W.              | ..                |
| 19    | 29.251     | 93.4         | 93.0    | 67.0      | 93.5                 | 76.0     | 84.75 | Ditto.             | N. W.              | ..                |
| 20    | 29.239     | 89.9         | 89.5    | 62.5      | 89.8                 | 70.8     | 80.3  | Ditto.             | N. W.              | ..                |
| 21    | 29.267     | 95.5         | 95.5    | 62.5      | 95.5                 | 69.5     | 82.5  | Ditto.             | N. W.              | ..                |
| 22    | 29.347     | 91.2         | 91.3    | 63.9      | 91.5                 | 69.2     | 80.35 | ^ scattered.       | E.                 | ..                |
| 23    | 29.405     | 97.2         | 97.0    | 65.0      | 97.5                 | 74.5     | 86.0  | Clear.             | S. W.              | ..                |
| 24    | 29.197     | 93.4         | 93.4    | 66.5      | 94.0                 | 74.5     | 84.25 | Hazy.              | W.                 | ..                |
| 25    | 29.283     | 89.1         | 89.0    | 58.0      | 89.0                 | 69.0     | 79.0  | Clear.             | W.                 | ..                |
| 26    | 29.327     | 91.0         | 90.5    | 60.0      | 91.0                 | 65.5     | 78.25 | Ditto.             | N. W.              | ..                |
| 27    | 29.337     | 93.0         | 93.0    | 62.6      | 92.5                 | 66.0     | 79.25 | Ditto.             | W.                 | ..                |
| 28    | 29.321     | 94.9         | 94.9    | 65.5      | 95.0                 | 65.8     | 80.4  | Ditto.             | W.                 | ..                |
| 29    | 29.207     | 96.0         | 95.8    | 68.0      | 97.0                 | 69.5     | 83.25 | ^ scattered.       | W.                 | ..                |
| 30    | 29.321     | 92.0         | 92.2    | 67.1      | 92.5                 | 69.0     | 80.75 | Clear.             | W.                 | ..                |
| 31    | 29.413     | 95.0         | 95.     | 68.       | 95.5                 | 75.0     | 85.25 | Ditto.             | W.                 | ..                |
| Mean. | 29.363     | 93.5         | 93.5    | 66.4      | 93.6                 | 70.1     | 81.9  |                    |                    |                   |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of April, 1856.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.  |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|---------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                     |
| 1     | 29.335     | 89.0         | 91.0    | 66.0      | N. E.              | ..                | Clear.              |
| 2     | 29.497     | 88.0         | 89.4    | 65.5      | W.                 | ..                | Ditto.              |
| 3     | 29.393     | 88.1         | 90.0    | 66.0      | W.                 | ..                | ∩ few scattered.    |
| 4     | 29.455     | 85.5         | 85.0    | 66.4      | W.                 | ..                | ∩ all over.         |
| 5     | 29.491     | 87.8         | 88.0    | 64.0      | N. W.              | ..                | Clear.              |
| 6     | 29.363     | 94.5         | 95.7    | 71.0      | N.                 | ..                | Ditto.              |
| 7     | 29.335     | 94.3         | 95.0    | 69.5      | N.                 | ..                | Ditto.              |
| 8     | 29.253     | 95.2         | 96.2    | 70.0      | N. W.              | ..                | Ditto.              |
| 9     | 29.217     | 97.8         | 97.8    | 68.0      | S. W.              | ..                | Ditto.              |
| 10    | 29.343     | 90.2         | 90.8    | 64.0      | W.                 | ..                | Ditto.              |
| 11    | 29.405     | 88.0         | 90.0    | 63.0      | E.                 | ..                | Ditto.              |
| 12    | 29.377     | 89.0         | 91.0    | 60.8      | N.                 | ..                | Ditto.              |
| 13    | 29.385     | 88.8         | 90.5    | 60.5      | W.                 | ..                | Ditto.              |
| 14    | 29.305     | 88.5         | 89.5    | 61.6      | W.                 | ..                | Ditto.              |
| 15    | 29.285     | 87.5         | 89.4    | 62.0      | W.                 | ..                | ∩ scattered in zen. |
| 16    | 29.359     | 89.5         | 90.7    | 63.0      | W.                 | ..                | Clear.              |
| 17    | 29.399     | 95.8         | 97.2    | 67.8      | W.                 | ..                | Ditto.              |
| 18    | 29.373     | 100.0        | 100.5   | 70.8      | W.                 | ..                | Ditto.              |
| 19    | 29.361     | 97.8         | 99.2    | 69.0      | W.                 | ..                | Ditto.              |
| 20    | 29.401     | 96.5         | 97.8    | 70.8      | W.                 | ..                | Ditto.              |
| 21    | 29.279     | 96.          | 97.0    | 67.0      | W.                 | ..                | Ditto.              |
| 22    | 29.265     | 97.0         | 98.5    | 65.5      | N. W.              | ..                | Ditto.              |
| 23    | 29.307     | 97.0         | 98.4    | 66.5      | W.                 | ..                | Ditto.              |
| 24    | 29.309     | 97.8         | 99.5    | 69.5      | W.                 | ..                | ∩ scattered.        |
| 25    | 29.315     | 100.0        | 101.9   | 69.0      | N. E.              | ..                | Clear.              |
| 26    | 29.293     | 96.0         | 95.8    | 70.4      | E.                 | ..                | Ditto.              |
| 27    | 29.389     | 89.0         | 89.9    | 69.0      | E.                 | ..                | Ditto.              |
| 28    | 29.439     | 88.9         | 88.5    | 73.5      | N. E.              | ..                | Ditto.              |
| 29    | 29.409     | 92.5         | 92.8    | 75.5      | S. E.              | ..                | Hazy.               |
| 30    | 29.337     | 96.0         | 96.8    | 74.5      | S. E.              | ..                | Clear.              |
| Mean. | 29.359     | 92.7         | 93.8    | 67.3      |                    |                   |                     |

Barometer Observations corrected for Capillarity only.

Symbols. {  
 \ Cirrus.  
 ∩ Cirro strata.  
 > Cumuli.  
 > Cumulo strati.  
 ∩ Nimbi or Nimbus.

*Note.*—The dry bulb and maximum Register do not agree; the former always reads more than the latter. The average difference is 1.6.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of April, 1856.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.  |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|---------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                     |
| 1     | 29.517     | 92.4         | 93.0    | 67.1      | W.                 | ..                | Clear.              |
| 2     | 29.473     | 92.6         | 93.5    | 66.5      | W.                 | ..                | Scattered in zen.   |
| 3     | 29.371     | 93.9         | 94.8    | 66.9      | W.                 | ..                | ✓ scattered.        |
| 4     | 29.427     | 91.0         | 92.0    | 67.8      | N. W.              | ..                | Clear.              |
| 5     | 29.455     | 92.0         | 92.5    | 65.0      | N. W.              | ..                | Ditto.              |
| 6     | 29.305     | 99.0         | 99.5    | 71.5      | N. W.              | ..                | Ditto.              |
| 7     | 29.329     | 99.2         | 99.9    | 70.0      | N.                 | ..                | Ditto.              |
| 8     | 29.205     | 100.0        | 101.    | 71.6      | ..                 | ..                | Ditto.              |
| 9     | 29.209     | 101.0        | 101.5   | 69.2      | N. W.              | ..                | Ditto.              |
| 10    | 29.323     | 96.9         | 97.5    | 63.5      | W.                 | ..                | Ditto.              |
| 11    | 29.385     | 93.5         | 94.0    | 63.6      | N.                 | ..                | Ditto.              |
| 12    | 29.355     | 93.7         | 95.8    | 63.0      | N.                 | ..                | Ditto.              |
| 13    | 29.453     | 94.5         | 95.0    | 61.0      | W.                 | ..                | Ditto.              |
| 14    | 29.279     | 93.0         | 94.0    | 62.5      | W.                 | ..                | Ditto.              |
| 15    | 29.283     | 92.3         | 93.0    | 63.5      | S. W.              | ..                | ✓ scattered in zen. |
| 16    | 29.353     | 95.5         | 96.0    | 64.8      | W.                 | ..                | Clear.              |
| 17    | 29.377     | 99.8         | 101.0   | 69.0      | W.                 | ..                | Ditto.              |
| 18    | 29.345     | 104.0        | 105.0   | 70.0      | W.                 | ..                | Ditto.              |
| 19    | 29.331     | 103.0        | 103.5   | 69.9      | N. W.              | ..                | Ditto.              |
| 20    | 29.383     | 100.8        | 101.8   | 71.5      | W.                 | ..                | Ditto.              |
| 21    | 29.259     | 99.8         | 100.4   | 67.2      | W.                 | ..                | Ditto.              |
| 22    | 29.255     | 102.0        | 103.0   | 67.0      | N. W.              | ..                | Ditto.              |
| 23    | 29.291     | 102.0        | 103.5   | 67.6      | W.                 | ..                | Ditto.              |
| 24    | 29.297     | 102.8        | 103.4   | 70.0      | N. W.              | ..                | ✓ scattered.        |
| 25    | 29.285     | 103.5        | 106.0   | 70.       | N. E.              | ..                | Clear.              |
| 26    | 29.277     | 99.0         | 99.5    | 75.5      | E.                 | ..                | Ditto.              |
| 27    | 29.351     | 92.0         | 92.8    | 70.5      | E.                 | ..                | Ditto.              |
| 28    | 29.399     | 91.5         | 92.0    | 73.0      | E.                 | ..                | ^ scattered in zen. |
| 29    | 29.385     | 94.9         | 95.2    | 76.3      | S. E.              | ..                | Hazy.               |
| 30    | 29.305     | 98.9         | 98.9    | 76.4      | S. E.              | ..                | ~ scattered.        |
| Mean. | 29.338     | 97.1         | 97.9    | 68.3      |                    |                   |                     |



*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of April, 1856.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky. | Direction of Wind. | Quantity of Rain. |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------|--------------------|-------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                    |                    |                   |
| 1     | 29.439     | 96.9         | 96.9    | 68.9      | 96.9                 | 79.0     | 87.95 | Clear.             | W.                 | ..                |
| 2     | 29.453     | 98.9         | 98.9    | 69.4      | 98.5                 | 79.0     | 88.75 | Ditto. [over.      | W.                 | ..                |
| 3     | 29.283     | 98.9         | 98.4    | 69.0      | 99.0                 | 74.0     | 86.5  | ~ scattered all    | W.                 | ..                |
| 4     | 29.365     | 96.5         | 96.5    | 67.4      | 96.0                 | 79.5     | 87.75 | Clear.             | N. W.              | ..                |
| 5     | 29.365     | 96.8         | 96.8    | 67.5      | 96.5                 | 79.0     | 87.75 | Ditto.             | N. W.              | ..                |
| 6     | 29.217     | 102.5        | 102.5   | 73.1      | 102.0                | 76.0     | 94.0  | Ditto.             | N. W.              | ..                |
| 7     | 29.243     | 104.6        | 104.0   | 73.0      | 104.0                | 76.5     | 90.25 | Ditto.             | N. W.              | ..                |
| 8     | 29.125     | 106.9        | 106.6   | 70.0      | 106.5                | 76.0     | 91.25 | Ditto.             | N. W.              | ..                |
| 9     | 29.167     | 106.5        | 106.5   | 72.1      | 106.5                | 84.0     | 95.25 | Ditto.             | N. W.              | ..                |
| 10    | 29.267     | 100.9        | 100.1   | 65.0      | 100.5                | 78.5     | 89.5  | Ditto.             | W.                 | ..                |
| 11    | 29.311     | 99.5         | 99.5    | 64.0      | 99.8                 | 73.0     | 86.4  | Ditto.             | W.                 | ..                |
| 12    | 29.275     | 98.9         | 99.6    | 64.7      | 99.2                 | 70.8     | 85.0  | Ditto.             | N. W.              | ..                |
| 13    | 29.285     | 97.8         | 97.5    | 64.0      | 97.5                 | 71.0     | 84.25 | Ditto.             | W.                 | ..                |
| 14    | 29.205     | 98.5         | 98.5    | 64.6      | 98.0                 | 73.0     | 85.5  | Ditto.             | W.                 | ..                |
| 15    | 29.217     | 99.0         | 99.0    | 65.5      | 98.8                 | 72.0     | 85.4  | Ditto.             | W.                 | ..                |
| 16    | 29.295     | 101.5        | 102.4   | 67.0      | 102.2                | 72.0     | 87.1  | Ditto.             | W.                 | ..                |
| 17    | 29.187     | 105.0        | 105.5   | 72.3      | 105.0                | 79.0     | 92.0  | Ditto.             | N. W.              | ..                |
| 18    | 29.263     | 108.5        | 109.5   | 70.5      | 109.2                | 82.5     | 95.85 | Ditto.             | W.                 | ..                |
| 19    | 29.255     | 107.0        | 107.0   | 72.5      | 109.0                | 82.5     | 95.75 | Ditto.             | N. W.              | ..                |
| 20    | 29.223     | 110.6        | 110.5   | 73.0      | 110.0                | 81.0     | 95.5  | Ditto.             | W.                 | ..                |
| 21    | 29.185     | 105.0        | 105.2   | 69.5      | 105.0                | 80.8     | 92.9  | Ditto.             | W.                 | ..                |
| 22    | 29.179     | 106.8        | 106.8   | 69.0      | 106.5                | 81.8     | 94.2  | Ditto.             | N. W.              | ..                |
| 23    | 29.205     | 108.0        | 109.2   | 70.1      | 108.5                | 83.0     | 95.75 | Ditto.             | ..                 | ..                |
| 24    | 29.229     | 109.2        | 109.5   | 69.5      | 109.0                | 83.5     | 96.25 | Ditto.             | W.                 | ..                |
| 25    | 29.175     | 108.9        | 108.5   | 73.6      | 108.5                | 83.5     | 96.0  | Ditto.             | N. E.              | ..                |
| 26    | 29.205     | 104.5        | 104.2   | 75.5      | 104.0                | 84.0     | 94.0  | Ditto.             | E.                 | ..                |
| 27    | 29.285     | 95.8         | 94.9    | 71.6      | 95.5                 | 79.0     | 87.25 | Ditto.             | E.                 | ..                |
| 28    | 29.305     | 96.0         | 96.2    | 74.5      | 96.0                 | 78.0     | 87.0  | Ditto.             | E.                 | ..                |
| 29    | 29.295     | 100.5        | 100.5   | 80.0      | 100.0                | 83.0     | 91.5  | Ditto.             | S. E.              | ..                |
| 30    | 29.189     | 104.0        | 104.0   | 76.5      | 104.0                | 84.0     | 94.0  | ~ scattered.       | S. E.              | ..                |
| Mean. | 29.256     | 102.4        | 102.1   | 70.1      | 102.4                | 78.6     | 90.5  |                    |                    |                   |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of April, 1856.*

Latitude 22° 33' 1" North, Longitude 88° 20' 34" East.

Height of the cistern of the Standard Barometer above the Level of the Sea 18.11. feet.

Daily Means, &c. of the Observations, and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fah. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                        | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | 29.830                                         | 29.918                                    | 29.762  | 0.156   | 86.2                          | 97.0                                          | 78.3 | 18.7  |
| 2     | .789                                           | .880                                      | .715    | .165    | 86.7                          | 97.2                                          | 77.6 | 19.6  |
| 3     | .758                                           | .849                                      | .689    | .160    | 86.7                          | 97.4                                          | 78.8 | 18.6  |
| 4     | .759                                           | .833                                      | .681    | .152    | 85.8                          | 93.3                                          | 81.0 | 12.3  |
| 5     | .757                                           | .854                                      | .663    | .191    | 86.8                          | 97.0                                          | 78.8 | 18.2  |
| 6     | <i>Sunday.</i>                                 |                                           |         |         |                               |                                               |      |       |
| 7     | .667                                           | .747                                      | .581    | .166    | 85.4                          | 93.0                                          | 79.9 | 13.1  |
| 8     | .583                                           | .652                                      | .500    | .152    | 86.9                          | 97.2                                          | 79.8 | 17.4  |
| 9     | .621                                           | .702                                      | .550    | .152    | 86.1                          | 92.6                                          | 81.4 | 11.2  |
| 10    | .689                                           | .770                                      | .627    | .143    | 85.8                          | 93.0                                          | 80.4 | 12.6  |
| 11    | .745                                           | .823                                      | .690    | .133    | 86.0                          | 93.0                                          | 81.9 | 11.1  |
| 12    | .726                                           | .819                                      | .662    | .157    | 86.3                          | 93.9                                          | 81.8 | 12.1  |
| 13    | <i>Sunday.</i>                                 |                                           |         |         |                               |                                               |      |       |
| 14    | .668                                           | .762                                      | .592    | .170    | 87.4                          | 96.6                                          | 81.6 | 15.0  |
| 15    | .676                                           | .752                                      | .616    | .136    | 87.5                          | 98.0                                          | 80.3 | 17.7  |
| 16    | .749                                           | .836                                      | .667    | .169    | 85.3                          | 92.7                                          | 80.7 | 12.0  |
| 17    | .798                                           | .881                                      | .712    | .169    | 85.3                          | 93.6                                          | 79.3 | 14.3  |
| 18    | .752                                           | .816                                      | .658    | .158    | 85.9                          | 94.6                                          | 78.0 | 16.6  |
| 19    | .708                                           | .788                                      | .631    | .157    | 86.2                          | 96.4                                          | 78.0 | 18.4  |
| 20    | <i>Sunday.</i>                                 |                                           |         |         |                               |                                               |      |       |
| 21    | .602                                           | .684                                      | .531    | .153    | 86.4                          | 95.0                                          | 80.8 | 14.2  |
| 22    | .658                                           | .730                                      | .595    | .135    | 86.5                          | 95.4                                          | 79.6 | 15.8  |
| 23    | .692                                           | .752                                      | .624    | .128    | 86.4                          | 92.8                                          | 81.6 | 11.2  |
| 24    | .699                                           | .753                                      | .618    | .135    | 86.6                          | 92.4                                          | 81.2 | 11.2  |
| 25    | .757                                           | .828                                      | .686    | .142    | 86.5                          | 94.4                                          | 81.2 | 13.2  |
| 26    | .810                                           | .916                                      | .735    | .181    | 79.1                          | 89.0                                          | 73.0 | 16.0  |
| 27    | <i>Sunday.</i>                                 |                                           |         |         |                               |                                               |      |       |
| 28    | .817                                           | .896                                      | .735    | .161    | 83.5                          | 93.1                                          | 78.2 | 14.9  |
| 29    | .804                                           | .882                                      | .724    | .158    | 84.4                          | 94.2                                          | 77.8 | 16.4  |
| 30    | .760                                           | .842                                      | .655    | .187    | 85.6                          | 93.4                                          | 79.8 | 13.6  |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of April, 1856.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Va-<br>pour in a Cubic foot<br>of Air. | Additional weight of<br>vapour required for<br>complete saturation. | Mean degree of Hu-<br>midity, complete sa-<br>turation being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                                | T. gr.                                                              |                                                                     |
| 1     | 78.5                            | 7.7                 | 74.6                | 11.6                         | 0.843                            | 8.98                                                  | 4.01                                                                | 0.69                                                                |
| 2     | 76.3                            | 10.4                | 71.1                | 15.6                         | .753                             | .02                                                   | 5.16                                                                | .61                                                                 |
| 3     | 80.6                            | 6.1                 | 77.5                | 9.2                          | .925                             | 9.86                                                  | 3.32                                                                | .75                                                                 |
| 4     | 80.4                            | 5.4                 | 77.7                | 8.1                          | .931                             | .94                                                   | 2.89                                                                | .78                                                                 |
| 5     | 77.4                            | 9.4                 | 72.7                | 14.1                         | .792                             | 8.44                                                  | 4.77                                                                | .64                                                                 |
| 6     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                       |                                                                     |                                                                     |
| 7     | 80.6                            | 4.8                 | 78.2                | 7.2                          | .946                             | 10.11                                                 | 2.57                                                                | .80                                                                 |
| 8     | 81.5                            | 5.4                 | 78.8                | 8.1                          | .964                             | .27                                                   | .98                                                                 | .78                                                                 |
| 9     | 81.1                            | 5.0                 | 78.6                | 7.5                          | .958                             | .21                                                   | .74                                                                 | .79                                                                 |
| 10    | 80.2                            | 5.6                 | 77.4                | 8.4                          | .922                             | 9.85                                                  | .98                                                                 | .77                                                                 |
| 11    | 80.5                            | 5.5                 | 77.7                | 8.3                          | .931                             | .94                                                   | .97                                                                 | .77                                                                 |
| 12    | 80.8                            | 5.5                 | 78.0                | 8.3                          | .940                             | 10.03                                                 | .99                                                                 | .77                                                                 |
| 13    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                       |                                                                     |                                                                     |
| 14    | 76.7                            | 10.7                | 71.3                | 16.1                         | .758                             | 8.06                                                  | 5.39                                                                | .60                                                                 |
| 15    | 78.6                            | 8.9                 | 74.1                | 13.4                         | .830                             | .83                                                   | 4.66                                                                | .66                                                                 |
| 16    | 79.6                            | 5.7                 | 76.7                | 8.6                          | .902                             | 9.62                                                  | 3.02                                                                | .76                                                                 |
| 17    | 79.3                            | 6.0                 | 76.3                | 9.0                          | .890                             | .52                                                   | .12                                                                 | .75                                                                 |
| 18    | 79.8                            | 6.1                 | 76.7                | 9.2                          | .902                             | .62                                                   | .25                                                                 | .75                                                                 |
| 19    | 78.9                            | 7.3                 | 75.2                | 11.0                         | .860                             | .16                                                   | .83                                                                 | .71                                                                 |
| 20    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                       |                                                                     |                                                                     |
| 21    | 80.6                            | 5.8                 | 77.7                | 8.7                          | .931                             | .92                                                   | .14                                                                 | .76                                                                 |
| 22    | 80.6                            | 5.9                 | 77.6                | 8.9                          | .928                             | .89                                                   | .21                                                                 | .76                                                                 |
| 23    | 80.1                            | 6.3                 | 76.9                | 9.5                          | .908                             | .66                                                   | .40                                                                 | .74                                                                 |
| 24    | 80.2                            | 6.4                 | 77.0                | 9.6                          | .910                             | .69                                                   | .45                                                                 | .74                                                                 |
| 25    | 79.7                            | 6.8                 | 76.3                | 10.2                         | .890                             | .50                                                   | .60                                                                 | .73                                                                 |
| 26    | 75.4                            | 3.7                 | 73.5                | 5.6                          | .814                             | 8.79                                                  | 1.74                                                                | .84                                                                 |
| 27    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                       |                                                                     |                                                                     |
| 28    | 77.6                            | 5.9                 | 74.6                | 8.9                          | .843                             | 9.03                                                  | 2.97                                                                | .75                                                                 |
| 29    | 77.7                            | 6.7                 | 74.3                | 10.1                         | .835                             | 8.94                                                  | 3.37                                                                | .73                                                                 |
| 30    | 79.1                            | 6.5                 | 75.8                | 9.8                          | .876                             | 9.35                                                  | .41                                                                 | .73                                                                 |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of April, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Hour.      | Mean Height of the Barometer at 32° Faht. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | o                          | o                                                        | o    | o     |
| Mid-night. | 29.729                                    | 29.825                                                 | 29.605  | 0.220   | 82.3                       | 84.6                                                     | 79.8 | 4.8   |
| 1          | .720                                      | .840                                                   | .595    | .245    | 81.9                       | 86.0                                                     | 79.4 | 6.6   |
| 2          | .710                                      | .818                                                   | .580    | .238    | 81.4                       | 84.4                                                     | 78.9 | 5.5   |
| 3          | .699                                      | .815                                                   | .564    | .251    | 81.0                       | 83.1                                                     | 78.2 | 4.9   |
| 4          | .705                                      | .814                                                   | .559    | .255    | 80.5                       | 82.5                                                     | 78.0 | 4.5   |
| 5          | .719                                      | .836                                                   | .550    | .286    | 80.1                       | 82.5                                                     | 77.9 | 4.6   |
| 6          | .742                                      | .850                                                   | .580    | .270    | 80.1                       | 82.0                                                     | 77.6 | 4.4   |
| 7          | .761                                      | .875                                                   | .601    | .274    | 81.0                       | 83.0                                                     | 78.2 | 4.8   |
| 8          | .783                                      | .900                                                   | .628    | .272    | 83.6                       | 85.4                                                     | 81.7 | 3.7   |
| 9          | .799                                      | .913                                                   | .645    | .268    | 86.4                       | 88.6                                                     | 84.4 | 4.2   |
| 10         | .799                                      | .918                                                   | .642    | .276    | 88.7                       | 90.3                                                     | 85.6 | 4.7   |
| 11         | .787                                      | .902                                                   | .631    | .271    | 91.0                       | 93.7                                                     | 88.2 | 5.5   |
| Noon.      | .768                                      | .916                                                   | .600    | .316    | 92.0                       | 95.1                                                     | 73.2 | 21.9  |
| 1          | .737                                      | .909                                                   | .571    | .338    | 93.1                       | 96.8                                                     | 73.0 | 23.8  |
| 2          | .705                                      | .843                                                   | .533    | .310    | 93.6                       | 97.8                                                     | 73.4 | 24.4  |
| 3          | .681                                      | .838                                                   | .506    | .332    | 93.3                       | 98.0                                                     | 76.8 | 21.2  |
| 4          | .663                                      | .772                                                   | .505    | .267    | 92.3                       | 98.0                                                     | 76.2 | 21.8  |
| 5          | .655                                      | .762                                                   | .500    | .262    | 90.3                       | 96.2                                                     | 75.8 | 20.4  |
| 6          | .664                                      | .763                                                   | .517    | .246    | 88.0                       | 92.6                                                     | 75.2 | 17.4  |
| 7          | .684                                      | .792                                                   | .529    | .263    | 85.8                       | 88.6                                                     | 74.8 | 13.8  |
| 8          | .705                                      | .796                                                   | .554    | .242    | 84.3                       | 87.4                                                     | 74.8 | 12.6  |
| 9          | .726                                      | .813                                                   | .571    | .242    | 83.4                       | 85.0                                                     | 74.8 | 10.2  |
| 10         | .738                                      | .824                                                   | .607    | .217    | 82.8                       | 84.4                                                     | 74.2 | 10.2  |
| 11         | .740                                      | .821                                                   | .609    | .212    | 82.4                       | 83.8                                                     | 73.2 | 10.6  |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of April, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of Air. | Additional weight of va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity,<br>complete saturation be-<br>ing unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                   |
| Mid-<br>night. | 78.7                            | 3.6                 | 76.9                | 5.4                          | 0.908                            | 9.76                                             | 1.82                                                                    | 0.84                                                              |
| 1              | 78.3                            | 3.6                 | 76.5                | 5.4                          | .896                             | .65                                              | .79                                                                     | .84                                                               |
| 2              | 78.1                            | 3.3                 | 76.4                | 5.0                          | .893                             | .62                                              | .65                                                                     | .85                                                               |
| 3              | 77.8                            | 3.2                 | 76.2                | 4.8                          | .887                             | .56                                              | .58                                                                     | .86                                                               |
| 4              | 77.6                            | 2.9                 | 76.1                | 4.4                          | .885                             | .55                                              | .43                                                                     | .87                                                               |
| 5              | 77.4                            | 2.7                 | 76.0                | 4.1                          | .882                             | .52                                              | .32                                                                     | .88                                                               |
| 6              | 77.1                            | 3.0                 | 75.6                | 4.5                          | .871                             | .39                                              | .45                                                                     | .87                                                               |
| 7              | 77.8                            | 3.2                 | 76.2                | 4.8                          | .887                             | .56                                              | .58                                                                     | .86                                                               |
| 8              | 78.9                            | 4.7                 | 76.5                | 7.1                          | .896                             | .61                                              | 2.42                                                                    | .80                                                               |
| 9              | 79.6                            | 6.8                 | 76.2                | 10.2                         | .887                             | .47                                              | 3.59                                                                    | .73                                                               |
| 10             | 80.5                            | 8.2                 | 76.4                | 12.3                         | .893                             | .49                                              | 4.47                                                                    | .68                                                               |
| 11             | 80.9                            | 10.1                | 75.8                | 15.2                         | .876                             | .25                                              | 5.68                                                                    | .62                                                               |
| Noon.          | 80.9                            | 11.1                | 75.3                | 16.7                         | .862                             | .08                                              | 6.28                                                                    | .59                                                               |
| 1              | 81.1                            | 12.0                | 75.1                | 18.0                         | .857                             | .00                                              | .86                                                                     | .57                                                               |
| 2              | 81.3                            | 12.3                | 75.1                | 18.5                         | .857                             | 8.99                                             | 7.09                                                                    | .56                                                               |
| 3              | 81.2                            | 12.1                | 75.1                | 18.2                         | .857                             | 9.00                                             | 6.95                                                                    | .56                                                               |
| 4              | 81.0                            | 11.3                | 75.3                | 17.0                         | .862                             | .08                                              | .42                                                                     | .59                                                               |
| 5              | 80.6                            | 9.7                 | 75.7                | 14.6                         | .873                             | .22                                              | 5.41                                                                    | .63                                                               |
| 6              | 80.4                            | 7.6                 | 76.6                | 11.4                         | .899                             | .56                                              | 4.12                                                                    | .70                                                               |
| 7              | 79.5                            | 6.3                 | 76.3                | 9.5                          | .890                             | .50                                              | 3.33                                                                    | .74                                                               |
| 8              | 78.8                            | 5.5                 | 76.0                | 8.3                          | .882                             | .45                                              | 2.83                                                                    | .77                                                               |
| 9              | 78.5                            | 4.9                 | 76.0                | 7.4                          | .882                             | .47                                              | .49                                                                     | .79                                                               |
| 10             | 78.7                            | 4.1                 | 76.6                | 6.2                          | .899                             | .65                                              | .10                                                                     | .82                                                               |
| 11             | 78.5                            | 3.9                 | 76.5                | 5.9                          | .896                             | .63                                              | 1.98                                                                    | .83                                                               |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of April, 1856.*

Solar radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain.   | Prevailing direction of the Wind.                             | General Aspect of the Sky.                               |
|-------|-----------------------|---------|---------------------------------------------------------------|----------------------------------------------------------|
|       | o                     | Inches. |                                                               |                                                          |
| 1     | 137.0                 | ..      | S. or S. W.                                                   | Cloudless.                                               |
| 2     | 148.4                 | ..      | S. or W.                                                      | Ditto.                                                   |
| 3     | 147.0                 | ..      | S. or S. W.                                                   | Ditto.                                                   |
| 4     | 137.0                 | ..      | S. (high 7 to 9 P. M.)                                        | Cloudless till 8 A. M. cloudy afterwards.                |
| 5     | 136.0                 | ..      | S. or S. W.                                                   | Cloudless.                                               |
| 6     | <i>Sunday.</i>        |         |                                                               |                                                          |
| 7     | 125.0                 | ..      | S. E. or S.                                                   | [clouds till 8 P. M. cloudless afterwards.               |
| 8     | 143.0                 | ..      | S.                                                            | Cloudless till 7 A. M. scattered thin                    |
| 9     | 131.0                 | ..      | S. (high at 6 P. M.)                                          | Cloudless.                                               |
| 10    | 137.0                 | ..      | S.                                                            | Cloudy till 7 P. M. cloudless afterwards.                |
| 11    | 132.0                 | ..      | S. (constantly high.)                                         | Cloudless till 4 A. M. scattered $\sim$ till 3           |
| 12    | 143.0                 | ..      | S. (constantly high.)                                         | Cloudy. [P. M. cloudy afterwards.                        |
|       |                       |         |                                                               | Cloudy till Noon, cloudless afterwards.                  |
| 13    | <i>Sunday.</i>        |         |                                                               | [scattered $\sim$ afterwards.                            |
| 14    | 133.0                 | ..      | S. E. or S.                                                   | Cloudy till 10 A. M., cloudless till 3 P. M.             |
| 15    | 145.7                 | ..      | S. or W.                                                      | Scattered $\sim$ & $\sim$ till 9 A. M. cloudless         |
| 16    | 133.2                 | ..      | S.                                                            | Scattered $\sim$ . [afterwards.                          |
| 17    | 146.0                 | ..      | S. E. or S.                                                   | Scattered $\sim$ till 2 A. M. cloudless till 7           |
|       |                       |         |                                                               | A. M. various clouds till 11 A. M. cloudless afterwards. |
| 18    | 130.0                 | ..      | S. (high at 10 A. M.)                                         | Cloudless.                                               |
| 19    | 132.4                 | ..      | S.                                                            | Ditto.                                                   |
| 20    | <i>Sunday.</i>        |         |                                                               |                                                          |
| 21    | 131.0                 | ..      | S.                                                            | Scattered clouds till 11 A. M. cloudless                 |
| 22    | 142.0                 | ..      | S. [to 11 P. M.)                                              | Occasionally cloudy. [afterwards.                        |
| 23    | 129.0                 | ..      | S. (high after 8 A. M.)                                       | Cloudy.                                                  |
| 24    | 128.6                 | ..      | S. or S. E. (high throughout the day.)                        | Cloudy, also lightning 7 to 9 P. M.                      |
| 25    | 131.4                 | ..      | S. E. (high) or S.                                            | Cloudy.                                                  |
| 26    | ..                    | 0.42    | S. E. or S. or E. also a N. Wester between 11 A. M. & 1 P. M. | [P. M. Cloudy with rain between 11 A. M. to 1            |
| 27    | <i>Sunday.</i>        |         |                                                               | [3 P. M.                                                 |
| 28    | 126.2                 | 0.20    | S. E. or S.                                                   | Clouds of various kinds and raining at                   |
| 29    | 147.0                 | ..      | S. E. or S. W. or S.                                          | Cloudless till 5 A. M. clouds of vari-                   |
|       |                       |         |                                                               | ous kinds afterwards.                                    |
| 30    | 134.8                 | ..      | S.                                                            | Clouds of various kinds.                                 |

$\sim$  i Cirri,  $\sim$  i cirro strati,  $\sim$  i cumuli,  $\sim$  i cumulo strati,  $\sim$  i Nimbi, — i strati,  $\sim$  i cirro cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of April, 1856.*

## MONTHLY RESULTS.

|                                                                |    |      | Inches. |
|----------------------------------------------------------------|----|------|---------|
| Mean height of the Barometer for the month,                    | .. | .... | 29.726  |
| Max. height of the Barometer, occurred at 10 A. M. on the 1st, |    | .... | 29.918  |
| Min. height of the Barometer, occurred at 5 P. M. on the 8th,  |    | .... | 29.500  |
| Extreme range of the Barometer, during the month,              | .. | .... | 0.418   |

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|                                                     |    |      | °    |
|-----------------------------------------------------|----|------|------|
| Mean Dry Bulb Thermometer for the month,            | .. | .... | 85.8 |
| Max. Temperature, occurred at 3 P. M. on the 15th,  | .. | .... | 98.0 |
| Min. Temperature, occurred at 1 P. M. on the 26th,  | .. | .... | 73.0 |
| Extreme range of the Temperature, during the month, | .. | .... | 25.0 |

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|                                                             |    |      |      |
|-------------------------------------------------------------|----|------|------|
| Mean Wet Bulb Thermometer for the month,                    | .. | .... | 79.3 |
| Mean Dry Bulb Thermometer, above Mean Wet Bulb Thermometer, |    | .... | 6.5  |
| Computed Mean Dew Point for the month,                      | .. | .... | 76.0 |
| Mean Dry Bulb Thermometer, above computed Mean Dew Point,   | .. |      | 9.8  |

|                                             |    |      | Inches. |
|---------------------------------------------|----|------|---------|
| Mean elastic force of vapour for the month, | .. | .... | 0.882   |

|                                                                         |    |      | Troy grains. |
|-------------------------------------------------------------------------|----|------|--------------|
| Mean weight of vapour for the month,                                    | .. | ..   | 9.41         |
| Additional weight of vapour, required for complete saturation.          |    | .... | 3.42         |
| Mean degree of Humidity for the month, complete saturation being unity, |    |      | 0.73         |

|                                                  |    |      | Inches. |
|--------------------------------------------------|----|------|---------|
| ained 2 days. Max. fall of Rain during 24 hours, | .. | .... | 0.42    |
| Total amount of rain during the month,           | .. | .... | 0.62    |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1856.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.  
Height of the Cistern of the Standard Barometer above the level of the Sea, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahrt. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|--------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                  | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                          | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | 29.750                                           | 29.815                                    | 29.670  | 0.145   | 85.5                          | 93.9                                          | 74.8 | 19.1  |
| 2     | .715                                             | .783                                      | .657    | .126    | 83.9                          | 92.2                                          | 77.6 | 14.6  |
| 3     | .690                                             | .754                                      | .622    | .132    | 82.1                          | 92.2                                          | 75.6 | 16.6  |
| 4     | <i>Sunday.</i>                                   |                                           |         |         |                               |                                               |      |       |
| 5     | .705                                             | .795                                      | .635    | .160    | 87.2                          | 95.4                                          | 81.4 | 14.0  |
| 6     | .731                                             | .785                                      | .649    | .136    | 84.4                          | 91.8                                          | 75.4 | 16.4  |
| 7     | .704                                             | .784                                      | .621    | .163    | 86.9                          | 93.9                                          | 82.3 | 11.6  |
| 8     | .649                                             | .708                                      | .539    | .169    | 86.7                          | 94.8                                          | 79.5 | 15.3  |
| 9     | .642                                             | .709                                      | .550    | .159    | 85.9                          | 94.8                                          | 78.4 | 16.4  |
| 10    | .647                                             | .704                                      | .576    | .128    | 88.2                          | 95.1                                          | 83.3 | 11.8  |
| 11    | <i>Sunday.</i>                                   |                                           |         |         |                               |                                               |      |       |
| 12    | .586                                             | .645                                      | .498    | .147    | 89.1                          | 97.0                                          | 84.1 | 12.9  |
| 13    | .585                                             | .636                                      | .529    | .107    | 89.1                          | 96.8                                          | 84.0 | 12.8  |
| 14    | .606                                             | .716                                      | .529    | .187    | 87.5                          | 96.8                                          | 75.5 | 21.3  |
| 15    | .635                                             | .703                                      | .576    | .127    | 82.8                          | 92.4                                          | 77.0 | 15.4  |
| 16    | .721                                             | .789                                      | .637    | .152    | 83.0                          | 90.5                                          | 76.0 | 14.5  |
| 17    | .746                                             | .811                                      | .694    | .117    | 85.3                          | 94.0                                          | 77.0 | 17.0  |
| 18    | <i>Sunday.</i>                                   |                                           |         |         |                               |                                               |      |       |
| 19    | .771                                             | .868                                      | .686    | .182    | 86.7                          | 94.5                                          | 80.2 | 14.3  |
| 20    | .740                                             | .818                                      | .685    | .133    | 87.2                          | 95.2                                          | 80.9 | 14.3  |
| 21    | .761                                             | .827                                      | .672    | .155    | 87.5                          | 94.3                                          | 81.4 | 12.9  |
| 22    | .738                                             | .795                                      | .666    | .129    | 86.3                          | 94.2                                          | 80.2 | 14.0  |
| 23    | .700                                             | .798                                      | .622    | .176    | 83.9                          | 90.0                                          | 78.4 | 11.6  |
| 24    | .715                                             | .769                                      | .661    | .108    | 81.4                          | 90.3                                          | 77.4 | 12.9  |
| 25    | <i>Sunday.</i>                                   |                                           |         |         |                               |                                               |      |       |
| 26    | .595                                             | .642                                      | .518    | .124    | 79.7                          | 83.4                                          | 77.4 | 6.0   |
| 27    | .574                                             | .641                                      | .511    | .130    | 82.4                          | 89.0                                          | 76.0 | 13.0  |
| 28    | .536                                             | .608                                      | .445    | .163    | 86.7                          | 94.2                                          | 80.5 | 13.7  |
| 29    | .458                                             | .518                                      | .384    | .134    | 83.8                          | 87.8                                          | 80.4 | 7.4   |
| 30    | .421                                             | .463                                      | .358    | .105    | 80.2                          | 81.4                                          | 78.6 | 2.8   |
| 31    | .430                                             | .517                                      | .381    | .136    | 80.7                          | 84.0                                          | 78.5 | 5.5   |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1856.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Date. | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of Air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity<br>complete saturation be-<br>ing unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------|
|       | °                               | °                   | °                   | °                            | Inches.                          | T. gr                                            | T. gr.                                                                  |                                                                  |
| 1     | 78.5                            | 7.0                 | 75.0                | 10.5                         | .0854                            | 9.11                                             | 3.61                                                                    | 0.72                                                             |
| 2     | 78.3                            | 5.6                 | 75.5                | 8.4                          | .868                             | .31                                              | 2.82                                                                    | .77                                                              |
| 3     | 77.5                            | 4.6                 | 75.2                | 6.9                          | .860                             | .24                                              | .27                                                                     | .80                                                              |
| 4     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                  |
| 5     | 81.6                            | 5.6                 | 78.8                | 8.4                          | .964                             | 10.27                                            | 3.10                                                                    | .77                                                              |
| 6     | 79.2                            | 5.2                 | 76.6                | 7.8                          | .899                             | 9.61                                             | 2.70                                                                    | .78                                                              |
| 7     | 81.3                            | 5.6                 | 78.5                | 8.4                          | .955                             | 10.18                                            | 3.07                                                                    | .77                                                              |
| 8     | 80.6                            | 6.1                 | 77.5                | 9.2                          | .925                             | 9.86                                             | .32                                                                     | .75                                                              |
| 9     | 79.5                            | 6.4                 | 76.3                | 9.6                          | .890                             | .50                                              | .37                                                                     | .74                                                              |
| 10    | 82.3                            | 5.9                 | 79.3                | 8.9                          | .979                             | 10.40                                            | .36                                                                     | .76                                                              |
| 11    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                  |
| 12    | 82.5                            | 6.6                 | 79.2                | 9.9                          | .976                             | .35                                              | .77                                                                     | .73                                                              |
| 13    | 82.7                            | 6.4                 | 79.5                | 9.6                          | .986                             | .45                                              | .67                                                                     | .74                                                              |
| 14    | 81.2                            | 6.3                 | 78.0                | 9.5                          | .940                             | 9.99                                             | .50                                                                     | .74                                                              |
| 15    | 77.3                            | 5.5                 | 74.5                | 8.3                          | .840                             | .03                                              | 2.72                                                                    | .77                                                              |
| 16    | 78.0                            | 5.0                 | 75.5                | 7.5                          | .868                             | .31                                              | .51                                                                     | .79                                                              |
| 17    | 79.2                            | 6.1                 | 76.1                | 9.2                          | .885                             | .46                                              | 3.18                                                                    | .75                                                              |
| 18    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                  |
| 19    | 80.0                            | 6.7                 | 76.6                | 10.1                         | .899                             | .57                                              | .61                                                                     | .73                                                              |
| 20    | 80.2                            | 7.0                 | 76.7                | 10.5                         | .902                             | .58                                              | .79                                                                     | .72                                                              |
| 21    | 80.2                            | 7.3                 | 76.5                | 11.0                         | .896                             | .54                                              | .95                                                                     | .71                                                              |
| 22    | 79.6                            | 6.7                 | 76.2                | 10.1                         | .887                             | .47                                              | .55                                                                     | .73                                                              |
| 23    | 77.6                            | 6.3                 | 74.4                | 9.5                          | .838                             | 8.97                                             | .16                                                                     | .74                                                              |
| 24    | 78.4                            | 3.0                 | 76.9                | 4.5                          | .908                             | 9.76                                             | 1.51                                                                    | .87                                                              |
| 25    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                  |
| 26    | 77.7                            | 2.0                 | 76.7                | 3.0                          | .902                             | .74                                              | 0.98                                                                    | .91                                                              |
| 27    | 78.5                            | 3.9                 | 76.5                | 5.9                          | .896                             | .63                                              | 1.98                                                                    | .83                                                              |
| 28    | 80.8                            | 5.9                 | 77.8                | 8.9                          | .934                             | .95                                              | 3.23                                                                    | .76                                                              |
| 29    | 79.9                            | 3.9                 | 77.9                | 5.9                          | .937                             | 10.04                                            | 2.06                                                                    | .83                                                              |
| 30    | 78.4                            | 1.8                 | 77.5                | 2.7                          | .925                             | 9.98                                             | 0.90                                                                    | .92                                                              |
| 31    | 78.9                            | 1.8                 | 78.0                | 2.7                          | .940                             | 10.13                                            | .91                                                                     | .92                                                              |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.      | Mean Height of the Barometer at 32° Faht. | Range of the Barometer for each hour during the day. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the day. |      |       |
|------------|-------------------------------------------|------------------------------------------------------|---------|---------|----------------------------|--------------------------------------------------------|------|-------|
|            |                                           | Max.                                                 | Min.    | Diff.   |                            | Max.                                                   | Min. | Diff. |
|            | Inches.                                   | Inches.                                              | Inches. | Inches. | o                          | o                                                      | o    | o     |
| Mid-night. | } 29.662                                  | 29.794                                               | 29.411  | 0.383   | 81.9                       | 85.7                                                   | 77.4 | 8.3   |
| 1          | .648                                      | .776                                                 | .411    | .365    | 81.5                       | 85.4                                                   | 76.8 | 8.6   |
| 2          | .636                                      | .770                                                 | .398    | .372    | 81.1                       | 84.8                                                   | 75.5 | 9.3   |
| 3          | .627                                      | .749                                                 | .388    | .361    | 80.8                       | 84.5                                                   | 75.4 | 9.1   |
| 4          | .636                                      | .753                                                 | .381    | .372    | 80.7                       | 84.5                                                   | 76.0 | 8.5   |
| 5          | .637                                      | .758                                                 | .385    | .373    | 80.4                       | 84.9                                                   | 76.0 | 8.9   |
| 6          | .663                                      | .787                                                 | .404    | .383    | 80.5                       | 84.6                                                   | 76.0 | 8.6   |
| 7          | .684                                      | .824                                                 | .407    | .417    | 81.9                       | 85.8                                                   | 77.3 | 8.5   |
| 8          | .700                                      | .868                                                 | .436    | .432    | 84.1                       | 88.0                                                   | 79.4 | 8.6   |
| 9          | .708                                      | .866                                                 | .455    | .411    | 86.5                       | 89.8                                                   | 79.8 | 10.0  |
| 10         | .708                                      | .862                                                 | .462    | .400    | 88.3                       | 92.0                                                   | 79.6 | 12.4  |
| 11         | .694                                      | .851                                                 | .458    | .393    | 89.7                       | 93.9                                                   | 79.6 | 14.3  |
| Noon.      | .676                                      | .823                                                 | .444    | .379    | 90.6                       | 96.4                                                   | 79.8 | 16.6  |
| 1          | .654                                      | .801                                                 | .428    | .373    | 91.1                       | 96.6                                                   | 79.8 | 16.8  |
| 2          | .627                                      | .775                                                 | .397    | .378    | 91.3                       | 97.0                                                   | 79.9 | 17.1  |
| 3          | .608                                      | .736                                                 | .386    | .350    | 90.7                       | 96.7                                                   | 78.6 | 18.1  |
| 4          | .587                                      | .706                                                 | .379    | .327    | 89.7                       | 95.5                                                   | 75.6 | 19.9  |
| 5          | .584                                      | .698                                                 | .358    | .340    | 88.4                       | 93.6                                                   | 76.3 | 17.3  |
| 6          | .596                                      | .729                                                 | .369    | .360    | 86.6                       | 92.6                                                   | 75.8 | 16.8  |
| 7          | .619                                      | .765                                                 | .372    | .393    | 84.4                       | 90.2                                                   | 76.2 | 14.0  |
| 8          | .650                                      | .790                                                 | .395    | .395    | 82.9                       | 88.4                                                   | 75.5 | 12.9  |
| 9          | .664                                      | .827                                                 | .415    | .412    | 82.4                       | 86.8                                                   | 77.6 | 9.2   |
| 10         | .665                                      | .809                                                 | .434    | .375    | 81.7                       | 86.4                                                   | 74.8 | 11.6  |
| 11         | .666                                      | .811                                                 | .430    | .381    | 81.5                       | 86.0                                                   | 75.0 | 11.0  |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of Air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity,<br>complete saturation be-<br>ing unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                   |
| Mid-<br>night. | { 78.6                          | 3.3                 | 76.9                | 5.0                          | 0.908                            | 9.76                                             | 1.68                                                                    | 0.85                                                              |
| 1              | 78.4                            | 3.1                 | 76.8                | 4.7                          | .905                             | .73                                              | .58                                                                     | .86                                                               |
| 2              | 78.2                            | 2.9                 | 76.7                | 4.4                          | .902                             | .72                                              | .45                                                                     | .87                                                               |
| 3              | 78.1                            | 2.7                 | 76.7                | 4.1                          | .902                             | .72                                              | .35                                                                     | .88                                                               |
| 4              | 78.0                            | 2.7                 | 76.6                | 4.1                          | .899                             | .69                                              | .35                                                                     | .88                                                               |
| 5              | 77.9                            | 2.5                 | 76.6                | 3.8                          | .899                             | .69                                              | .25                                                                     | .89                                                               |
| 6              | 78.3                            | 2.2                 | 77.2                | 3.3                          | .916                             | .89                                              | .09                                                                     | .90                                                               |
| 7              | 79.1                            | 2.8                 | 77.7                | 4.2                          | .931                             | 10.02                                            | .42                                                                     | .88                                                               |
| 8              | 79.9                            | 4.2                 | 77.8                | 6.3                          | .934                             | .01                                              | 2.20                                                                    | .82                                                               |
| 9              | 80.6                            | 5.9                 | 77.6                | 8.9                          | .928                             | 9.89                                             | 3.21                                                                    | .76                                                               |
| 10             | 81.2                            | 7.1                 | 77.6                | 10.7                         | .928                             | .85                                              | .95                                                                     | .71                                                               |
| 11             | 81.5                            | 8.2                 | 77.4                | 12.3                         | .922                             | .77                                              | 4.60                                                                    | .68                                                               |
| Noon.          | 82.0                            | 8.6                 | 77.7                | 12.9                         | .931                             | .84                                              | .92                                                                     | .67                                                               |
| 1              | 82.0                            | 9.1                 | 77.4                | 13.7                         | .922                             | .73                                              | 5.24                                                                    | .65                                                               |
| 2              | 82.1                            | 9.2                 | 77.5                | 13.8                         | .925                             | .76                                              | .30                                                                     | .65                                                               |
| 3              | 81.6                            | 9.1                 | 77.0                | 13.7                         | .910                             | .61                                              | .19                                                                     | .65                                                               |
| 4              | 80.8                            | 8.9                 | 76.3                | 13.4                         | .890                             | .44                                              | 4.93                                                                    | .66                                                               |
| 5              | 80.6                            | 7.8                 | 76.7                | 11.7                         | .902                             | .56                                              | .28                                                                     | .69                                                               |
| 6              | 80.0                            | 6.6                 | 76.7                | 9.9                          | .902                             | .60                                              | 3.54                                                                    | .73                                                               |
| 7              | 78.9                            | 5.5                 | 76.1                | 8.3                          | .885                             | .48                                              | 2.83                                                                    | .77                                                               |
| 8              | 78.2                            | 4.7                 | 75.8                | 7.1                          | .876                             | .41                                              | .38                                                                     | .80                                                               |
| 9              | 78.3                            | 4.1                 | 76.2                | 6.2                          | .887                             | .54                                              | .07                                                                     | .82                                                               |
| 10             | 78.2                            | 3.5                 | 76.4                | 5.3                          | .893                             | .62                                              | 1.75                                                                    | .85                                                               |
| 11             | 78.2                            | 3.3                 | 76.5                | 5.0                          | .896                             | .65                                              | .66                                                                     | .85                                                               |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1856.*

Solar radiation, Weather, &c. (Continued.)

| Date. | Max. Solar radiation. | Rain.   | Prevailing direction of the Wind.                           | General Aspect of the Sky.                                                                                                                                      |
|-------|-----------------------|---------|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | o                     | Inches. |                                                             |                                                                                                                                                                 |
| 1     | 133.0                 | 1.09    | S. E. or S.                                                 | Ni & Ni & Ci; also rain at 10 & 11 P. M.                                                                                                                        |
| 2     | 129.0                 | ..      | S. E. or S.                                                 | Cloudy till 7 P. M., cloudless afterwards.                                                                                                                      |
| 3     | 123.0                 | 0.72    | S. E. or S. (high)                                          | Cloudy with much rain between Noon & [Sunset.                                                                                                                   |
| 4     | <i>Sunday.</i>        |         | [from 10 A. M. to 1 P. M.)                                  |                                                                                                                                                                 |
| 5     | 139.0                 | ..      | S. (occasionally high)                                      | Cloudless till 6 A. M., cloudy till 5 P. M.                                                                                                                     |
| 6     | 135.0                 | 0.68    | S. W. or S.                                                 | Cloudy. [cloudless afterwards.                                                                                                                                  |
| 7     | 128.9                 | ..      | S. W. (high) or S.                                          | Cloudy till 2 P. M., cloudless afterwards.                                                                                                                      |
| 8     | 126.0                 | ..      | S.                                                          | Cloudless till 5 P. M., cloudy afterwards                                                                                                                       |
| 9     | 133.0                 | ..      | S. E. or S. (both high)<br>also a squall from W. at 8 P. M. | [also slightly drizzling at 9 P. M.<br>Cloudless till 6 A. M., scattered Ci till 1 P. M., cloudless till 5 P. M., cloudy with thunder and lightning afterwards. |
| 10    | 128.7                 | ..      | S. E. or S. (both high)                                     | Cloudy.                                                                                                                                                         |
| 11    | <i>Sunday.</i>        |         |                                                             |                                                                                                                                                                 |
| 12    | 135.0                 | ..      | S. or S. E.                                                 | Cloudy. [wards.                                                                                                                                                 |
| 13    | 132.0                 | ..      | S. or S. E.                                                 | Cloudless till 6 A. M., scattered Ci after-                                                                                                                     |
| 14    | 128.0                 | 1.96    | S. E. or N. E.                                              | Cloudy, also a very violent gale accom-<br>panied by much rain & lightning & an<br>incessant fall of hail stones between 7<br>& 8 P. M.                         |
| 15    | ..                    | ..      | S. E.                                                       | Cloudy, also a slight drizzling with much<br>[lightning and thundering at 5 P. M.                                                                               |
| 16    | 116.8                 | ..      | S. E. or S.                                                 | Cloudy.                                                                                                                                                         |
| 17    | 132.7                 | ..      | S. E. or E. (high)                                          | Clouds of various kinds.                                                                                                                                        |
| 18    | <i>Sunday.</i>        |         |                                                             |                                                                                                                                                                 |
| 19    | 133.0                 | ..      | Calm or S. E.                                               | Scattered Ci.                                                                                                                                                   |
| 20    | 130.0                 | ..      | S. or S. E. or S.                                           | Scattered clouds.                                                                                                                                               |
| 21    | 125.0                 | } 0.13  | S. E. or S. (high)                                          | Scattered clouds; also drizzling with some<br>[thunder & lightning after 8 P. M. [set.                                                                          |
| 22    | 131.8                 |         | S. or S. E.                                                 | Cloudy with occasional drizzling after sun-                                                                                                                     |
| 23    | 125.0                 |         | N. W. or S. or S. E.                                        | Cloudy till 7 P. M.; cloudless afterwards.                                                                                                                      |
| 24    | ..                    | 0.76    | S. E.                                                       | Cloudy the whole day; also some rain in<br>[the afternoon & during the night.                                                                                   |
| 25    | <i>Sunday.</i>        | 0.36    |                                                             |                                                                                                                                                                 |
| 26    | ..                    | 0.20    | S. E. or N. E.                                              | Cloudy with some rain in the afternoon.                                                                                                                         |
| 27    | 122.0                 | ..      | N. E.                                                       | Cloudy. [ & Ci afterwards.                                                                                                                                      |
| 28    | 133.0                 | ..      | S. E. or N. E. or S. W.                                     | Cloudless till 5 A. M. scattered Ni & Ni                                                                                                                        |
| 29    | 118.0                 | 0.16    | N. W. or S. or S. E.                                        | Scattered clouds, also little rain between<br>[1 & 2 P. M.                                                                                                      |
| 30    | ..                    | 0.86    | S. E. or N. E.                                              | Cloudy with constantly drizzling.                                                                                                                               |
| 31    | ..                    | 1.26    | E.                                                          | Cloudy and constantly raining.                                                                                                                                  |

Ni Cirri, Ni Cirro-strati, Ci Cumuli, Ni Cumulo-strati, Ni Nimbi, —i Strati,  
Ni Cirro-cumuli.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
for the month of May, 1856.*

## MONTHLY RESULTS.

|                                                                |    |    | Inches. |
|----------------------------------------------------------------|----|----|---------|
| Mean height of the Barometer, for the month,                   | .. | .. | 29.650  |
| Max. height of the Barometer, occurred at 8 A. M. on the 19th, | .. | .. | 29.868  |
| Min. height of the Barometer, occurred at 5 P. M. on the 30th, | .. | .. | 29.358  |
| Extreme Range of the Barometer, during the month,              | .. | .. | 0.510   |

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|                                                     |    |    | °    |
|-----------------------------------------------------|----|----|------|
| Mean dry bulb Thermometer for the month,            | .. | .. | 85.0 |
| Max. Temperature occurred at 2 P. M. on the 12th,   | .. | .. | 97.0 |
| Min. Temperature, occurred at 10 P. M. on the 1st,  | .. | .. | 74.8 |
| Extreme Range of the Temperature, during the month, | .. | .. | 22.2 |

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|                                                             |    |    |      |
|-------------------------------------------------------------|----|----|------|
| Mean wet bulb Thermometer for the month,                    | .. | .. | 79.6 |
| Mean dry bulb Thermometer, above Mean wet bulb Thermometer, | .. | .. | 5.4  |
| Computed Mean dew point for the month,                      | .. | .. | 76.9 |
| Mean dry bulb Thermometer above computed Mean Dew point,    | .. | .. | 8.1  |

|                                             |    |    | Inches. |
|---------------------------------------------|----|----|---------|
| Mean elastic force of vapour for the month, | .. | .. | 0.908   |

|                                                                         |    |    | Troy grains. |
|-------------------------------------------------------------------------|----|----|--------------|
| Mean weight of vapour for the month,                                    | .. | .. | 9.70         |
| Additional weight of vapour required for complete saturation,           | .. | .. | 2.83         |
| Mean degree of humidity for the month, complete saturation being unity. | .. | .. | 0.77         |

|                                                    |    |    | Inches. |
|----------------------------------------------------|----|----|---------|
| Rained 12 days. Max. fall of rain during 24 hours, | .. | .. | 1.96    |
| Total amount of Rain during the month,             | .. | .. | 8.18    |

A very violent N. E. gale accompanied by much thundering, lightning and rain and an incessant fall of hail stones occurred between 7 & 8 P. M. on the 14th. The observations taken after 10 minutes intervals during the gale, are forthcoming at the Surveyor General's Office.

Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of May, 1856.

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.     |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                        |
| 1     | 29.325     | 99.0         | 99.4    | 75.8      | S. W.              | ..                | Clear.                 |
| 2     | 29.235     | 101.9        | 102.5   | 76.2      | S. E.              | ..                | Ditto.                 |
| 3     | 29.205     | 94.0         | 94.8    | 79.0      | W. E.              | ..                | Ditto.                 |
| 4     | 29.235     | 91.0         | 91.5    | 75.0      | W.                 | ..                | Ditto.                 |
| 5     | 29.295     | 93.0         | 93.4    | 76.5      | S. E.              | ..                | Ditto.                 |
| 6     | 29.29      | 99.5         | 99.8    | 75.0      | S. W.              | ..                | Ditto.                 |
| 7     | 29.263     | 100.5        | 101.3   | 72.2      | W.                 | ..                | Ditto.                 |
| 8     | 29.229     | 100.0        | 100.6   | 71.5      | W.                 | ..                | ~ scattered in zenith. |
| 9     | 29.183     | 101.9        | 102.5   | 72.0      | W.                 | ..                | Clear.                 |
| 10    | 29.273     | 100.9        | 102.0   | 73.6      | N.                 | ..                | Ditto.                 |
| 11    | 29.249     | 100.4        | 101.0   | 72.3      | W.                 | ..                | Ditto.                 |
| 12    | 29.225     | 101.0        | 101.2   | 72.0      | W.                 | ..                | Ditto.                 |
| 13    | 29.225     | 99.8         | 100.5   | 72.0      | N. W.              | ..                | Ditto.                 |
| 14    | 29.221     | 99.8         | 100.0   | 71.5      | W.                 | ..                | Ditto.                 |
| 15    | 29.215     | 98.2         | 98.5    | 73.0      | W.                 | ..                | Ditto.                 |
| 16    | 29.231     | 97.6         | 97.9    | 76.0      | E.                 | ..                | Ditto.                 |
| 17    | 29.271     | 91.0         | 91.9    | 75.0      | E.                 | ..                | Ditto.                 |
| 18    | 29.355     | 95.4         | 96.0    | 73.8      | S. E.              | ..                | Ditto.                 |
| 19    | 29.331     | 98.5         | 98.5    | 75.0      | S. E.              | ..                | Ditto.                 |
| 20    | 29.255     | 103.9        | 104.5   | 74.0      | W.                 | ..                | Ditto.                 |
| 21    | 29.283     | 101.5        | 101.9   | 74.8      | N. E.              | ..                | Ditto.                 |
| 22    | 29.275     | 102.5        | 101.5   | 81.0      | E.                 | ..                | Ditto.                 |
| 23    | 29.201     | 94.5         | 95.0    | 77.0      | E.                 | ..                | Ditto.                 |
| 24    | 29.275     | 88.5         | 89.0    | 76.5      | E.                 | ..                | ~ scattered            |
| 25    | 29.181     | 97.0         | 97.6    | 76.2      | S. E.              | ..                | Clear.                 |
| 26    | 29.129     | 98.8         | 99.0    | 78.5      | W.                 | ..                | Ditto.                 |
| 27    | 29.149     | 98.9         | 99.0    | 79.0      | E.                 | ..                | Ditto.                 |
| 28    | 29.183     | 100.5        | 100.8   | 78.8      | S. W.              | ..                | Ditto.                 |
| 29    | 29.103     | 98.0         | 98.2    | 78.5      | N. E.              | ..                | Ditto.                 |
| 30    | 29.085     | 97.0         | 97.5    | 80.0      | S. E.              | ..                | Ditto.                 |
| 31    | 29.165     | 89.0         | 89.0    | 74.9      | N. E.              | 1.62              | ~ scattered.           |
| Mean. | 29.227     | 97.8         | 98.2    | 75.3      |                    | 1.62              |                        |

Barometer Observations corrected for Capillarity only.

Symbols. { \ Cirrus.  
 { / Cirro strata.  
 { > Cumuli.  
 { ^ Cumulo strata.  
 { ~ Nimbi or Nimbus.

Note.—The dry bulb and maximum Register do not agree; the former always reads more than the latter. The average difference is 1.6.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of May, 1856.*

## Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky. |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|--------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                    |
| 1     | 29.285     | 102.0        | 102.5   | 74.5      | S. W.              | ..                | Clear.             |
| 2     | 29.205     | 104.0        | 105.0   | 77.0      | W.                 | ..                | Ditto.             |
| 3     | 29.181     | 99.9         | 101.4   | 80.5      | E.                 | ..                | Ditto.             |
| 4     | 29.205     | 95.0         | 95.6    | 76.0      | N.                 | ..                | Ditto.             |
| 5     | 29.277     | 96.9         | 97.8    | 78.4      | S. W.              | ..                | Ditto.             |
| 6     | 29.279     | 102.8        | 103.5   | 76.0      | S. W.              | ..                | Ditto.             |
| 7     | 29.241     | 105.2        | 105.5   | 72.5      | W.                 | ..                | Ditto.             |
| 8     | 29.215     | 108.8        | 104.0   | 72.5      | W.                 | ..                | ~ scattered.       |
| 9     | 29.171     | 106.8        | 107.0   | 74.0      | W.                 | ..                | Clear.             |
| 10    | 29.259     | 104.5        | 105.5   | 75.0      | N.                 | ..                | Ditto.             |
| 11    | 29.229     | 104.5        | 104.8   | 73.0      | W.                 | ..                | Ditto.             |
| 12    | 29.199     | 104.3        | 103.5   | 72.5      | W.                 | ..                | Ditto.             |
| 13    | 29.215     | 102.5        | 104.5   | 73.0      | N. W.              | ..                | Ditto.             |
| 14    | 29.197     | 102.0        | 102.2   | 74.3      | W.                 | ..                | Ditto.             |
| 15    | 29.189     | 101.0        | 101.9   | 74.0      | W.                 | ..                | Ditto.             |
| 16    | 29.209     | 101.0        | 101.9   | 75.0      | S. W.              | ..                | Ditto.             |
| 17    | 29.255     | 96.0         | 97.2    | 76.4      | E.                 | ..                | Ditto.             |
| 18    | 29.329     | 99.9         | 100.5   | 75.4      | S. E.              | ..                | Ditto.             |
| 19    | 29.305     | 101.0        | 101.2   | 75.5      | N. E.              | ..                | Ditto.             |
| 20    | 29.245     | 108.8        | 108.5   | 72.5      | W.                 | ..                | Ditto.             |
| 21    | 29.267     | 105.0        | 106.0   | 76.0      | N. E.              | ..                | Ditto.             |
| 22    | 29.255     | 107.0        | 107.5   | 77.0      | N. E.              | ..                | Ditto.             |
| 23    | 29.193     | 98.2         | 99.5    | 78.4      | E.                 | ..                | Hazy.              |
| 24    | 29.261     | 93.0         | 93.5    | 77.0      | E.                 | ..                | ~ scattered.       |
| 25    | 29.161     | 100.9        | 100.5   | 77.0      | S.                 | ..                | Clear.             |
| 26    | 29.095     | 102.5        | 102.5   | 77.5      | W.                 | ..                | Ditto.             |
| 27    | 29.129     | 102.0        | 102.5   | 78.0      | N.                 | ..                | Ditto.             |
| 28    | 29.153     | 103.8        | 104.3   | 80.0      | N. W.              | ..                | Ditto.             |
| 29    | 29.075     | 101.0        | 101.5   | 79.4      | W.                 | ..                | Ditto.             |
| 30    | 29.075     | 101.5        | 102.0   | 80.3      | N. E.              | ..                | Ditto.             |
| 31    | 29.139     | 93.5         | 94.0    | 76.3      | N. E.              | ..                | Hazy.              |
| Mean. | 29.209     | 101.6        | 102.2   | 75.9      |                    |                   |                    |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of May, 1856.*

Minimum pressure observed at 4 p. m.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky. | Direction of Wind. | Quantity of Rain. | Total Rain. |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------|--------------------|-------------------|-------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                    |                    |                   |             |
| 1     | 29.189     | 106.5        | 106.2   | 77.0      | 106.3                | 85.5     | 95.9  | Clear.             | N. W.              | ..                | ..          |
| 2     | 29.111     | 110.0        | 111.0   | 76.5      | 111.2                | 89.0     | 100.1 | Ditto.             | N. W.              | ..                | ..          |
| 3     | 29.115     | 107.5        | 107.0   | 82.5      | 107.2                | 87.0     | 97.1  | Ditto.             | W.                 | ..                | ..          |
| 4     | 29.165     | 103.6        | 103.5   | 77.9      | 111.0                | 87.5     | 99.25 | Ditto.             | N. W.              | ..                | ..          |
| 5     | 29.205     | 103.0        | 103.5   | 78.7      | 103.5                | 81.0     | 92.25 | Ditto.             | S. W.              | ..                | ..          |
| 6     | 29.199     | 107.0        | 107.0   | 75.4      | 107.0                | 87.0     | 97.0  | Ditto.             | W.                 | ..                | ..          |
| 7     | 29.167     | 109.9        | 108.5   | 71.8      | 109.8                | 89.5     | 99.65 | ^ scattered.       | W.                 | ..                | ..          |
| 8     | 29.139     | 108.9        | 108.0   | 72.2      | 110.0                | 90.5     | 100.2 | ^ scattered.       | N. W.              | ..                | ..          |
| 9     | 29.105     | 111.2        | 111.0   | 74.2      | 111.0                | 89.0     | 100.0 | Clear.             | W.                 | ..                | ..          |
| 10    | 29.183     | 106.8        | 106.5   | 74.5      | 109.0                | 87.5     | 98.25 | ^ scattered to     | N. W.              | ..                | ..          |
| 11    | 29.173     | 107.5        | 107.0   | 75.5      | 107.5                | 88.0     | 97.75 | Clear. [N. E.      | W.                 | ..                | ..          |
| 12    | 29.139     | 107.5        | 107.5   | 72.0      | 107.5                | 87.5     | 97.5  | ^ scattered.       | W.                 | ..                | ..          |
| 13    | 29.135     | 107.2        | 106.5   | 73.5      | 106.5                | 87.0     | 96.75 | ^ ditto.           | W.                 | ..                | ..          |
| 14    | 29.129     | 106.0        | 106.0   | 76.0      | 106.0                | 87.8     | 96.9  | Clear.             | W.                 | ..                | ..          |
| 15    | 29.119     | 106.4        | 106.4   | 74.2      | 106.4                | 91.0     | 98.7  | Ditto.             | N. W.              | ..                | ..          |
| 16    | 29.135     | 107.8        | 108.0   | 72.9      | 107.9                | 84.5     | 96.2  | ^ scattered.       | N. W.              | ..                | ..          |
| 17    | 29.193     | 103.0        | 103.5   | 76.0      | 106.6                | 85.0     | 95.8  | Clear.             | E.                 | ..                | ..          |
| 18    | 29.239     | 106.5        | 106.2   | 75.8      | 106.5                | 86.0     | 96.25 | Ditto.             | N. W.              | ..                | ..          |
| 19    | 29.205     | 107.0        | 107.0   | 78.5      | 107.0                | 85.8     | 96.4  | Ditto.             | N. W.              | ..                | ..          |
| 20    | 29.189     | 112.5        | 112.4   | 75.0      | 112.0                | 89.0     | 100.5 | Ditto.             | W.                 | ..                | ..          |
| 21    | 29.205     | 110.5        | 110.5   | 78.2      | 110.5                | 89.0     | 99.75 | Ditto.             | N. E.              | ..                | ..          |
| 22    | 29.193     | 111.2        | 111.0   | 76.9      | 111.0                | 92.8     | 101.9 | Ditto.             | N. W.              | ..                | ..          |
| 23    | 29.119     | 100.0        | 100.0   | 77.0      | 100.5                | 84.5     | 92.5  | Hazy.              | E.                 | ..                | ..          |
| 24    | 29.157     | 98.0         | 98.0    | 76.5      | 98.0                 | 79.8     | 88.9  | Clear.             | E.                 | ..                | ..          |
| 25    | 29.033     | 104.9        | 106.0   | 79.0      | 105.5                | 83.9     | 94.7  | Ditto.             | N. W.              | ..                | ..          |
| 26    | 29.013     | 106.8        | 106.8   | 79.0      | 107.0                | 90.8     | 98.9  | Ditto.             | N. W.              | ..                | ..          |
| 27    | 29.071     | 105.8        | 105.4   | 81.9      | 105.5                | 85.5     | 95.5  | Ditto.             | N.                 | ..                | ..          |
| 28    | 29.091     | 98.0         | 98.0    | 74.0      | 110.0                | 90.0     | 100.0 | Stormy.            | W.                 | ..                | ..          |
| 29    | 29.967     | 106.2        | 105.0   | 82.4      | 106.0                | 87.0     | 96.5  | Hazy.              | W.                 | ..                | ..          |
| 30    | 29.979     | 103.8        | 103.0   | 80.5      | 104.2                | 91.2     | 97.7  | Clear.             | E.                 | ..                | ..          |
| 31    | 29.049     | 99.9         | 99.4    | 80.5      | 100.0                | 69.8     | 84.9  | ^ scattered.       | N. E.              | ..                | ..          |
| Mean. | 29.132     | 106.1        | 105.9   | 76.6      | 107.0                | 86.7     | 96.89 |                    |                    |                   |             |



*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of June, 1856.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.     |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                        |
| 1     | 29.147     | 90.5         | 91.4    | 74.8      | E.                 | ..                | ☁ scattered.           |
| 2     | 29.077     | 80.8         | 78.4    | 74.0      | N. E.              | ..                | ☁ all over.            |
| 3     | 29.245     | 81.5         | 82.0    | 77.0      | S. E.              | ..                | ☁ scattered.           |
| 4     | 29.265     | 85.9         | 86.0    | 80.2      | N. E.              | ..                | ☁ scattered in zenith. |
| 5     | 29.247     | 88.0         | 88.0    | 80.0      | S. E.              | ..                | Clear.                 |
| 6     | 29.231     | 90.5         | 90.6    | 81.2      | S. E.              | ..                | Ditto.                 |
| 7     | 29.147     | 92.0         | 92.7    | 81.6      | E.                 | ..                | ☁ scattered towards E. |
| 8     | 29.155     | 93.8         | 93.5    | 80.0      | E.                 | ..                | ☁ scattered.           |
| 9     | 29.133     | 90.9         | 91.0    | 80.5      | E.                 | ..                | ☁ ditto all over.      |
| 10    | 29.095     | 92.5         | 93.0    | 81.5      | S. E.              | ..                | ☁ ditto.               |
| 11    | 29.087     | 83.2         | 82.5    | 80.4      | N. W.              | 1.37              | ☁ all over.            |
| 12    | 29.063     | 85.3         | 85.9    | 82.0      | N. E.              | ..                | ☁ ditto.               |
| 13    | 28.991     | 86.0         | 86.4    | 82.4      | S.                 | ..                | ☁ scattered.           |
| 14    | 29.005     | 90.9         | 91.0    | 78.5      | N. W.              | ..                | ☁ ditto.               |
| 15    | 29.061     | 93.0         | 93.8    | 81.0      | N. W.              | ..                | ☁ ditto.               |
| 16    | 29.037     | 91.5         | 92.0    | 81.5      | S. W.              | ..                | ☁ ditto.               |
| 17    | 29.035     | 90.8         | 91.5    | 80.9      | W.                 | ..                | Clear.                 |
| 18    | 29.059     | 95.0         | 95.5    | 80.5      | N. W.              | ..                | ☁ scattered.           |
| 19    | 29.133     | 88.9         | 88.8    | 77.0      | N. E.              | ..                | Clear.                 |
| 20    | 29.149     | 91.5         | 92.0    | 79.5      | N. W.              | ..                | ☁ scattered in zenith. |
| 21    | 29.145     | 94.8         | 95.0    | 81.4      | N. W.              | ..                | Clear.                 |
| 22    | 29.155     | 98.5         | 98.9    | 79.0      | N. W.              | ..                | Ditto.                 |
| 23    | 29.105     | 98.0         | 98.5    | 78.2      | N. W.              | ..                | Ditto.                 |
| 24    | 29.055     | 96.8         | 97.0    | 77.8      | N. W.              | ..                | Ditto.                 |
| 25    | 29.085     | 95.9         | 96.2    | 77.5      | N. W.              | ..                | Ditto.                 |
| 26    | 29.127     | 98.8         | 99.4    | 80.5      | N. W.              | ..                | ☁ scattered.           |
| 27    | 29.127     | 98.1         | 98.5    | 79.1      | N. W.              | ..                | Clear.                 |
| 28    | 29.173     | 92.5         | 92.0    | 81.4      | N.                 | ..                | Ditto.                 |
| 29    | 29.141     | 98.5         | 99.0    | 81.2      | N. E.              | ..                | ☁ scattered in zenith. |
| 30    | 29.073     | 101.0        | 101.5   | 81.6      | S. W.              | ..                | Clear.                 |
| Mean. | 29.118     | 91.8         | 92.0    | 79.7      |                    | 1.37              |                        |

Barometer Observations corrected for Capillarity only.

Symbols. { ☁ Cirrus.  
☁ Cirro strata.  
☁ Cumuli.  
☁ Cumulo strata.  
☁ Nimbi or Nimbus.

*Note.*—The dry bulb and maximum Register do not agree; the former always reads more than the latter. The average difference is 1.6.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of June, 1856.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.     |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                        |
| 1     | 29.123     | 94.0         | 95.2    | 75.2      | E.                 | ..                | ☁ scattered.           |
| 2     | 29.069     | 77.8         | 72.5    | 72.5      | N. E.              | ..                | Raining.               |
| 3     | 29.221     | 84.9         | 85.8    | 79.3      | S. E.              | ..                | ☁ scattered.           |
| 4     | 29.239     | 89.0         | 90.1    | 80.5      | E.                 | ..                | ☁ ditto in zen.        |
| 5     | 29.239     | 90.1         | 91.4    | 79.9      | E.                 | ..                | ☁ scattered in zenith. |
| 6     | 29.197     | 92.9         | 94.2    | 81.0      | S. E.              | ..                | Clear.                 |
| 7     | 29.131     | 95.5         | 96.0    | 82.4      | S. E.              | ..                | ☁ scattered all over.  |
| 8     | 29.137     | 95.5         | 96.0    | 81.0      | E.                 | ..                | ☁ scattered.           |
| 9     | 29.119     | 93.6         | 94.2    | 80.5      | S. E.              | ..                | ☁ ditto all over.      |
| 10    | 29.069     | 94.6         | 95.0    | 81.5      | E.                 | ..                | ☁ ditto.               |
| 11    | 29.055     | 86.0         | 87.0    | 83.5      | N. W.              | ..                | ☁ scattered.           |
| 12    | 29.033     | 87.0         | 86.4    | 82.5      | N. W.              | ..                | ☁ all over.            |
| 13    | 29.973     | 88.4         | 88.8    | 83.0      | S. W.              | ..                | ☁ scattered.           |
| 14    | 28.993     | 92.4         | 92.4    | 80.0      | N. W.              | ..                | ☁ ditto.               |
| 15    | 29.047     | 96.0         | 96.8    | 81.9      | N. W.              | ..                | ☁ ditto.               |
| 16    | 29.031     | 92.0         | 91.0    | 82.6      | S. W.              | ..                | ☁ all over.            |
| 17    | 29.023     | 93.8         | 94.0    | 82.0      | W.                 | ..                | ☁ scattered in zenith. |
| 18    | 29.055     | 96.8         | 97.0    | 82.5      | N. W.              | ..                | ☁ all over.            |
| 19    | 29.127     | 91.5         | 92.4    | 80.0      | E.                 | ..                | Clear.                 |
| 20    | 29.143     | 94.5         | 95.0    | 79.0      | W.                 | ..                | Ditto.                 |
| 21    | 29.145     | 97.9         | 98.5    | 78.5      | N. W.              | ..                | Ditto.                 |
| 22    | 29.141     | 100.7        | 100.9   | 79.5      | N. W.              | ..                | Ditto.                 |
| 23    | 29.083     | 100.5        | 106.8   | 78.9      | N. W.              | ..                | Ditto.                 |
| 24    | 29.045     | 98.9         | 99.4    | 78.2      | N. W.              | ..                | Ditto.                 |
| 25    | 29.085     | 99.5         | 100.0   | 79.4      | W.                 | ..                | Ditto.                 |
| 26    | 29.109     | 100.0        | 100.2   | 80.0      | N.                 | ..                | Ditto.                 |
| 27    | 29.117     | 100.4        | 100.4   | 80.4      | N. W.              | ..                | ☁ scattered to W. hor. |
| 28    | 29.149     | 94.2         | 94.5    | 81.0      | N.                 | ..                | ☁ scattered in zenith. |
| 29    | 29.119     | 101.8        | 102.0   | 81.0      | N. E.              | ..                | ☁ ditto.               |
| 30    | 29.061     | 103.8        | 104.9   | 80.3      | N. W.              | ..                | ☁ scattered.           |
| Mean. | 29.102     | 94.1         | 94.6    | 80.2      |                    |                   |                        |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of June, 1856.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky.        | Direction of Wind. | Quantity of Rain. |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|---------------------------|--------------------|-------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                           |                    |                   |
| 1     | 29.065     | 91.8         | 89.8    | 76.6      | 95.2                 | 69.5     | 82.35 | [over.<br>\ scattered all | S. E.              | ..                |
| 2     | 29.005     | 77.5         | 77.0    | 73.0      | 77.0                 | 75.8     | 76.4  | \ all over.               | N. E.              | 2.22              |
| 3     | 29.157     | 89.5         | 89.5    | 80.4      | 90.0                 | 71.5     | 80.75 | \ scattered.              | E.                 | ..                |
| 4     | 29.137     | 94.2         | 95.0    | 80.5      | 94.5                 | 77.5     | 86.0  | Clear.                    | N. E.              | ..                |
| 5     | 29.143     | 94.5         | 94.5    | 79.9      | 94.5                 | 79.0     | 86.75 | Ditto.                    | E.                 | ..                |
| 6     | 29.099     | 97.9         | 98.2    | 80.0      | 98.0                 | 81.8     | 89.9  | Ditto. [over.             | E.                 | ..                |
| 7     | 29.055     | 99.7         | 99.5    | 81.8      | 99.8                 | 86.0     | 92.9  | \ scattered all           | S. E.              | ..                |
| 8     | 29.051     | 98.5         | 98.5    | 81.2      | 98.5                 | 85.0     | 91.75 | \ scattered.              | E.                 | ..                |
| 9     | 29.017     | 97.0         | 96.5    | 80.2      | 97.0                 | 84.0     | 90.5  | \ ditto.                  | E.                 | ..                |
| 10    | 29.005     | 91.2         | 87.9    | 80.2      | 97.8                 | 84.8     | 91.3  | \ ditto.                  | N. E.              | ..                |
| 11    | 29.033     | 83.8         | 83.4    | 80.9      | 89.0                 | 79.0     | 84.0  | \ raining.                | N.                 | ..                |
| 12    | 28.959     | 83.9         | 83.9    | 79.8      | 89.5                 | 79.0     | 84.25 | \ scattered.              | S.                 | ..                |
| 13    | 28.917     | 86.0         | 81.0    | 79.0      | 91.2                 | 79.0     | 85.1  | \ twds. N.E.              | S. W.              | 0.24              |
| 14    | 28.935     | 96.9         | 96.4    | 81.0      | 96.8                 | 79.5     | 88.15 | \ scattered.              | N. W.              | ..                |
| 15    | 28.979     | 85.8         | 86.0    | 81.5      | 97.0                 | 83.8     | 90.4  | \ all over.               | N. W.              | 0.12              |
| 16    | 28.959     | 95.9         | 95.6    | 82.0      | 95.5                 | 81.5     | 88.5  | Clear. [W.                | W.                 | ..                |
| 17    | 28.961     | 98.4         | 98.9    | 81.0      | 98.0                 | 80.0     | 89.0  | \ scatd. twds.            | W.                 | ..                |
| 18    | 29.005     | 89.0         | 83.2    | 78.2      | 97.0                 | 80.3     | 88.65 | \ scattered.              | N. E.              | 0.62              |
| 19    | 29.099     | 84.0         | 84.5    | 79.2      | 93.0                 | 82.0     | 87.5  | \ all over                | S. W.              | 0.07              |
| 20    | 29.077     | 101.0        | 101.0   | 79.8      | 100.5                | 81.3     | 90.9  | Clear.                    | N. W.              | ..                |
| 21    | 29.043     | 102.5        | 103.0   | 79.5      | 103.0                | 81.5     | 92.25 | Ditto.                    | N. W.              | ..                |
| 22    | 29.067     | 104.8        | 105.0   | 82.0      | 105.0                | 89.0     | 97.0  | Ditto.                    | N. W.              | ..                |
| 23    | 29.021     | 106.8        | 106.5   | 80.5      | 106.8                | 89.0     | 97.9  | Ditto.                    | N. W.              | ..                |
| 24    | 28.983     | 103.9        | 103.0   | 81.0      | 103.8                | 89.0     | 96.4  | Ditto.                    | W.                 | ..                |
| 25    | 29.031     | 103.5        | 103.0   | 79.0      | 103.5                | 89.0     | 96.25 | Ditto.                    | W.                 | ..                |
| 26    | 29.021     | 104.0        | 104.4   | 82.0      | 105.0                | 88.0     | 96.5  | \ scattered.              | W.                 | ..                |
| 27    | 29.031     | 105.5        | 105.0   | 80.5      | 106.0                | 88.2     | 97.1  | \ all over.               | N. W.              | ..                |
| 28    | 29.065     | 99.9         | 99.5    | 82.0      | 99.5                 | 81.0     | 90.25 | Clear. [zen.              | N.                 | ..                |
| 29    | 29.025     | 104.8        | 104.1   | 81.0      | 105.0                | 95.0     | 100.0 | \ scattered in            | N.                 | ..                |
| 30    | 28.987     | 109.0        | 109.0   | 82.2      | 109.0                | 83.0     | 96.0  | \ ditto.                  | N. W.              | ..                |
| Mean. | 29.031     | 96.1         | 95.4    | 80.2      | 97.8                 | 82.4     | 90.15 |                           |                    | 3.27              |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1856.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Height of the Cistern of the Standard Barometer above the level of the Sea, 18.11 Feet.

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 2     | 29.623                                          | 29.704                                    | 29.577  | 0.127   | 81.5                          | 86.2                                          | 77.2 | 9.0   |
| 3     | .682                                            | .733                                      | .624    | .109    | 83.1                          | 87.6                                          | 79.2 | 8.4   |
| 4     | .673                                            | .745                                      | .584    | .161    | 83.1                          | 88.2                                          | 79.8 | 8.4   |
| 5     | .643                                            | .688                                      | .571    | .117    | 82.8                          | 86.4                                          | 80.0 | 6.4   |
| 6     | .606                                            | .658                                      | .526    | .132    | 83.3                          | 89.0                                          | 79.8 | 9.2   |
| 7     | .537                                            | .598                                      | .469    | .129    | 82.6                          | 86.4                                          | 79.7 | 6.7   |
| 8     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 9     | .592                                            | .650                                      | .511    | .139    | 84.0                          | 91.6                                          | 80.0 | 11.6  |
| 10    | .590                                            | .630                                      | .518    | .112    | 83.2                          | 88.4                                          | 80.2 | 8.2   |
| 11    | .601                                            | .649                                      | .538    | .111    | 83.2                          | 86.2                                          | 80.9 | 5.3   |
| 12    | .526                                            | .599                                      | .421    | .178    | 83.8                          | 89.8                                          | 80.4 | 9.4   |
| 13    | .417                                            | .467                                      | .359    | .108    | 84.9                          | 90.2                                          | 81.2 | 9.0   |
| 14    | .401                                            | .476                                      | .352    | .124    | 83.7                          | 87.7                                          | 80.0 | 7.7   |
| 15    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 16    | .450                                            | .502                                      | .406    | .096    | 81.5                          | 84.4                                          | 79.8 | 4.6   |
| 17    | .447                                            | .487                                      | .381    | .106    | 82.7                          | 89.8                                          | 79.0 | 10.8  |
| 18    | .497                                            | .571                                      | .443    | .123    | 83.6                          | 89.0                                          | 79.2 | 9.8   |
| 19    | .548                                            | .593                                      | .500    | .093    | 81.9                          | 86.6                                          | 76.4 | 10.2  |
| 20    | .552                                            | .610                                      | .491    | .119    | 83.6                          | 88.1                                          | 75.8 | 12.3  |
| 21    | .589                                            | .631                                      | .547    | .084    | 85.1                          | 91.7                                          | 79.7 | 12.0  |
| 22    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 23    | .516                                            | .571                                      | .442    | .129    | 86.2                          | 91.7                                          | 81.8 | 9.9   |
| 24    | .471                                            | .515                                      | .430    | .085    | 82.7                          | 88.4                                          | 80.4 | 8.0   |
| 25    | .507                                            | .553                                      | .461    | .092    | 82.3                          | 83.8                                          | 81.0 | 2.8   |
| 26    | .513                                            | .565                                      | .462    | .103    | 79.9                          | 81.8                                          | 77.8 | 4.0   |
| 27    | .540                                            | .590                                      | .490    | .100    | 83.0                          | 89.6                                          | 78.0 | 11.6  |
| 28    | .574                                            | .623                                      | .523    | .100    | 85.5                          | 91.0                                          | 81.4 | 9.6   |
| 29    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 30    | .527                                            | .587                                      | .464    | .123    | 85.5                          | 91.8                                          | 82.2 | 9.6   |



*Meteorological Observations.*

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1856.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Date. | Mean Wet Bulb Thermometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew Point. | Mean Elastic force of Vapour. | Mean Weight of Vapour in a cubic foot of air. | Additional weight of Vapour required for complete saturation. | Mean degree of Humidity, complete saturation being unity. |
|-------|----------------------------|---------------------|---------------------|---------------------------|-------------------------------|-----------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------|
|       | o                          | o                   | o                   | o                         | Inches.                       | T. gr.                                        | T. gr.                                                        |                                                           |
| 1     | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 2     | 78.7                       | 2.8                 | 77.3                | 4.2                       | 0.919                         | 9.90                                          | 1.41                                                          | 0.88                                                      |
| 3     | 79.4                       | 3.7                 | 77.5                | 5.6                       | .925                          | .92                                           | .94                                                           | .84                                                       |
| 4     | 79.4                       | 3.7                 | 77.5                | 5.6                       | .925                          | .92                                           | .94                                                           | .84                                                       |
| 5     | 79.8                       | 3.0                 | 78.3                | 4.5                       | .949                          | 10.18                                         | .57                                                           | .87                                                       |
| 6     | 80.0                       | 3.3                 | 78.3                | 5.0                       | .949                          | .18                                           | .75                                                           | .85                                                       |
| 7     | 79.7                       | 2.9                 | 78.2                | 4.4                       | .946                          | .17                                           | .51                                                           | .87                                                       |
| 8     | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 9     | 80.2                       | 3.8                 | 78.3                | 5.7                       | .949                          | .16                                           | 2.01                                                          | .84                                                       |
| 10    | 80.1                       | 3.1                 | 78.5                | 4.7                       | .955                          | .25                                           | 1.64                                                          | .86                                                       |
| 11    | 80.3                       | 2.9                 | 78.8                | 4.4                       | .964                          | .36                                           | .53                                                           | .87                                                       |
| 12    | 80.7                       | 3.1                 | 79.1                | 4.7                       | .973                          | .42                                           | .68                                                           | .86                                                       |
| 13    | 82.0                       | 2.9                 | 80.5                | 4.4                       | 1.017                         | .89                                           | .60                                                           | .87                                                       |
| 14    | 81.3                       | 2.4                 | 80.1                | 3.6                       | .005                          | .75                                           | .32                                                           | .89                                                       |
| 15    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 16    | 79.4                       | 2.1                 | 78.3                | 3.2                       | 0.949                         | .22                                           | .09                                                           | .90                                                       |
| 17    | 79.4                       | 3.3                 | 77.7                | 5.0                       | .931                          | .00                                           | .72                                                           | .85                                                       |
| 18    | 80.2                       | 3.4                 | 78.5                | 5.1                       | .955                          | .25                                           | .78                                                           | .85                                                       |
| 19    | 79.7                       | 2.2                 | 78.6                | 3.3                       | .958                          | .32                                           | .12                                                           | .90                                                       |
| 20    | 80.3                       | 3.3                 | 78.6                | 5.0                       | .958                          | .28                                           | .75                                                           | .86                                                       |
| 21    | 81.0                       | 4.1                 | 78.9                | 6.2                       | .967                          | .34                                           | 2.23                                                          | .82                                                       |
| 22    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 23    | 81.7                       | 4.5                 | 79.4                | 6.8                       | .983                          | .47                                           | .52                                                           | .81                                                       |
| 24    | 80.1                       | 2.6                 | 78.8                | 3.9                       | .964                          | .36                                           | .36                                                           | .88                                                       |
| 25    | 79.9                       | 2.4                 | 78.7                | 3.6                       | .961                          | .33                                           | 1.25                                                          | .89                                                       |
| 26    | 78.3                       | 1.6                 | 77.5                | 2.4                       | .925                          | .00                                           | 0.78                                                          | .93                                                       |
| 27    | 79.1                       | 3.9                 | 77.1                | 5.9                       | .913                          | 9.80                                          | 2.02                                                          | .83                                                       |
| 28    | 81.3                       | 4.2                 | 79.2                | 6.3                       | .976                          | 10.43                                         | .29                                                           | .82                                                       |
| 29    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 30    | 81.9                       | 3.6                 | 80.1                | 5.4                       | 1.005                         | .73                                           | 1.99                                                          | .84                                                       |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Fah. | Range of the Barometer<br>for each hour during<br>the month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Temperature<br>for each hour during<br>the month. |      |       |
|----------------|------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|----------------------------------------------------------------|------|-------|
|                |                                                | Max.                                                         | Min.    | Diff.   |                               | Max.                                                           | Min. | Diff. |
|                | Inches.                                        | Inches.                                                      | Inches. | Inches. | o                             | o                                                              | o    | o     |
| Mid-<br>night. | 29.561                                         | 29.704                                                       | 29.412  | 0.292   | 81.4                          | 83.8                                                           | 77.2 | 6.6   |
| 1              | .550                                           | .697                                                         | .389    | .308    | 81.1                          | 83.6                                                           | 77.6 | 6.0   |
| 2              | .541                                           | .679                                                         | .382    | .297    | 81.0                          | 83.4                                                           | 77.8 | 5.6   |
| 3              | .532                                           | .677                                                         | .361    | .316    | 80.7                          | 83.0                                                           | 78.2 | 4.8   |
| 4              | .531                                           | .681                                                         | .365    | .316    | 80.4                          | 83.0                                                           | 76.4 | 6.6   |
| 5              | .537                                           | .675                                                         | .352    | .323    | 80.2                          | 82.2                                                           | 76.8 | 5.4   |
| 6              | .557                                           | .693                                                         | .376    | .317    | 80.4                          | 82.8                                                           | 77.0 | 5.8   |
| 7              | .570                                           | .725                                                         | .413    | .312    | 81.2                          | 83.6                                                           | 77.0 | 6.6   |
| 8              | .581                                           | .740                                                         | .436    | .304    | 82.7                          | 86.0                                                           | 77.0 | 9.0   |
| 9              | .584                                           | .739                                                         | .421    | .318    | 84.1                          | 87.2                                                           | 77.8 | 9.4   |
| 10             | .585                                           | .745                                                         | .417    | .328    | 84.8                          | 88.7                                                           | 75.8 | 12.9  |
| 11             | .576                                           | .726                                                         | .407    | .319    | 85.7                          | 90.2                                                           | 78.6 | 11.6  |
| Noon.          | .561                                           | .702                                                         | .389    | .313    | 86.1                          | 91.6                                                           | 79.2 | 12.4  |
| 1              | .543                                           | .674                                                         | .386    | .288    | 86.7                          | 91.8                                                           | 79.0 | 12.8  |
| 2              | .522                                           | .647                                                         | .369    | .278    | 86.8                          | 91.7                                                           | 79.4 | 12.3  |
| 3              | .505                                           | .626                                                         | .368    | .258    | 86.6                          | 91.7                                                           | 80.1 | 11.6  |
| 4              | .494                                           | .625                                                         | .359    | .266    | 86.0                          | 91.6                                                           | 80.2 | 11.4  |
| 5              | .488                                           | .624                                                         | .360    | .264    | 85.4                          | 89.4                                                           | 80.4 | 9.0   |
| 6              | .499                                           | .635                                                         | .368    | .267    | 84.5                          | 87.6                                                           | 80.4 | 7.2   |
| 7              | .518                                           | .659                                                         | .370    | .289    | 83.6                          | 86.2                                                           | 79.0 | 7.2   |
| 8              | .541                                           | .692                                                         | .392    | .300    | 83.0                          | 85.2                                                           | 78.8 | 6.4   |
| 9              | .557                                           | .702                                                         | .420    | .282    | 82.5                          | 85.2                                                           | 78.2 | 7.0   |
| 10             | .570                                           | .724                                                         | .424    | .300    | 82.1                          | 85.2                                                           | 78.0 | 7.2   |
| 11             | .570                                           | .714                                                         | .424    | .290    | 81.9                          | 84.2                                                           | 77.8 | 6.4   |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Hour.          | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of Air. | Additional weight of va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity,<br>complete saturation be-<br>ing unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                   |
| Mid-<br>night. | 79.4                            | 2.0                 | 78.4                | 3.0                          | 0.952                            | 10.25                                            | 1.02                                                                    | 0.91                                                              |
| 1              | 79.3                            | 1.8                 | 78.4                | 2.7                          | .952                             | .25                                              | 0.92                                                                    | .92                                                               |
| 2              | 79.2                            | 1.8                 | 78.3                | 2.7                          | .949                             | .22                                              | .92                                                                     | .92                                                               |
| 3              | 79.0                            | 1.7                 | 78.1                | 2.6                          | .943                             | .16                                              | .88                                                                     | .92                                                               |
| 4              | 78.9                            | 1.5                 | 78.1                | 2.3                          | .943                             | .18                                              | .76                                                                     | .93                                                               |
| 5              | 78.7                            | 1.5                 | 77.9                | 2.3                          | .937                             | .12                                              | .76                                                                     | .93                                                               |
| 6              | 78.9                            | 1.5                 | 78.1                | 2.3                          | .943                             | .18                                              | .76                                                                     | .93                                                               |
| 7              | 79.4                            | 1.8                 | 78.5                | 2.7                          | .955                             | .29                                              | .92                                                                     | .92                                                               |
| 8              | 80.2                            | 2.5                 | 78.9                | 3.8                          | .967                             | .39                                              | 1.33                                                                    | .89                                                               |
| 9              | 80.7                            | 3.4                 | 79.0                | 5.1                          | .970                             | .40                                              | .81                                                                     | .85                                                               |
| 10             | 80.6                            | 4.2                 | 78.5                | 6.3                          | .955                             | .23                                              | 2.23                                                                    | .82                                                               |
| 11             | 80.8                            | 4.9                 | 78.3                | 7.4                          | .949                             | .14                                              | .66                                                                     | .79                                                               |
| Noon.          | 81.1                            | 5.0                 | 78.6                | 7.5                          | .958                             | .21                                              | .74                                                                     | .79                                                               |
| 1              | 81.5                            | 5.2                 | 78.9                | 7.8                          | .967                             | .30                                              | .88                                                                     | .78                                                               |
| 2              | 81.4                            | 5.4                 | 78.7                | 8.1                          | .961                             | .24                                              | .97                                                                     | .78                                                               |
| 3              | 81.3                            | 5.3                 | 78.6                | 8.0                          | .958                             | .21                                              | .93                                                                     | .78                                                               |
| 4              | 81.1                            | 4.9                 | 78.6                | 7.4                          | .958                             | .23                                              | .68                                                                     | .79                                                               |
| 5              | 81.1                            | 4.3                 | 78.9                | 6.5                          | .967                             | .32                                              | .36                                                                     | .81                                                               |
| 6              | 80.7                            | 3.8                 | 78.8                | 5.7                          | .964                             | .31                                              | .04                                                                     | .84                                                               |
| 7              | 80.5                            | 3.1                 | 78.9                | 4.7                          | .967                             | .37                                              | 1.66                                                                    | .86                                                               |
| 8              | 80.0                            | 3.0                 | 78.5                | 4.5                          | .955                             | .25                                              | .57                                                                     | .87                                                               |
| 9              | 79.9                            | 2.6                 | 78.6                | 3.9                          | .958                             | .30                                              | .34                                                                     | .89                                                               |
| 10             | 79.8                            | 2.3                 | 78.6                | 3.5                          | .958                             | .30                                              | .21                                                                     | .90                                                               |
| 11             | 79.8                            | 2.1                 | 78.7                | 3.2                          | .961                             | .35                                              | .09                                                                     | .91                                                               |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1856.*  
Solar radiation, Weather, &c.

| Date.            | Max. Solar radiation. | Rain.  | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                         |
|------------------|-----------------------|--------|-----------------------------------|----------------------------------------------------------------------------------------------------|
|                  | o                     | Inches |                                   |                                                                                                    |
| 1 <i>Sunday.</i> |                       | 0.88   |                                   | Cloudless till 3 A. M. cloudy afterwards,                                                          |
| 2                | 109.0                 | 0.32   | E. or S. E.                       | [with some rain before and after sunrise.                                                          |
| 3                | 128.0                 | 0.11   | S. E. or E.                       | Cloudless till 3 A. M. cloudy afterwards.                                                          |
| 4                | ..                    | ..     | S. E. or E. or S. W.              | Cloudy. [Also little rain at 1 P. M.                                                               |
| 5                | ..                    | 0.11   | E.                                | Cloudless till 4 A. M. cloudy afterwards,                                                          |
| 6                | ..                    | ..     | E.                                | [also drizzling at 11 A. M. and 9 P. M.                                                            |
| 7                | ..                    | 0.70   | E. or N. E.                       | Cloudless till 6 A. M. cloudy afterwards,                                                          |
| 8                | <i>Sunday.</i>        | 0.18   |                                   | [Also little drizzling at 11 A. M.                                                                 |
| 9                | 125.0                 | 0.10   | E. or N. E. or S. E.              | Cloudless till 5 A. M. scattered ☉ or ☾ afterwards, also a shower of rain between Noon and 1 P. M. |
| 10               | 118.0                 | 0.42   | S. E.                             | [afterwards, also rain at 4 & 8 P. M.                                                              |
| 11               | ..                    | ..     | S. E.                             | Cloudless till 3 A. M., scattered ☾ & ☉                                                            |
| 12               | 110.0                 | 0.16   | S. E.                             | Cloudless till 5 A. M., cloudy afterwards,                                                         |
| 13               | ..                    | 0.08   | S. or S. E.                       | [also rain between 7 & 8 A. M.                                                                     |
| 14               | ..                    | 0.26   | S. E.                             | Cloudy, also drizzling at Noon.                                                                    |
| 15               | <i>Sunday.</i>        | 1.12   |                                   | Cloudless till 2 A. M. cloudy afterwards,                                                          |
| 16               | ..                    | 0.66   | S. or S. W.                       | [also rain between 1 & 2 P. M.                                                                     |
| 17               | 121.0                 | 0.16   | S. or S. W.                       | Cloudy, also little drizzling between 3                                                            |
| 18               | ..                    | 1.05   | S. W. or S.                       | [& 4 A. M.                                                                                         |
| 19               | ..                    | 1.20   | E. or S. E.                       | Cloudy with rain at 10 & 11 P. M.                                                                  |
| 20               | 109.0                 | 0.52   | S. E. or E.                       | [also raining between 6 & 7 P. M.                                                                  |
| 21               | 124.4                 | ..     | S. E. or S.                       | Cloudy and drizzling from 7 to 9 A. M.,                                                            |
| 22               | <i>Sunday.</i>        | ..     | S.                                | Cloudy, also after 4 P. M. much thunder                                                            |
| 23               | 130.0                 | ..     | S. E. or S.                       | [and lightning and some rain.                                                                      |
| 24               | 120.4                 | 2.08   | S. E. or S.                       | Cloudy, also a heavy shower of rain at                                                             |
| 25               | ..                    | 0.22   | S. or S. W.                       | [8 P. M.                                                                                           |
| 26               | ..                    | 2.34   | S. or S. E.                       | Cloudy till 4 P. M. with much thunder &                                                            |
| 27               | 114.0                 | ..     | S. or S. E.                       | rain before sunrise, scat. ☾ & ☾ after 4 P. M.                                                     |
| 28               | 122.0                 | ..     | S. E. or S.                       | Cloudless till 7 A. M., cloudy till 7 P. M.,                                                       |
| 29               | <i>Sunday.</i>        | ..     | S. E.                             | with rain at 10 A. M. cloudless after                                                              |
| 30               | 121.0                 | ..     | S. E.                             | 7 P. M.                                                                                            |
|                  |                       |        |                                   | Cloudless till 11 A. M. scattered clouds                                                           |
|                  |                       |        |                                   | [afterwards.                                                                                       |
|                  |                       |        |                                   | Cloudy.                                                                                            |
|                  |                       |        |                                   | Cloudy with rain from 12 to 2 P. M.                                                                |
|                  |                       |        |                                   | Cloudy with rain at 11 A. M.                                                                       |
|                  |                       |        |                                   | Cloudy with much rain between 9 A. M.                                                              |
|                  |                       |        |                                   | Scattered clouds. [ & 2 P. M.                                                                      |
|                  |                       |        |                                   | Cloudless till 3 A. M., cloudy till 7 P. M.,                                                       |
|                  |                       |        |                                   | [cloudless afterwards.                                                                             |
|                  |                       |        |                                   | [wards.                                                                                            |
|                  |                       |        |                                   | Cloudless till 4 A. M., scatd. ☉ after-                                                            |

☾ Cirri, ☾ cirro strati, ☉ cumuli, ☉ cumulo strati, ☾ Nimbi, — strati,  
☾ cirro cumuli.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1856.*

## MONTHLY RESULTS.

Inches.

|                                                                |      |      |        |
|----------------------------------------------------------------|------|------|--------|
| Mean height of the Barometer for the month,                    | ..   | .... | 29.545 |
| Max. height of the Barometer, occurred at 10 A. M. on the 4th, | .... |      | 29.745 |
| Min. height of the Barometer, occurred at 5 A. M. on the 14th, | .... |      | 29.352 |
| Extreme range of the Barometer during the month,               | ..   | .... | 0.393  |

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o

|                                                    |    |      |      |
|----------------------------------------------------|----|------|------|
| Mean Dry Bulb Thermometer for the month,           | .. | .... | 83.3 |
| Max. Temperature, occurred at 1 P. M. on the 30th, | .. | .... | 91.8 |
| Min. Temperature, occurred at 4 A. M. on the 19th, | .. | .... | 76.4 |
| Extreme range of the Temperature during the month, | .. | .... | 15.4 |

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|                                                                |    |      |      |
|----------------------------------------------------------------|----|------|------|
| Mean Wet Bulb Thermometer for the month,                       | .. | .... | 80.2 |
| Mean Dry Bulb Thermometer, above Mean Wet Bulb Thermometer,... |    |      | 3.1  |
| Computed Mean Dew Point for the month,                         | .. | .... | 78.6 |
| Mean Dry Bulb Thermometer, above computed Mean Dew Point,      | .. |      | 4.7  |

Inches.

|                                             |    |      |       |
|---------------------------------------------|----|------|-------|
| Mean elastic force of vapour for the month, | .. | .... | 0.958 |
|---------------------------------------------|----|------|-------|

Troy grains.

|                                                                         |      |    |      |       |
|-------------------------------------------------------------------------|------|----|------|-------|
| Mean weight of vapour for the month,                                    | ..   | .. | .... | 10.28 |
| Additional weight of vapour, required for complete saturation.          | .... |    |      | 1.65  |
| Mean degree of Humidity for the month, complete saturation being unity, |      |    |      | 0.86  |

Inches.

|                                                    |    |      |       |
|----------------------------------------------------|----|------|-------|
| Rained 22 days. Max. fall of Rain during 24 hours, | .. | .... | 2.34  |
| Total amount of rain during the month,             | .. | .... | 12.67 |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1856.*

Latitude 22° 33' 1" North, Longitude 88° 20' 34" East.

Height of the cistern of the Standard Barometer above the Level of the Sea 18.11. feet.

Daily Means, &c. of the Observations, and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 320 Faht. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | 29.515                                          | 29.553                                    | 29.455  | 0.098   | 84.2                          | 87.6                                          | 81.8 | 5.8   |
| 2     | .517                                            | .561                                      | .451    | .110    | 84.0                          | 87.8                                          | 81.2 | 6.6   |
| 3     | .549                                            | .612                                      | .496    | .116    | 84.7                          | 90.7                                          | 81.2 | 9.5   |
| 4     | .596                                            | .643                                      | .546    | .097    | 84.6                          | 90.2                                          | 82.0 | 8.2   |
| 5     | .594                                            | .631                                      | .544    | .087    | 85.2                          | 90.4                                          | 81.2 | 9.2   |
| 6     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 7     | .582                                            | .630                                      | .535    | .095    | 84.9                          | 90.0                                          | 82.2 | 7.8   |
| 8     | .558                                            | .625                                      | .484    | .141    | 84.0                          | 91.7                                          | 78.0 | 13.7  |
| 9     | .558                                            | .598                                      | .521    | .077    | 81.0                          | 85.9                                          | 77.9 | 8.0   |
| 10    | .512                                            | .579                                      | .449    | .130    | 81.7                          | 87.5                                          | 79.4 | 8.1   |
| 11    | .448                                            | .507                                      | .371    | .136    | 83.0                          | 88.0                                          | 79.0 | 9.0   |
| 12    | .471                                            | .539                                      | .429    | .110    | 84.5                          | 87.4                                          | 81.8 | 5.6   |
| 13    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 14    | .511                                            | .560                                      | .454    | .106    | 83.7                          | 89.2                                          | 81.2 | 8.0   |
| 15    | .476                                            | .523                                      | .397    | .126    | 84.0                          | 89.0                                          | 80.0 | 9.0   |
| 16    | .423                                            | .473                                      | .354    | .119    | 84.3                          | 88.6                                          | 82.0 | 6.6   |
| 17    | .418                                            | .452                                      | .367    | .085    | 82.6                          | 85.3                                          | 79.7 | 5.6   |
| 18    | .439                                            | .502                                      | .376    | .126    | 78.7                          | 80.2                                          | 76.9 | 3.3   |
| 19    | .469                                            | .512                                      | .407    | .105    | 80.9                          | 85.4                                          | 77.4 | 8.0   |
| 20    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 21    | .373                                            | .435                                      | .316    | .119    | 83.2                          | 88.6                                          | 80.4 | 8.2   |
| 22    | .419                                            | .470                                      | .379    | .091    | 81.8                          | 86.0                                          | 79.8 | 6.2   |
| 23    | .460                                            | .509                                      | .417    | .092    | 82.2                          | 87.4                                          | 79.5 | 7.9   |
| 24    | .495                                            | .549                                      | .452    | .097    | 83.3                          | 88.9                                          | 80.0 | 8.9   |
| 25    | .521                                            | .553                                      | .477    | .076    | 83.4                          | 87.4                                          | 80.8 | 6.6   |
| 26    | .434                                            | .520                                      | .343    | .177    | 82.7                          | 86.6                                          | 79.9 | 6.7   |
| 27    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 28    | .561                                            | .623                                      | .506    | .117    | 84.0                          | 88.0                                          | 80.8 | 7.2   |
| 29    | .542                                            | .603                                      | .463    | .140    | 83.9                          | 88.3                                          | 81.9 | 6.4   |
| 30    | .429                                            | .519                                      | .340    | .179    | 83.1                          | 88.4                                          | 80.2 | 8.2   |
| 31    | .414                                            | .492                                      | .357    | .135    | 82.2                          | 87.0                                          | 79.6 | 7.4   |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1856.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Wet Bulb Thermometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew Point. | Mean Elastic force of Vapour. | Mean Weight of Vapour in a Cubic foot of Air. | Additional weight of vapour required for complete saturation. | Mean degree of Humidity, complete saturation being unity. |
|-------|----------------------------|---------------------|---------------------|---------------------------|-------------------------------|-----------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------|
|       | °                          | °                   | °                   | °                         | Inches.                       | T. gr.                                        | T. gr.                                                        |                                                           |
| 1     | 81.3                       | 2.9                 | 79.8                | 4.4                       | .0995                         | 10.66                                         | 1.58                                                          | 0.87                                                      |
| 2     | 80.7                       | 3.3                 | 79.0                | 5.0                       | .970                          | .40                                           | .77                                                           | .86                                                       |
| 3     | 80.9                       | 3.8                 | 79.0                | 5.7                       | .970                          | .37                                           | 2.05                                                          | .84                                                       |
| 4     | 81.0                       | 3.6                 | 79.2                | 5.4                       | .976                          | .45                                           | 1.94                                                          | .84                                                       |
| 5     | 80.8                       | 4.4                 | 78.6                | 6.6                       | .958                          | .23                                           | 2.38                                                          | .81                                                       |
| 6     | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 7     | 81.0                       | 3.9                 | 79.0                | 5.9                       | .970                          | .37                                           | .12                                                           | .83                                                       |
| 8     | 80.6                       | 3.4                 | 78.9                | 5.1                       | .967                          | .37                                           | 1.80                                                          | .85                                                       |
| 9     | 79.4                       | 1.6                 | 78.6                | 2.4                       | .958                          | .34                                           | 0.80                                                          | .93                                                       |
| 10    | 79.3                       | 2.4                 | 78.1                | 3.6                       | .943                          | .14                                           | 1.23                                                          | .89                                                       |
| 11    | 80.3                       | 2.7                 | 78.9                | 4.1                       | .967                          | .39                                           | .43                                                           | .88                                                       |
| 12    | 81.4                       | 3.1                 | 79.8                | 4.7                       | .995                          | .64                                           | .71                                                           | .86                                                       |
| 13    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 14    | 80.9                       | 2.8                 | 79.5                | 4.2                       | .986                          | .57                                           | .50                                                           | .88                                                       |
| 15    | 81.2                       | 2.8                 | 79.8                | 4.2                       | .995                          | .66                                           | .51                                                           | .88                                                       |
| 16    | 81.3                       | 3.0                 | 79.8                | 4.5                       | .995                          | .64                                           | .64                                                           | .87                                                       |
| 17    | 80.8                       | 1.8                 | 79.9                | 2.7                       | .998                          | .72                                           | 0.96                                                          | .92                                                       |
| 18    | 77.1                       | 1.6                 | 76.3                | 2.4                       | .890                          | 9.65                                          | .76                                                           | .93                                                       |
| 19    | 78.1                       | 2.8                 | 76.7                | 4.2                       | .902                          | .72                                           | 1.38                                                          | .88                                                       |
| 20    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 21    | 80.2                       | 3.0                 | 78.7                | 4.5                       | .961                          | 10.31                                         | .58                                                           | .87                                                       |
| 22    | 79.4                       | 2.4                 | 78.2                | 3.6                       | .946                          | .17                                           | .23                                                           | .89                                                       |
| 23    | 79.8                       | 2.4                 | 78.6                | 3.6                       | .958                          | .30                                           | .24                                                           | .89                                                       |
| 24    | 80.6                       | 2.7                 | 79.2                | 4.1                       | .976                          | .48                                           | .45                                                           | .88                                                       |
| 25    | 80.5                       | 2.9                 | 79.0                | 4.4                       | .970                          | .42                                           | .54                                                           | .87                                                       |
| 26    | 79.9                       | 2.8                 | 78.5                | 4.2                       | .955                          | .27                                           | .45                                                           | .88                                                       |
| 27    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 28    | 80.0                       | 4.0                 | 78.0                | 6.0                       | .940                          | .07                                           | 2.10                                                          | .83                                                       |
| 29    | 80.7                       | 3.2                 | 79.1                | 4.8                       | .973                          | .42                                           | 1.71                                                          | .86                                                       |
| 30    | 79.6                       | 3.5                 | 77.8                | 5.3                       | .934                          | .03                                           | .83                                                           | .85                                                       |
| 31    | 79.1                       | 3.1                 | 77.5                | 4.7                       | .925                          | 9.94                                          | .60                                                           | .86                                                       |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Hour.      | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | °                          | °                                                        | °    | °     |
| Mid-night. | 29.512                                    | 29.630                                                 | 29.389  | 0.241   | 81.7                       | 84.2                                                     | 77.9 | 6.3   |
| 1          | .497                                      | .611                                                   | .379    | .232    | 81.5                       | 84.0                                                     | 78.4 | 5.6   |
| 2          | .486                                      | .588                                                   | .377    | .211    | 81.4                       | 83.8                                                     | 78.7 | 5.1   |
| 3          | .476                                      | .579                                                   | .353    | .226    | 81.2                       | 83.6                                                     | 78.0 | 5.6   |
| 4          | .477                                      | .576                                                   | .357    | .219    | 81.0                       | 83.4                                                     | 77.8 | 5.6   |
| 5          | .478                                      | .583                                                   | .362    | .221    | 80.7                       | 83.2                                                     | 77.6 | 5.6   |
| 6          | .499                                      | .599                                                   | .368    | .231    | 80.8                       | 83.7                                                     | 77.4 | 6.3   |
| 7          | .514                                      | .611                                                   | .367    | .244    | 81.4                       | 84.2                                                     | 77.6 | 6.6   |
| 8          | .523                                      | .635                                                   | .397    | .238    | 82.7                       | 85.6                                                     | 77.4 | 8.2   |
| 9          | .530                                      | .643                                                   | .409    | .234    | 83.6                       | 87.3                                                     | 77.3 | 10.0  |
| 10         | .531                                      | .640                                                   | .395    | .245    | 84.6                       | 88.2                                                     | 77.2 | 11.0  |
| 11         | .523                                      | .633                                                   | .388    | .245    | 85.7                       | 89.5                                                     | 77.2 | 12.3  |
| Noon.      | .507                                      | .614                                                   | .376    | .238    | 86.0                       | 90.4                                                     | 76.9 | 13.5  |
| 1          | .490                                      | .606                                                   | .352    | .254    | 86.6                       | 91.7                                                     | 77.6 | 14.1  |
| 2          | .471                                      | .592                                                   | .332    | .260    | 85.6                       | 90.4                                                     | 78.0 | 12.4  |
| 3          | .454                                      | .572                                                   | .324    | .248    | 85.4                       | 90.0                                                     | 78.4 | 11.6  |
| 4          | .439                                      | .557                                                   | .316    | .241    | 85.2                       | 88.2                                                     | 78.6 | 9.6   |
| 5          | .441                                      | .564                                                   | .318    | .246    | 84.8                       | 88.4                                                     | 79.2 | 9.2   |
| 6          | .451                                      | .577                                                   | .342    | .235    | 84.0                       | 86.6                                                     | 79.4 | 7.2   |
| 7          | .467                                      | .574                                                   | .364    | .210    | 83.3                       | 85.7                                                     | 79.6 | 6.1   |
| 8          | .488                                      | .589                                                   | .392    | .197    | 82.7                       | 85.0                                                     | 79.4 | 5.6   |
| 9          | .507                                      | .599                                                   | .407    | .192    | 82.4                       | 84.5                                                     | 79.6 | 4.9   |
| 10         | .524                                      | .632                                                   | .426    | .206    | 82.0                       | 84.0                                                     | 79.0 | 5.0   |
| 11         | .521                                      | .640                                                   | .425    | .215    | 81.7                       | 83.8                                                     | 78.0 | 5.8   |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of Air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity,<br>complete saturation be-<br>ing unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------|
|                | °                               | °                   | °                   | °                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                   |
| Mid-<br>night. | 79.6                            | 2.1                 | 78.5                | 3.2                          | 0.955                            | 10.29                                            | 1.08                                                                    | 0.91                                                              |
| 1              | 79.6                            | 1.9                 | 78.6                | 2.9                          | .958                             | .32                                              | 0.99                                                                    | .91                                                               |
| 2              | 79.5                            | 1.9                 | 78.5                | 2.9                          | .955                             | .29                                              | .98                                                                     | .91                                                               |
| 3              | 79.3                            | 1.9                 | 78.3                | 2.9                          | .949                             | .22                                              | .99                                                                     | .91                                                               |
| 4              | 79.2                            | 1.8                 | 78.3                | 2.7                          | .949                             | .22                                              | .92                                                                     | .92                                                               |
| 5              | 79.0                            | 1.7                 | 78.1                | 2.6                          | .943                             | .16                                              | .88                                                                     | .92                                                               |
| 6              | 79.2                            | 1.6                 | 78.4                | 2.4                          | .952                             | .27                                              | .80                                                                     | .93                                                               |
| 7              | 79.6                            | 1.8                 | 78.7                | 2.7                          | .961                             | .35                                              | .92                                                                     | .92                                                               |
| 8              | 80.2                            | 2.5                 | 78.9                | 3.8                          | .967                             | .39                                              | 1.33                                                                    | .89                                                               |
| 9              | 80.5                            | 3.8                 | 78.9                | 4.7                          | .967                             | .37                                              | .66                                                                     | .86                                                               |
| 10             | 81.0                            | 3.6                 | 79.2                | 5.4                          | .976                             | .45                                              | .94                                                                     | .84                                                               |
| 11             | 81.4                            | 4.3                 | 79.2                | 6.5                          | .976                             | .41                                              | 2.39                                                                    | .81                                                               |
| Noon.          | 81.4                            | 4.6                 | 79.1                | 6.9                          | .973                             | .38                                              | .53                                                                     | .80                                                               |
| 1              | 81.5                            | 5.1                 | 78.9                | 7.7                          | .967                             | .30                                              | .84                                                                     | .78                                                               |
| 2              | 81.2                            | 4.4                 | 79.0                | 6.6                          | .970                             | .35                                              | .41                                                                     | .81                                                               |
| 3              | 81.3                            | 4.1                 | 79.2                | 6.2                          | .976                             | .43                                              | .25                                                                     | .82                                                               |
| 4              | 81.2                            | 4.0                 | 79.2                | 6.0                          | .976                             | .43                                              | .18                                                                     | .83                                                               |
| 5              | 80.9                            | 3.9                 | 78.9                | 5.9                          | .967                             | .34                                              | .12                                                                     | .83                                                               |
| 6              | 80.5                            | 3.5                 | 78.7                | 5.3                          | .961                             | .31                                              | 1.86                                                                    | .85                                                               |
| 7              | 80.2                            | 3.1                 | 78.6                | 4.7                          | .958                             | .28                                              | .65                                                                     | .86                                                               |
| 8              | 80.0                            | 2.7                 | 78.6                | 4.1                          | .958                             | .30                                              | .42                                                                     | .88                                                               |
| 9              | 79.7                            | 2.7                 | 78.3                | 4.1                          | .949                             | .20                                              | .41                                                                     | .88                                                               |
| 10             | 79.6                            | 2.4                 | 78.4                | 3.6                          | .952                             | .23                                              | .24                                                                     | .89                                                               |
| 11             | 79.5                            | 2.2                 | 78.4                | 3.3                          | .952                             | .25                                              | .12                                                                     | .90                                                               |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1856.*

Solar radiation, Weather.

| Date. | Max. Solar radiation. | Rain.   | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                  |
|-------|-----------------------|---------|-----------------------------------|---------------------------------------------------------------------------------------------|
|       | o                     | Inches. |                                   | [till Noon.                                                                                 |
| 1     | ...                   | 0.12    | S. E.                             | Cloudy and also drizzling from 10 A. M.                                                     |
| 2     | 113.0                 | 0.14    | S. E.                             | Cloudless till 4 A. M., scatd. clouds afterwards: also a shower of rain between 1 & 2 P. M. |
| 3     | 117.5                 | ...     | S. E.                             | Cloudy, also drizzling at 10 A. M.                                                          |
| 4     | ...                   | 0.51    | S. E. or S.                       | Cloudy, also raining between 2 & 3 P. M.                                                    |
| 5     | 126.2                 | ...     | S. E. or S.                       | Cloudy till 7 P. M., cloudless afterwards.                                                  |
| 6     | Sunday.               | 0.16    |                                   |                                                                                             |
| 7     | 120.0                 | ...     | S. E. or S.                       | Cloudless till 6 A. M., cloudy afterwards.                                                  |
| 8     | 120.0                 | 0.82    | S.                                | Cloudy with much rain, thunder and [lightning from 5 P. M. to midnight.                     |
| 9     | ...                   | 0.42    | S. E. or S.                       | Cloudy and occasionally drizzling.                                                          |
| 10    | ...                   | 0.46    | S. or S. W.                       | Cloudy and occasionally drizzling.                                                          |
| 11    | ...                   | 0.36    | S. E. or S.                       | Cloudy with rain at 6 A. M.                                                                 |
| 12    | 125.0                 | 0.26    | S. E. or S.                       | Cloudy with rain at 11 P. M.                                                                |
| 13    | Sunday.               | 0.46    |                                   |                                                                                             |
| 14    | ...                   | 0.20    | S. E.                             | Cloudy, also raining at 2 P. M.                                                             |
| 15    | 120.0                 | 0.61    | S. E. or S.                       | Cloudy and constantly raining. [P. M.                                                       |
| 16    | ...                   | ...     | S. W. or S.                       | Cloudy with little drizzling at 8 & 10                                                      |
| 17    | ...                   | 1.36    | S.                                | Cloudy and constantly raining. [day.                                                        |
| 18    | ...                   | 1.51    | S. or S. W.                       | Cloudy and constantly raining during the                                                    |
| 19    | ...                   | ...     | S. W.                             | Cloudy, also slightly drizzling at 8 & 11 [A. M.                                            |
| 20    | Sunday.               | 0.18    |                                   |                                                                                             |
| 21    | ...                   | ...     | N. E. or E.                       | Cloudy, also slightly drizzling at 9 A. M.                                                  |
| 22    | ...                   | 1.52    | E.                                | Cloudy with rain from Noon till 2 P. M.                                                     |
| 23    | ...                   | 0.22    | E. or S. E.                       | Cloudy with rain at 10 A. M. & 2 P. M.                                                      |
| 24    | 126.8                 | 0.66    | Variable.                         | Cloudy with rain at 3 P. M.                                                                 |
| 25    | ...                   | 0.10    | S. E. or N. E.                    | Cloudy and rain between 2 & 3 P. M.                                                         |
| 26    | ...                   | 0.14    | S. E. or E. or N. E.              | Cloudy and raining at 11 A. M., and also [at 1, 10 & 11 P. M.                               |
| 27    | Sunday.               | 0.61    |                                   |                                                                                             |
| 28    | 124.0                 | ...     | S.                                | Cloudy.                                                                                     |
| 29    | ...                   | ...     | S. or S. W.                       | Cloudy.                                                                                     |
| 30    | 121.0                 | ...     | E. or N. E.                       | Cloudy and slightly drizzling after 6 P. M.                                                 |
| 31    | 116.4                 | 0.12    | S. E.                             | Cloudy and drizzling occasionally after [sunset;                                            |

☐ Cirri, ☐ Cirro Strati, ☐ Cumuli, ☐ Cumulo Strati, ☐ Nimbi. —i Strati, ☐ Cirro Cumuli.

# Meteorological Observations.

## *Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, for the month of July, 1856.*

### MONTHLY RESULTS.

|                                                                |    |    | Inches. |
|----------------------------------------------------------------|----|----|---------|
| Mean height of the Barometer, for the month,                   | .. | .. | 29.492  |
| Max. height of the Barometer, occurred at 9 A. M. on the 4th,  | .. | .. | 29.643  |
| Min. height of the Barometer, occurred at 4 P. M. on the 21st, | .. | .. | 29.316  |
| Extreme range of the Barometer, during the month,              | .. | .. | 0.327   |

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|                                                     |    |    | °    |
|-----------------------------------------------------|----|----|------|
| Mean Dry Bulb Thermometer, for the month,           | .. | .. | 83.2 |
| Max. Temperature, occurred at 1 P. M. on the 8th,   | .. | .. | 91.7 |
| Min. Temperature, occurred at Noon on the 18th,     | .. | .. | 76.9 |
| Extreme range of the Temperature, during the month, | .. | .. | 14.8 |

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|                                                                |    |    | °    |
|----------------------------------------------------------------|----|----|------|
| Mean Wet Bulb Thermometer, for the month, ..                   | .. | .. | 80.2 |
| Mean Dry Bulb Thermometer, above Mean Wet Bulb Thermometer, .. |    |    | 3.0  |
| Computed Mean Dew-point for the month, ..                      | .. | .. | 78.7 |
| Mean Dry Bulb Thermometer above computed Mean Dew-point,       | .. |    | 4.5  |

|                                                                         |    |    | Inches.      |
|-------------------------------------------------------------------------|----|----|--------------|
| Mean elastic force of vapour for the month,                             | .. | .. | 0.961        |
|                                                                         |    |    | Troy grains. |
| Mean weight of vapour for the month, ..                                 | .. | .. | 10.31        |
| Additional weight of vapour required for complete saturation,           | .. | .. | 1.58         |
| Mean degree of Humidity for the month, complete saturation being unity. |    |    | 0.87         |

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|                                                    |    |    | Inches. |
|----------------------------------------------------|----|----|---------|
| Rained 29 days. Max. fall of rain during 24 hours, | .. | .. | 1.52    |
| Total amount of rain during the month,             | .. | .. | 10.94   |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of August, 1856.*

Latitude 22° 33' 1" North, Longitude 88° 20' 34" East.

Height of the cistern of the Standard Barometer above the level of the Sea, 18.11. feet.

Daily Means, &c. of the Observations, and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | °                             | °                                             | °    | °     |
| 1     | 29.485                                          | 29.532                                    | 29.441  | 0.091   | 82.1                          | 85.8                                          | 79.4 | 6.4   |
| 2     | .482                                            | .542                                      | .430    | .112    | 82.6                          | 87.0                                          | 79.0 | 8.0   |
| 3     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 4     | .570                                            | .651                                      | .511    | .140    | 81.2                          | 85.8                                          | 78.8 | 7.0   |
| 5     | .656                                            | .715                                      | .596    | .119    | 80.2                          | 82.2                                          | 79.2 | 3.0   |
| 6     | .700                                            | .744                                      | .650    | .094    | 83.6                          | 88.6                                          | 79.4 | 9.2   |
| 7     | .658                                            | .724                                      | .576    | .148    | 84.7                          | 90.0                                          | 81.4 | 8.6   |
| 8     | .597                                            | .637                                      | .545    | .092    | 84.8                          | 88.6                                          | 81.9 | 6.7   |
| 9     | .633                                            | .682                                      | .574    | .108    | 80.9                          | 84.0                                          | 78.9 | 5.1   |
| 10    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 11    | .622                                            | .676                                      | .549    | .127    | 80.8                          | 85.7                                          | 77.2 | 8.5   |
| 12    | .630                                            | .682                                      | .570    | .112    | 82.7                          | 88.2                                          | 78.9 | 9.3   |
| 13    | .633                                            | .715                                      | .611    | .104    | 82.7                          | 85.8                                          | 80.0 | 5.8   |
| 14    | .688                                            | .734                                      | .621    | .113    | 82.2                          | 85.3                                          | 78.5 | 6.8   |
| 15    | .671                                            | .715                                      | .594    | .121    | 84.2                          | 88.8                                          | 80.6 | 8.2   |
| 16    | .613                                            | .679                                      | .535    | .144    | 83.6                          | 87.2                                          | 81.2 | 6.0   |
| 17    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 18    | .607                                            | .661                                      | .560    | .101    | 82.5                          | 88.4                                          | 80.6 | 7.8   |
| 19    | .666                                            | .731                                      | .613    | .118    | 81.7                          | 83.9                                          | 80.4 | 3.5   |
| 20    | .714                                            | .760                                      | .669    | .091    | 82.4                          | 85.8                                          | 79.6 | 6.2   |
| 21    | .719                                            | .786                                      | .659    | .127    | 81.7                          | 85.4                                          | 80.2 | 5.2   |
| 22    | .720                                            | .773                                      | .655    | .118    | 81.4                          | 86.8                                          | 79.7 | 7.1   |
| 23    | .683                                            | .730                                      | .616    | .114    | 81.6                          | 84.4                                          | 79.8 | 4.6   |
| 24    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 25    | .648                                            | .713                                      | .585    | .128    | 80.8                          | 83.8                                          | 78.8 | 5.0   |
| 26    | .669                                            | .717                                      | .610    | .107    | 80.5                          | 84.6                                          | 78.9 | 5.7   |
| 27    | .706                                            | .770                                      | .619    | .151    | 83.2                          | 88.4                                          | 78.8 | 9.6   |
| 28    | .667                                            | .726                                      | .584    | .142    | 83.6                          | 89.2                                          | 81.0 | 8.2   |
| 29    | .634                                            | .695                                      | .560    | .135    | 83.7                          | 89.0                                          | 81.0 | 8.0   |
| 30    | .596                                            | .657                                      | .503    | .154    | 83.4                          | 88.0                                          | 80.5 | 7.5   |
| 31    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of August, 1856.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of Air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity<br>complete saturation be-<br>ing unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                  |
| 1     | 79.5                            | 2.6                 | 78.2                | 3.9                          | 0.946                            | 10.17                                            | 1.34                                                                    | 0.88                                                             |
| 2     | 79.9                            | 2.7                 | 78.5                | 4.1                          | .955                             | .27                                              | .41                                                                     | .88                                                              |
| 3     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                  |
| 4     | 78.5                            | 2.7                 | 77.1                | 4.1                          | .913                             | 9.84                                             | .37                                                                     | .88                                                              |
| 5     | 78.4                            | 1.8                 | 77.5                | 2.7                          | .925                             | .98                                              | 0.90                                                                    | .92                                                              |
| 6     | 79.9                            | 3.7                 | 78.0                | 5.6                          | .940                             | 10.07                                            | 1.96                                                                    | .84                                                              |
| 7     | 80.6                            | 4.1                 | 78.5                | 6.2                          | .955                             | .23                                              | 2.19                                                                    | .82                                                              |
| 8     | 81.2                            | 3.6                 | 79.4                | 5.4                          | .983                             | .51                                              | 1.95                                                                    | .84                                                              |
| 9     | 78.9                            | 2.0                 | 77.9                | 3.0                          | .937                             | .10                                              | .00                                                                     | .91                                                              |
| 10    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                  |
| 11    | 78.2                            | 2.6                 | 76.9                | 3.9                          | .908                             | 9.78                                             | .29                                                                     | .88                                                              |
| 12    | 79.8                            | 2.9                 | 78.3                | 4.4                          | .949                             | 10.20                                            | .52                                                                     | .87                                                              |
| 13    | 80.5                            | 2.2                 | 79.4                | 3.3                          | .983                             | .56                                              | .16                                                                     | .90                                                              |
| 14    | 80.1                            | 2.1                 | 79.0                | 3.2                          | .970                             | .44                                              | .10                                                                     | .91                                                              |
| 15    | 80.2                            | 4.0                 | 78.2                | 6.0                          | .946                             | .13                                              | 2.11                                                                    | .83                                                              |
| 16    | 80.6                            | 3.0                 | 79.1                | 4.5                          | .973                             | .42                                              | 1.61                                                                    | .87                                                              |
| 17    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                  |
| 18    | 80.2                            | 2.3                 | 79.0                | 3.5                          | .970                             | .42                                              | .22                                                                     | .90                                                              |
| 19    | 79.7                            | 2.0                 | 78.7                | 3.0                          | .961                             | .35                                              | .02                                                                     | .91                                                              |
| 20    | 79.7                            | 2.7                 | 78.3                | 4.1                          | .949                             | .20                                              | .41                                                                     | .88                                                              |
| 21    | 78.8                            | 2.9                 | 77.3                | 4.4                          | .919                             | 9.90                                             | .47                                                                     | .87                                                              |
| 22    | 79.4                            | 2.0                 | 78.4                | 3.0                          | .952                             | 10.25                                            | .02                                                                     | .91                                                              |
| 23    | 79.7                            | 1.9                 | 78.7                | 2.9                          | .961                             | .35                                              | 0.99                                                                    | .91                                                              |
| 24    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                  |
| 25    | 78.7                            | 2.1                 | 77.6                | 3.2                          | .928                             | .01                                              | 1.06                                                                    | .90                                                              |
| 26    | 78.8                            | 1.7                 | 77.9                | 2.6                          | .937                             | .10                                              | 0.88                                                                    | .92                                                              |
| 27    | 80.2                            | 3.0                 | 78.7                | 4.5                          | .961                             | .31                                              | 1.58                                                                    | .87                                                              |
| 28    | 80.7                            | 2.9                 | 79.2                | 4.4                          | .976                             | .48                                              | .55                                                                     | .87                                                              |
| 29    | 80.8                            | 2.9                 | 79.3                | 4.4                          | .979                             | .51                                              | .56                                                                     | .87                                                              |
| 30    | 80.1                            | 3.3                 | 78.4                | 5.0                          | .952                             | .21                                              | .75                                                                     | .85                                                              |
| 31    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                  |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of August, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Hour.      | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | °                          | °                                                        | °    | °     |
| Mid-night. | 29.663                                    | 29.747                                                 | 29.488  | 0.259   | 80.9                       | 83.2                                                     | 79.0 | 4.2   |
| 1          | .647                                      | .743                                                   | .469    | .274    | 80.6                       | 82.6                                                     | 77.8 | 4.8   |
| 2          | .636                                      | .731                                                   | .457    | .274    | 80.4                       | 82.4                                                     | 77.4 | 5.0   |
| 3          | .625                                      | .723                                                   | .449    | .274    | 80.3                       | 82.0                                                     | 77.8 | 4.2   |
| 4          | .629                                      | .713                                                   | .448    | .265    | 80.2                       | 82.2                                                     | 77.8 | 4.4   |
| 5          | .631                                      | .723                                                   | .451    | .272    | 80.1                       | 82.3                                                     | 77.4 | 4.9   |
| 6          | .647                                      | .737                                                   | .462    | .275    | 80.1                       | 82.4                                                     | 77.2 | 5.2   |
| 7          | .663                                      | .753                                                   | .474    | .279    | 80.6                       | 82.8                                                     | 77.8 | 5.0   |
| 8          | .676                                      | .766                                                   | .495    | .271    | 81.7                       | 83.8                                                     | 78.2 | 5.6   |
| 9          | .688                                      | .770                                                   | .502    | .268    | 82.8                       | 85.7                                                     | 79.8 | 5.9   |
| 10         | .691                                      | .786                                                   | .508    | .278    | 83.7                       | 87.1                                                     | 79.6 | 7.5   |
| 11         | .681                                      | .773                                                   | .498    | .275    | 84.3                       | 88.6                                                     | 79.8 | 8.8   |
| Noon.      | .664                                      | .749                                                   | .488    | .261    | 84.9                       | 89.6                                                     | 80.5 | 9.1   |
| 1          | .645                                      | .729                                                   | .466    | .263    | 85.2                       | 90.0                                                     | 79.3 | 10.7  |
| 2          | .621                                      | .706                                                   | .458    | .248    | 85.5                       | 90.0                                                     | 80.8 | 9.2   |
| 3          | .599                                      | .688                                                   | .450    | .238    | 85.2                       | 89.0                                                     | 79.4 | 9.6   |
| 4          | .586                                      | .672                                                   | .430    | .242    | 84.6                       | 89.0                                                     | 80.5 | 8.5   |
| 5          | .584                                      | .669                                                   | .433    | .236    | 84.0                       | 87.6                                                     | 80.4 | 7.2   |
| 6          | .593                                      | .679                                                   | .436    | .243    | 83.1                       | 86.4                                                     | 80.3 | 6.1   |
| 7          | .608                                      | .683                                                   | .458    | .225    | 82.5                       | 85.2                                                     | 79.6 | 5.6   |
| 8          | .633                                      | .706                                                   | .475    | .231    | 82.1                       | 84.0                                                     | 79.8 | 4.2   |
| 9          | .658                                      | .729                                                   | .511    | .218    | 81.9                       | 83.6                                                     | 80.0 | 3.6   |
| 10         | .675                                      | .752                                                   | .529    | .223    | 81.6                       | 83.6                                                     | 79.8 | 3.8   |
| 11         | .673                                      | .750                                                   | .529    | .221    | 81.3                       | 83.4                                                     | 78.8 | 4.6   |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of August, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dew<br>Bulb above<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of Air. | Additional weight of va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity,<br>complete saturation be-<br>ing unity. |
|----------------|---------------------------------|---------------------|---------------------|-----------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                           | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                   |
| Mid-<br>night. | 79.1                            | 1.8                 | 78.2                | 2.7                         | 0.946                            | 10.19                                            | 0.91                                                                    | 0.92                                                              |
| 1              | 78.9                            | 1.7                 | 78.0                | 2.6                         | .940                             | .13                                              | .88                                                                     | .92                                                               |
| 2              | 78.8                            | 1.6                 | 78.0                | 2.4                         | .940                             | .15                                              | .79                                                                     | .93                                                               |
| 3              | 78.8                            | 1.5                 | 78.0                | 2.3                         | .940                             | .15                                              | .76                                                                     | .93                                                               |
| 4              | 78.7                            | 1.5                 | 77.9                | 2.3                         | .937                             | .12                                              | .76                                                                     | .93                                                               |
| 5              | 78.7                            | 1.4                 | 78.0                | 2.1                         | .940                             | .15                                              | .69                                                                     | .94                                                               |
| 6              | 78.7                            | 1.4                 | 78.0                | 2.1                         | .940                             | .15                                              | .69                                                                     | .94                                                               |
| 7              | 79.2                            | 1.4                 | 78.5                | 2.1                         | .955                             | .31                                              | .70                                                                     | .94                                                               |
| 8              | 79.7                            | 2.0                 | 78.7                | 3.0                         | .961                             | .35                                              | 1.02                                                                    | .91                                                               |
| 9              | 80.1                            | 2.7                 | 78.7                | 4.1                         | .961                             | .33                                              | .42                                                                     | .88                                                               |
| 10             | 80.4                            | 3.3                 | 78.7                | 5.0                         | .961                             | .31                                              | .76                                                                     | .85                                                               |
| 11             | 80.6                            | 3.7                 | 78.7                | 5.6                         | .961                             | .29                                              | .99                                                                     | .84                                                               |
| Noon.          | 80.7                            | 4.2                 | 78.6                | 6.3                         | .958                             | .26                                              | 2.23                                                                    | .82                                                               |
| 1              | 80.6                            | 4.6                 | 78.3                | 6.9                         | .949                             | .14                                              | .47                                                                     | .80                                                               |
| 2              | 80.9                            | 4.6                 | 78.6                | 6.9                         | .958                             | .23                                              | .49                                                                     | .80                                                               |
| 3              | 80.6                            | 4.6                 | 78.3                | 6.9                         | .949                             | .14                                              | .47                                                                     | .80                                                               |
| 4              | 80.7                            | 3.9                 | 78.7                | 5.9                         | .961                             | .29                                              | .10                                                                     | .83                                                               |
| 5              | 80.3                            | 3.7                 | 78.4                | 5.6                         | .952                             | .19                                              | 1.98                                                                    | .84                                                               |
| 6              | 79.9                            | 3.2                 | 78.3                | 4.8                         | .949                             | .18                                              | .68                                                                     | .86                                                               |
| 7              | 79.7                            | 2.8                 | 78.3                | 4.2                         | .949                             | .20                                              | .44                                                                     | .88                                                               |
| 8              | 79.6                            | 2.5                 | 78.3                | 3.8                         | .949                             | .20                                              | .31                                                                     | .89                                                               |
| 9              | 79.7                            | 2.2                 | 78.6                | 3.3                         | .958                             | .32                                              | .12                                                                     | .90                                                               |
| 10             | 79.6                            | 2.0                 | 78.6                | 3.0                         | .958                             | .32                                              | .02                                                                     | .91                                                               |
| 11             | 79.5                            | 1.8                 | 78.6                | 2.7                         | .958                             | .32                                              | 0.92                                                                    | .92                                                               |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of August, 1856.*

Solar radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain.   | Prevailing direction of the Wind. | General Aspect of the Sky.                                            |
|-------|-----------------------|---------|-----------------------------------|-----------------------------------------------------------------------|
|       | o                     | Inches. |                                   |                                                                       |
| 1     | ..                    | 0.20    | S. E. or S.                       | Cloudy and constantly drizzling.                                      |
| 2     | ..                    | 0.50    | S. E.                             | Cloudy and raining between midnight<br>[and 2 A. M.]                  |
| 3     | <i>Sunday.</i>        | 0.34    |                                   |                                                                       |
| 4     | 117.0                 | ..      | E.                                | Cloudy and drizzling occasionally.                                    |
| 5     | ..                    | 0.48    | E.                                | Cloudy and occasionally raining.                                      |
| 6     | 121.5                 | 0.07    | S. or S. E.                       | Cloudy & also rain between 9 & 10 A. M.                               |
| 7     | 122.4                 | ..      | S. or S. W.                       | Cloudless till 4 A. M., clouds of various<br>[kinds afterwards]       |
| 8     | 114.0                 | ..      | S. or S. W.                       | Scattered clouds, also slightly drizzling<br>[between 3 & 4 A. M.]    |
| 9     | ..                    | 1.21    | S. W.                             | Cloudy, and constantly raining.                                       |
| 10    | <i>Sunday.</i>        | ..      |                                   | [tween midnight and 6 A. M.]                                          |
| 11    | ..                    | 1.50    | S. W. or S. or S. E.              | Cloudy, and also constantly raining be-                               |
| 12    | ..                    | 0.07    | S. W. or S.                       | Cloudy & slightly drizzling at midnight.                              |
| 13    | ..                    | 0.52    | S. or S. E.                       | Cloudy and occasionally raining.                                      |
| 14    | ..                    | 1.49    | S.                                | Cloudy, and raining very heavily be-<br>[tween midnight and 2 A. M.]  |
| 15    | 129.0                 | ..      | S.                                | Scattered clouds of various kinds.                                    |
| 16    | ..                    | 0.36    | S. E. or S.                       | Cloudy and occasionally raining.                                      |
| 17    | <i>Sunday.</i>        | 0.04    |                                   | [and 3 P. M.]                                                         |
| 18    | ..                    | 0.10    | N. E. or N. or W.                 | Cloudy, also a shower of rain between 2                               |
| 19    | ..                    | 0.72    | S. E. or E.                       | Cloudy and occasionally raining.                                      |
| 20    | ..                    | ..      | E. or S. E.                       | Scattered ∩i.                                                         |
| 21    | ..                    | ..      | S. E. or E.                       | Cloudy & occasionally slightly drizzling.                             |
| 22    | ..                    | 0.53    | S. E.                             | Cloudy and constantly raining.                                        |
| 23    | ..                    | 0.40    | S. E. or S.                       | Cloudy and occasionally raining.                                      |
| 24    | <i>Sunday.</i>        | 0.97    |                                   |                                                                       |
| 25    | ..                    | 0.11    | S. E.                             | Cloudy and occasionally drizzling.                                    |
| 26    | ..                    | 0.25    | S. E.                             | Cloudy and occasionally drizzling                                     |
| 27    | 131.0                 | ..      | S.                                | Scattered ∩i. [wards.                                                 |
| 28    | 122.0                 | ..      | S.                                | Cloudless till 5 A. M. scattered ∩i after-                            |
| 29    | 135.0                 | 0.32    | S.                                | Scattered clouds and a shower of rain<br>[at 4 P. M.]                 |
| 30    | ..                    | 0.12    | E.                                | Cloudy till 6 A. M scattered clouds of<br>[various kinds afterwards.] |
| 31    | <i>Sunday.</i>        | ..      |                                   |                                                                       |

∩i Cirri, ∩i cirro strati, ∩i cumuli, ∩i cumulo strati, ∩i Nimbi, —i strati,  
∩i cirro cumuli.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of August, 1856.*

## MONTHLY RESULTS.

|                                                                 |    |      | Inches. |
|-----------------------------------------------------------------|----|------|---------|
| Mean height of the Barometer for the month,                     | .. | .... | 29.642  |
| Max. height of the Barometer, occurred at 10 A. M. on the 21st, | .. | .... | 29.786  |
| Min. height of the Barometer, occurred at 4 P. M. on the 2nd,   | .. | .... | 29.430  |
| Extreme range of the Barometer during the month,                | .. | .... | 0.356   |

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|                                                       |    |      | °    |
|-------------------------------------------------------|----|------|------|
| Mean Dry Bulb Thermometer for the month,              | .. | .... | 82.4 |
| Max. Temperature, occurred at 1 & 2 P. M. on the 7th, | .. | .... | 90.0 |
| Min. Temperature, occurred at 6 A. M. on the 11th,    | .. | .... | 77.2 |
| Extreme range of the Temperature during the month,    | .. | .... | 12.8 |

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|                                                             |    |      | °    |
|-------------------------------------------------------------|----|------|------|
| Mean Wet Bulb Thermometer for the month,                    | .. | .... | 79.7 |
| Mean Dry Bulb Thermometer, above Mean Wet Bulb Thermometer, | .. | .... | 2.7  |
| Computed Mean Dew Point for the month,                      | .. | .... | 78.3 |
| Mean Dry Bulb Thermometer, above computed Mean Dew Point,   | .. | .... | 4.1  |

|                                             |    |      | Inches. |
|---------------------------------------------|----|------|---------|
| Mean elastic force of vapour for the month, | .. | .... | 0.949   |

|                                                                         |    |      | Troy grains. |
|-------------------------------------------------------------------------|----|------|--------------|
| Mean weight of vapour for the month,                                    | .. | .... | 10.20        |
| Additional weight of vapour, required for complete saturation.          | .. | .... | 1.41         |
| Mean degree of Humidity for the month, complete saturation being unity, | .. | .... | 0.88         |

|                                                    |    |      | Inches. |
|----------------------------------------------------|----|------|---------|
| Rained 25 days. Max. fall of Rain during 24 hours, | .. | .... | 1.50    |
| Total amount of rain during the month,             | .. | .... | 10.30   |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of August, 1856.*

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind  
blew, together with the number of days on which at the same hour,  
when any particular wind was blowing it rained.

| Date.     | N.           | Rain on.<br>N. E. | Rain on.<br>E. | Rain on.<br>S. E. | Rain on.<br>S. | Rain on.<br>S. W. | Rain on.<br>W. | Rain on.<br>N. W. | Rain on.<br>Calm. | Rain on. |
|-----------|--------------|-------------------|----------------|-------------------|----------------|-------------------|----------------|-------------------|-------------------|----------|
|           | No. of days. |                   |                |                   |                |                   |                |                   |                   |          |
| Midnight. |              | 1                 | 6              | 3                 | 8              | 2                 | 9              | 2                 |                   | 1        |
| 1         |              | 1                 | 8              | 1                 | 7              | 2                 | 9              | 1                 | 1                 |          |
| 2         |              | 1                 | 6              |                   | 9              | 3                 | 8              | 1                 | 2                 | 1        |
| 3         |              | 1                 | 5              |                   | 9              | 3                 | 8              |                   | 2                 | 1        |
| 4         | 1            |                   | 6              |                   | 9              | 3                 | 7              | 1                 | 2                 | 1        |
| 5         | 1            |                   | 6              | 1                 | 9              |                   | 6              |                   | 3                 | 2        |
| 6         | 1            |                   | 8              | 1                 | 7              |                   | 6              |                   | 3                 | 2        |
| 7         | 1            | 1                 | 7              |                   | 8              | 2                 | 5              |                   | 3                 | 1        |
| 8         | 1            | 4                 | 5              |                   | 6              | 2                 | 5              |                   | 4                 |          |
| 9         |              | 5                 | 3              |                   | 3              | 1                 | 10             | 1                 | 5                 | 2        |
| 10        | 1            | 2                 | 5              | 2                 | 5              | 1                 | 8              | 2                 | 5                 | 2        |
| 11        |              | 3                 | 1              | 3                 | 1              | 5                 | 3              | 10                | 2                 | 5        |
| Noon.     |              | 3                 | 4              | 1                 | 6              | 3                 | 7              | 1                 | 6                 | 1        |
| 1         |              | 2                 | 4              | 2                 | 7              | 1                 | 9              | 1                 | 4                 |          |
| 2         |              | 1                 | 4              | 2                 | 8              | 3                 | 9              |                   | 4                 |          |
| 3         |              | 1                 | 4              | 1                 | 7              | 2                 | 10             | 1                 | 4                 |          |
| 4         |              |                   | 4              | 3                 | 11             | 2                 | 8              |                   | 3                 |          |
| 5         |              |                   | 4              |                   | 10             | 1                 | 9              | 1                 | 2                 |          |
| 6         |              |                   | 3              | 1                 | 11             | 1                 | 8              |                   | 2                 |          |
| 7         |              |                   | 4              |                   | 10             | 2                 | 9              | 1                 | 1                 | 1        |
| 8         |              |                   | 4              |                   | 10             |                   | 10             | 2                 | 1                 | 1        |
| 9         |              |                   | 5              | 1                 | 9              | 2                 | 10             |                   | 1                 | 1        |
| 10        |              |                   | 5              |                   | 9              |                   | 10             | 2                 | 1                 | 1        |
| 11        |              |                   | 5              | 2                 | 9              |                   | 10             | 2                 | 1                 | 1        |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of September, 1856.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the level of the Sea, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | 29.476                                          | 29.530                                    | 29.400  | 0.130   | 85.5                          | 91.6                                          | 81.1 | 10.5  |
| 2     | .360                                            | .474                                      | .265    | .209    | 83.3                          | 88.0                                          | 80.7 | 7.3   |
| 3     | .290                                            | .529                                      | .156    | .373    | 80.8                          | 83.2                                          | 79.0 | 4.2   |
| 4     | .638                                            | .723                                      | .551    | .172    | 84.0                          | 88.6                                          | 80.8 | 7.8   |
| 5     | .707                                            | .783                                      | .630    | .153    | 85.1                          | 90.2                                          | 81.3 | 8.9   |
| 6     | .648                                            | .702                                      | .590    | .112    | 85.8                          | 90.6                                          | 82.8 | 7.8   |
| 7     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 8     | .706                                            | .754                                      | .665    | .089    | 85.1                          | 90.8                                          | 82.1 | 8.7   |
| 9     | .686                                            | .756                                      | .600    | .150    | 85.1                          | 90.2                                          | 81.8 | 8.4   |
| 10    | .655                                            | .712                                      | .591    | .121    | 82.6                          | 89.6                                          | 78.4 | 11.2  |
| 11    | .628                                            | .683                                      | .565    | .118    | 82.7                          | 88.8                                          | 79.6 | 9.2   |
| 12    | .668                                            | .728                                      | .606    | .122    | 83.7                          | 90.8                                          | 80.6 | 10.2  |
| 13    | .750                                            | .820                                      | .685    | .135    | 82.7                          | 86.0                                          | 80.6 | 5.4   |
| 14    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 15    | .784                                            | .859                                      | .715    | .144    | 81.5                          | 84.6                                          | 79.6 | 5.0   |
| 16    | .676                                            | .742                                      | .571    | .171    | 84.1                          | 89.0                                          | 80.2 | 8.8   |
| 17    | .602                                            | .674                                      | .521    | .153    | 85.5                          | 90.3                                          | 82.1 | 8.2   |
| 18    | .620                                            | .759                                      | .519    | .240    | 80.7                          | 84.4                                          | 79.0 | 5.4   |
| 19    | .763                                            | .821                                      | .698    | .123    | 79.5                          | 82.9                                          | 76.6 | 6.3   |
| 20    | .755                                            | .832                                      | .699    | .133    | 81.1                          | 86.2                                          | 77.0 | 9.2   |
| 21    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 22    | .803                                            | .865                                      | .732    | .133    | 84.2                          | 89.8                                          | 80.3 | 9.5   |
| 23    | .787                                            | .870                                      | .683    | .187    | 84.5                          | 89.8                                          | 80.6 | 9.2   |
| 24    | .729                                            | .801                                      | .645    | .156    | 84.8                          | 90.3                                          | 80.7 | 9.6   |
| 25    | .704                                            | .772                                      | .625    | .147    | 84.7                          | 90.0                                          | 81.4 | 8.6   |
| 26    | .732                                            | .801                                      | .659    | .142    | 84.2                          | 88.5                                          | 81.2 | 7.3   |
| 27    | .767                                            | .827                                      | .696    | .131    | 83.4                          | 88.6                                          | 80.8 | 7.8   |
| 28    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 29    | .762                                            | .834                                      | .688    | .146    | 82.8                          | 88.8                                          | 80.4 | 8.4   |
| 30    | .807                                            | .877                                      | .748    | .129    | 81.1                          | 84.2                                          | 79.6 | 4.6   |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of September, 1856.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| 1     | 80.9                            | 4.6                 | 78.6                | 6.9                          | 0.958                            | 10.23                                            | 2.49                                                                    | 0.80                                                                |
| 2     | 80.4                            | 2.9                 | 78.9                | 4.4                          | .967                             | .39                                              | 1.54                                                                    | .87                                                                 |
| 3     | 79.0                            | 1.8                 | 78.1                | 2.7                          | .943                             | .16                                              | 0.91                                                                    | .92                                                                 |
| 4     | 81.1                            | 2.9                 | 79.6                | 4.4                          | .989                             | .60                                              | 1.57                                                                    | .87                                                                 |
| 5     | 81.3                            | 3.8                 | 79.4                | 5.7                          | .983                             | .49                                              | 2.08                                                                    | .84                                                                 |
| 6     | 82.1                            | 3.7                 | 80.2                | 5.6                          | 1.008                            | .75                                              | .08                                                                     | .84                                                                 |
| 7     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 8     | 81.7                            | 3.4                 | 80.0                | 5.1                          | .001                             | .70                                              | 1.87                                                                    | .85                                                                 |
| 9     | 81.7                            | 3.4                 | 80.0                | 5.1                          | .001                             | .70                                              | .87                                                                     | .85                                                                 |
| 10    | 79.8                            | 2.8                 | 78.4                | 4.2                          | 0.952                            | .23                                              | .45                                                                     | .88                                                                 |
| 11    | 80.0                            | 2.7                 | 78.6                | 4.1                          | .958                             | .30                                              | .42                                                                     | .88                                                                 |
| 12    | 80.5                            | 3.2                 | 78.9                | 4.8                          | .967                             | .37                                              | .70                                                                     | .86                                                                 |
| 13    | 79.6                            | 3.1                 | 78.0                | 4.7                          | .940                             | .09                                              | .63                                                                     | .86                                                                 |
| 14    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 15    | 79.4                            | 2.1                 | 78.3                | 3.2                          | .949                             | .22                                              | .09                                                                     | .90                                                                 |
| 16    | 80.4                            | 3.7                 | 78.5                | 5.6                          | .955                             | .23                                              | .98                                                                     | .84                                                                 |
| 17    | 81.6                            | 3.9                 | 79.6                | 5.9                          | .989                             | .56                                              | 2.16                                                                    | .83                                                                 |
| 18    | 78.6                            | 2.1                 | 77.5                | 3.2                          | .925                             | 9.98                                             | 1.06                                                                    | .90                                                                 |
| 19    | 77.4                            | 2.1                 | 76.3                | 3.2                          | .890                             | .63                                              | .03                                                                     | .90                                                                 |
| 20    | 78.7                            | 2.4                 | 77.5                | 3.6                          | .925                             | .96                                              | .21                                                                     | .89                                                                 |
| 21    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 22    | 80.6                            | 3.6                 | 78.8                | 5.4                          | .964                             | 10.34                                            | .90                                                                     | .85                                                                 |
| 23    | 80.5                            | 4.0                 | 78.5                | 6.0                          | .955                             | .23                                              | 2.12                                                                    | .83                                                                 |
| 24    | 80.8                            | 4.0                 | 78.8                | 6.0                          | .964                             | .31                                              | .15                                                                     | .83                                                                 |
| 25    | 80.7                            | 4.0                 | 78.7                | 6.0                          | .961                             | .29                                              | .13                                                                     | .83                                                                 |
| 26    | 80.7                            | 3.5                 | 78.9                | 5.3                          | .967                             | .37                                              | 1.87                                                                    | .85                                                                 |
| 27    | 80.2                            | 3.2                 | 78.6                | 4.8                          | .958                             | .28                                              | .68                                                                     | .86                                                                 |
| 28    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 29    | 79.9                            | 2.9                 | 78.4                | 4.4                          | 9.52                             | .23                                              | .52                                                                     | .87                                                                 |
| 30    | 79.2                            | 1.9                 | 78.2                | 2.9                          | .946                             | .19                                              | 0.98                                                                    | .91                                                                 |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of September, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Fahrt. | Range of the Barometer<br>for each hour during<br>the month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Temperature<br>for each hour during<br>the month. |      |       |
|----------------|--------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|----------------------------------------------------------------|------|-------|
|                |                                                  | Max.                                                         | Min.    | Diff.   |                               | Max.                                                           | Min. | Diff. |
|                | Inches.                                          | Inches.                                                      | Inches. | Inches. | o                             | o                                                              | o    | o     |
| Mid-<br>night. | 29.688                                           | 29.818                                                       | 29.262  | 0.556   | 81.9                          | 84.4                                                           | 78.6 | 5.8   |
| 1              | .672                                             | .808                                                         | .224    | .584    | 81.4                          | 83.9                                                           | 78.0 | 5.9   |
| 2              | .657                                             | .798                                                         | .209    | .589    | 81.4                          | 83.4                                                           | 78.9 | 4.5   |
| 3              | .652                                             | .792                                                         | .178    | .614    | 81.1                          | 83.6                                                           | 77.4 | 6.2   |
| 4              | .650                                             | .800                                                         | .156    | .644    | 80.9                          | 83.4                                                           | 77.4 | 6.0   |
| 5              | .658                                             | .805                                                         | .165    | .640    | 80.8                          | 83.6                                                           | 77.4 | 6.2   |
| 6              | .673                                             | .823                                                         | .176    | .647    | 80.7                          | 83.6                                                           | 77.0 | 6.6   |
| 7              | .693                                             | .840                                                         | .191    | .649    | 81.4                          | 84.0                                                           | 78.4 | 5.6   |
| 8              | .713                                             | .858                                                         | .200    | .658    | 82.5                          | 85.7                                                           | 76.6 | 9.1   |
| 9              | .724                                             | .870                                                         | .207    | .663    | 83.7                          | 87.2                                                           | 78.0 | 9.2   |
| 10             | .727                                             | .877                                                         | .216    | .661    | 84.9                          | 88.2                                                           | 78.4 | 9.8   |
| 11             | .717                                             | .858                                                         | .243    | .615    | 86.1                          | 89.6                                                           | 78.6 | 11.0  |
| Noon.          | .698                                             | .848                                                         | .262    | .586    | 86.9                          | 90.6                                                           | 78.0 | 12.6  |
| 1              | .670                                             | .813                                                         | .284    | .529    | 87.0                          | 90.8                                                           | 80.0 | 10.8  |
| 2              | .641                                             | .780                                                         | .280    | .500    | 87.0                          | 91.6                                                           | 82.0 | 9.6   |
| 3              | .624                                             | .761                                                         | .284    | .477    | 86.1                          | 90.3                                                           | 80.6 | 9.7   |
| 4              | .613                                             | .762                                                         | .279    | .483    | 85.8                          | 90.3                                                           | 79.8 | 10.5  |
| 5              | .616                                             | .748                                                         | .280    | .468    | 85.0                          | 89.4                                                           | 80.2 | 9.2   |
| 6              | .629                                             | .766                                                         | .265    | .501    | 84.0                          | 87.8                                                           | 78.4 | 9.4   |
| 7              | .650                                             | .794                                                         | .287    | .507    | 83.4                          | 86.4                                                           | 79.4 | 7.0   |
| 8              | .676                                             | .825                                                         | .311    | .514    | 82.9                          | 85.8                                                           | 80.0 | 5.8   |
| 9              | .698                                             | .843                                                         | .323    | .520    | 82.6                          | 85.4                                                           | 79.8 | 5.6   |
| 10             | .707                                             | .854                                                         | .319    | .535    | 82.3                          | 85.2                                                           | 79.3 | 5.9   |
| 11             | .702                                             | .854                                                         | .307    | .547    | 81.9                          | 84.7                                                           | 78.6 | 6.1   |

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in the month of September, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb<br>Thermometer. | Dry Bulb above Wet. | Computed Dew point. | Dry Bulb above Dew<br>point. | Mean elastic force of<br>Vapour. | Mean Weight of Va-<br>pour in a Cubic foot<br>of Air. | Additional weight of<br>vapour required for<br>complete saturation. | Mean degree of hu-<br>midity, complete satu-<br>ration being unity. |
|----------------|-------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                             | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                           |                                                                     |
| Mid-<br>night. | 79.9                          | 2.0                 | 78.9                | 3.0                          | 0.967                            | 10.41                                                 | 1.03                                                                | 0.91                                                                |
| 1              | 79.6                          | 1.8                 | 78.7                | 2.7                          | .961                             | .25                                                   | 0.92                                                                | .92                                                                 |
| 2              | 79.5                          | 1.9                 | 78.5                | 2.9                          | .955                             | .29                                                   | .98                                                                 | .91                                                                 |
| 3              | 79.3                          | 1.8                 | 78.4                | 2.7                          | .952                             | .25                                                   | .92                                                                 | .92                                                                 |
| 4              | 79.3                          | 1.6                 | 78.5                | 2.4                          | .955                             | .31                                                   | .79                                                                 | .93                                                                 |
| 5              | 79.3                          | 1.5                 | 78.5                | 2.3                          | .955                             | .31                                                   | .76                                                                 | .93                                                                 |
| 6              | 79.3                          | 1.4                 | 78.6                | 2.1                          | .958                             | .34                                                   | .70                                                                 | .94                                                                 |
| 7              | 79.8                          | 1.6                 | 79.0                | 2.4                          | .970                             | .46                                                   | .81                                                                 | .93                                                                 |
| 8              | 80.0                          | 2.5                 | 78.7                | 3.8                          | .961                             | .33                                                   | 1.31                                                                | .89                                                                 |
| 9              | 80.5                          | 3.2                 | 78.9                | 4.8                          | .967                             | .37                                                   | .70                                                                 | .86                                                                 |
| 10             | 80.8                          | 4.1                 | 78.7                | 6.2                          | .961                             | .29                                                   | 2.20                                                                | .82                                                                 |
| 11             | 81.2                          | 4.9                 | 78.7                | 7.4                          | .961                             | .26                                                   | .69                                                                 | .79                                                                 |
| Noon.          | 81.4                          | 5.5                 | 78.6                | 8.3                          | .958                             | .21                                                   | 3.04                                                                | .77                                                                 |
| 1              | 81.4                          | 5.6                 | 78.6                | 8.4                          | .958                             | .21                                                   | .08                                                                 | .77                                                                 |
| 2              | 81.3                          | 5.7                 | 78.4                | 8.6                          | .952                             | .12                                                   | .17                                                                 | .76                                                                 |
| 3              | 81.1                          | 5.0                 | 78.6                | 7.5                          | .958                             | .21                                                   | 2.74                                                                | .79                                                                 |
| 4              | 81.0                          | 4.8                 | 78.6                | 7.2                          | .958                             | .23                                                   | .60                                                                 | .80                                                                 |
| 5              | 80.6                          | 4.4                 | 78.4                | 6.6                          | .952                             | .17                                                   | .36                                                                 | .81                                                                 |
| 6              | 80.4                          | 3.6                 | 78.6                | 5.4                          | .958                             | .28                                                   | 1.89                                                                | .85                                                                 |
| 7              | 80.4                          | 3.0                 | 78.9                | 4.5                          | .967                             | .37                                                   | .59                                                                 | .87                                                                 |
| 8              | 80.1                          | 2.8                 | 78.7                | 4.2                          | .961                             | .33                                                   | .46                                                                 | .88                                                                 |
| 9              | 80.1                          | 2.5                 | 78.8                | 3.8                          | .964                             | .36                                                   | .32                                                                 | .89                                                                 |
| 10             | 80.0                          | 2.3                 | 78.8                | 3.5                          | .964                             | .36                                                   | .22                                                                 | .90                                                                 |
| 11             | 79.9                          | 2.0                 | 78.9                | 3.0                          | .967                             | .41                                                   | .03                                                                 | .91                                                                 |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of September, 1856.*

Solar radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain.   | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                  |
|-------|-----------------------|---------|-----------------------------------|---------------------------------------------------------------------------------------------|
|       | o                     | Inches. |                                   |                                                                                             |
| 1     | 137.4                 | ..      | N. E. & E.                        | [P. M., cloudless afterwards. Cloudless till 5 A. M. scattered $\odot$ till 6               |
| 2     | ..                    | 0.45    | N. E.                             | Cloudy and constantly drizzling, also a high N. Easter was blowing during the night.        |
| 3     | ..                    | 0.80    | S. & N. E. (both blowing high)    | Cloudy and constantly raining.                                                              |
| 4     | ..                    | 0.30    | E. & S.                           | Cloudy and occasionally raining. [wards.                                                    |
| 5     | 141.0                 | ..      | S.                                | Cloudless till 6 A. M., scattered $\odot$ afterwards.                                       |
| 6     | 128.0                 | ..      | W.                                | Scattered clouds.                                                                           |
| 7     | <i>Sunday.</i>        | 2.30    | ..                                |                                                                                             |
| 8     | 122.6                 | ..      | Variable.                         | Scattered clouds.                                                                           |
| 9     | 123.0                 | ..      | S. & S. W.                        | Cloudless till 6 A. M., cloudy afterwards.                                                  |
| 10    | 126.0                 | 0.66    | Variable.                         | Cloudy and also rain between 4 & 5 P. M.                                                    |
| 11    | 127.0                 | 0.12    | E. & N.                           | Scattered clouds.                                                                           |
| 12    | 131.0                 | 0.46    | N. E. & S.                        | Cloudless till 7 A. M., scattd. clouds afterwards, also a shower of rain at 3 P. M.         |
| 13    | ..                    | ..      | S. E. & N. E. & E.                | Scattered clouds.                                                                           |
| 14    | <i>Sunday.</i>        | 0.38    | ..                                | [wards, also a shower of rain at 10 A. M.                                                   |
| 15    | ..                    | 0.22    | E. & S.                           | Scattered $\searrow$ till 8 A. M., cloudy afterwards.                                       |
| 16    | 132.0                 | ..      | S. E. & S.                        | Cloudy till 8 A. M., scattd. $\searrow$ afterwards.                                         |
| 17    | 131.4                 | ..      | N. W. & W.                        | Cloudless till 4 A. M., scattd. clouds afterwards.                                          |
| 18    | ..                    | 1.32    | W. & E.                           | Cloudy and constantly drizzling.                                                            |
| 19    | ..                    | 0.56    | E. (high) & S.                    | Cloudy and occasionally raining.                                                            |
| 20    | 117.0                 | ..      | E. & S.                           | Scattered $\odot$ .                                                                         |
| 21    | <i>Sunday.</i>        | 0.28    | ..                                | [P. M., cloudless afterwards.                                                               |
| 22    | 137.0                 | ..      | S.                                | Scattd. $\searrow$ till 7 A. M., scattd. $\odot$ till 6                                     |
| 23    | 135.0                 | ..      | S.                                | Cloudless till 6 A. M., scattd. $\odot$ afterwards.                                         |
| 24    | 142.5                 | ..      | S.                                | Cloudless till 6 A. M., scattd. $\odot$ afterwards.                                         |
| 25    | 136.0                 | ..      | S.                                | Scattd. clouds of various kinds till 6 P. M.                                                |
| 26    | ..                    | ..      | S. E. & S.                        | Cloudy. [cloudless afterwards.                                                              |
| 27    | 136.4                 | 0.19    | S. E. & S.                        | Cloudless till 6 A. M., scattd. $\searrow$ afterwards also little rain at 7 A. M. & 2 P. M. |
| 28    | <i>Sunday.</i>        | ..      | ..                                | [zling occasionally.                                                                        |
| 29    | 128.0                 | 0.10    | E. & S.                           | Scattd. clouds also thundering and drizzling.                                               |
| 30    | ..                    | 0.88    | E & S.                            | Scattd. clouds till 6 P. M., cloudless afterwards, also raining at 5 A. M. & 4 P. M.        |

$\searrow$  Cirri,  $\searrow$  Cirro-strati,  $\odot$  Cumuli,  $\searrow$  Cumulo-strati,  $\searrow$  Nimbi, —i Strati,  $\searrow$  Cirro-cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
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for the month of September, 1856.*

MONTHLY RESULTS.

|                                                                         |    |    | Inches.     |
|-------------------------------------------------------------------------|----|----|-------------|
| Mean height of the Barometer for the month,                             | .. | .. | 29.673      |
| Max. height of the Barometer, occurred at 10 A. M. on the 30th,         | .. | .. | 29.877      |
| Min. height of the Barometer, occurred at 4 A. M. on the 3d,            | .. | .. | 29.156      |
| Extreme range of the Barometer, during the month,                       | .. | .. | 0.721       |
|                                                                         |    |    | o           |
| Mean Dry Bulb Thermometer for the month,                                | .. | .. | 83.4        |
| Max. Temperature, occurred at 2 P. M. on the 1st,                       | .. | .. | 91.6        |
| Min. Temperature, occurred at 8 A. M. on the 19th,                      | .. | .. | 76.6        |
| Extreme range of the Temperature, during the month,                     | .. | .. | 15.0        |
|                                                                         |    |    | o           |
| Mean Wet Bulb Thermometer for the month,                                | .. | .. | 80.3        |
| Mean Dry Bulb Thermometer, above Mean Wet Bulb Thermometer,             | .. | .. | 3.1         |
| Computed Mean Dew-point for the month,                                  | .. | .. | 78.7        |
| Mean Dry Bulb Thermometer above computed Mean Dew-point,                | .. | .. | 4.7         |
|                                                                         |    |    | Inches.     |
| Mean elastic force of vapour for the month,                             | .. | .. | 0.961       |
|                                                                         |    |    | Troy grains |
| Mean weight of vapour for the month,                                    | .. | .. | 10.31       |
| Additional weight of vapour required for complete saturation,           | .. | .. | 1.65        |
| Mean degree of Humidity for the month, complete saturation being unity, | .. | .. | 0.86        |
|                                                                         |    |    | Inches.     |
| Rained 19 days. Max. fall of rain during 24 hours,                      | .. | .. | 2.30        |
| Total amount of rain during the month,                                  | .. | .. | 9.02        |
| Prevailing direction of the Wind. South and East,                       | .. | .. |             |

On Wednesday the 3d, the Barometer at 4 A. M. descended to 29.156 inches, which is the lowest reading we have had for the last three years. After 4 A. M. the Barometer commenced ascending and continuously ascended till midnight: without exhibiting the usual daily tides; the highest reading of the Barometer on the midnight aforesaid of the 4th, being 29.555 inches. During the time the Barometer was indicating the unusual readings described above, it rained incessantly. Also a high North-easter blew from midnight till 9 A. M., after which a light easterly breeze sprung up which continued for three hours. Finally from 1 P. M. till midnight following there was a high southerly breeze. All this took place on the 3d; on the 4th, again the Barometer exhibited the usual daily tides, the weather remaining as unsteady as on the 3d.



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MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind  
blew, together with the number of days on which at the same hour when  
any particular wind was blowing it rained.

| Hour.     | N.           | Rain on.<br>N. E. | E. | Rain on.<br>S. E. | S. | Rain on.<br>S. W. | W. | Rain on.<br>N. W. | Calm. | Rain on. |
|-----------|--------------|-------------------|----|-------------------|----|-------------------|----|-------------------|-------|----------|
|           | No. of days. |                   |    |                   |    |                   |    |                   |       |          |
| Midnight. | 1            | 2                 | 6  | 3                 | 10 |                   | 2  | 1                 | 2     |          |
| 1         | 1            | 2                 | 6  | 2                 | 9  |                   | 2  | 1                 | 4     |          |
| 2         | 1            | 2                 | 1  | 5                 | 9  | 1                 | 1  | 1                 | 2     |          |
| 3         | 1            | 2                 | 1  | 6                 | 10 |                   | 1  | 1                 | 2     |          |
| 4         | 1            | 2                 | 1  | 6                 | 9  | 1                 | 1  | 1                 | 2     | 1        |
| 5         | 1            | 1                 | 1  | 6                 | 9  | 3                 | 1  | 1                 | 1     | 1        |
| 6         | 3            | 4                 | 4  | 1                 | 6  | 3                 | 3  | 1                 |       |          |
| 7         | 1            | 5                 | 1  | 4                 | 8  | 3                 | 3  |                   | 1     |          |
| 8         | 2            | 5                 | 1  | 6                 | 6  | 1                 | 3  |                   |       |          |
| 9         |              | 6                 | 4  | 1                 | 4  | 6                 | 3  | 1                 |       |          |
| 10        | 1            | 4                 | 6  | 5                 | 5  | 1                 | 3  | 1                 | 1     |          |
| 11        | 1            | 5                 | 4  | 1                 | 2  | 5                 | 2  | 6                 | 1     |          |
| Noon.     |              | 5                 | 6  | 2                 | 4  | 5                 | 4  | 1                 |       |          |
| 1         |              | 5                 | 1  | 5                 | 1  | 2                 | 5  | 1                 | 2     |          |
| 2         | 1            | 1                 | 1  | 6                 | 1  | 4                 | 4  | 1                 | 1     |          |
| 3         |              | 1                 | 1  | 3                 | 2  | 7                 | 5  | 2                 | 2     |          |
| 4         |              | 4                 | 2  | 4                 | 1  | 4                 | 8  | 1                 | 1     |          |
| 5         |              | 3                 | 1  | 6                 | 1  | 3                 | 11 | 1                 | 1     |          |
| 6         |              | 3                 | 5  | 5                 | 5  | 10                | 1  | 1                 | 1     |          |
| 7         | 2            | 2                 | 5  | 2                 | 2  | 13                | 2  | 1                 |       | 1        |
| 8         | 1            | 3                 | 1  | 4                 | 1  | 2                 | 13 |                   | 2     |          |
| 9         |              | 3                 | 6  | 2                 | 2  | 13                |    | 2                 |       |          |
| 10        | 1            | 2                 | 6  | 2                 | 2  | 12                | 1  | 1                 |       |          |
| 11        | 1            | 2                 | 5  | 1                 | 3  | 11                |    | 1                 | 1     |          |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of July, 1856.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.     |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                        |
| 1     | 29.032     | 99.8         | 99.4    | 81.5      | N. E.              | ..                | ☼ scattered in zenith. |
| 2     | 29.037     | 98.8         | 98.9    | 81.0      | N. W.              | ..                | ☼ very few scattered.  |
| 3     | 29.083     | 88.9         | 88.0    | 80.5      | N. E.              | ..                | ☼ scattered.           |
| 4     | 29.113     | 84.8         | 83.8    | 79.5      | N. E.              | ..                | ☼ all over.            |
| 5     | 29.087     | 87.3         | 86.9    | 82.3      | N. E.              | ..                | ☼ scattered.           |
| 6     | 29.063     | 86.8         | 87.0    | 82.0      | S. E.              | ..                | ☼ ditto.               |
| 7     | 29.125     | 88.9         | 88.9    | 81.9      | S. W.              | ..                | ☼ ditto.               |
| 8     | 29.105     | 89.5         | 89.5    | 80.5      | N. W.              | ..                | ☼ ditto.               |
| 9     | 29.079     | 86.9         | 87.9    | 83.3      | W.                 | 1.12              | ☼ ditto.               |
| 10    | 29.055     | 85.6         | 86.6    | 82.1      | S. W.              | 1.12              | ☼ all over.            |
| 11    | 29.019     | 90.5         | 90.9    | 80.4      | N. W.              | ..                | ☼ Clear.               |
| 12    | 29.055     | 89.9         | 88.6    | 82.5      | E.                 | ..                | ☼ scattered all over.  |
| 13    | 29.081     | 87.0         | 87.0    | 83.2      | E.                 | 0.27              | ☼ ditto.               |
| 14    | 29.063     | 86.5         | 86.5    | 82.9      | S. E.              | ..                | ☼ all over.            |
| 15    | 29.023     | 87.9         | 88.0    | 84.2      | S. W.              | ..                | ☼ ditto.               |
| 16    | 28.995     | 79.5         | 79.8    | 79.0      | N. W.              | ..                | ☼ ditto.               |
| 17    | 29.003     | 79.9         | 80.0    | 75.5      | N. W.              | 1.37              | ☼ ditto.               |
| 18    | 29.993     | 79.2         | 79.5    | 78.2      | W.                 | ..                | ☼ ditto.               |
| 19    | 29.027     | 81.8         | 81.4    | 80.0      | N. W.              | ..                | ☼ ditto.               |
| 20    | 29.055     | 86.4         | 86.8    | 83.0      | N.                 | ..                | ☼ scattered.           |
| 21    | 29.075     | 90.8         | 90.8    | 84.6      | N. E.              | ..                | ☼ ditto.               |
| 22    | 29.059     | 92.8         | 92.4    | 83.9      | N. E.              | ..                | ☼ ditto.               |
| 23    | 29.077     | 90.3         | 90.0    | 82.1      | N.                 | ..                | ☼ ditto.               |
| 24    | 29.017     | 88.3         | 89.0    | 81.9      | E.                 | 0.15              | ☼ ditto.               |
| 25    | 29.051     | 87.0         | 87.4    | 82.5      | S. E.              | ..                | ☼ ditto.               |
| 26    | 29.055     | 87.0         | 87.0    | 83.5      | N. E.              | 1.00              | ☼ ditto.               |
| 27    | 29.025     | 85.2         | 85.2    | 82.0      | S. E.              | ..                | ☼ all over.            |
| 28    | 29.005     | 85.9         | 85.8    | 80.5      | E.                 | ..                | ☼ scattered.           |
| 29    | 29.067     | 84.2         | 84.5    | 80.5      | E.                 | ..                | ☼ all over.            |
| 30    | 29.050     | 86.9         | 86.9    | 82.9      | N. E.              | ..                | ☼ ditto.               |
| 31    | 29.019     | 87.0         | 87.4    | 82.1      | N. W.              | ..                | ☼ scattered.           |
| Mean. | 29.051     | 87.4         | 87.5    | 81.7      |                    | 5.03              |                        |

*Note.*—The dry bulb and maximum Register do not agree; the former always reads more than the latter. The average difference is 1.6.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of July, 1856.*

## Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.    |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|-----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                       |
| 1     | 29.017     | 192.9        | 102.6   | 83.5      | N. E.              | ..                | Clear.                |
| 2     | 29.031     | 101.0        | 101.2   | 82.5      | N. W.              | ..                | ~ scattered all over. |
| 3     | 29.073     | 90.8         | 90.0    | 82.0      | N. E.              | ..                | ~ scattered.          |
| 4     | 29.113     | 85.6         | 85.0    | 81.5      | E.                 | ..                | ~ all over.           |
| 5     | 29.057     | 90.0         | 89.5    | 84.0      | N.                 | ..                | ~ scattered.          |
| 6     | 29.051     | 90.3         | 90.5    | 83.5      | S. E.              | ..                | Ditto.                |
| 7     | 29.115     | 91.0         | 92.0    | 83.0      | N. W.              | ..                | Ditto.                |
| 8     | 29.083     | 92.0         | 93.0    | 82.0      | N. W.              | ..                | ~ Ditto.              |
| 9     | 29.069     | 90.5         | 91.1    | 83.5      | W.                 | ..                | ~ Ditto.              |
| 10    | 29.047     | 89.0         | 89.2    | 82.0      | W.                 | ..                | ~ all over.           |
| 11    | 29.013     | 93.5         | 93.4    | 80.2      | N. W.              | ..                | ~ scattered.          |
| 12    | 29.055     | 90.8         | 90.1    | 83.5      | E.                 | ..                | ~ scattered over.     |
| 13    | 29.063     | 88.0         | 87.5    | 82.9      | N. E.              | ..                | ~ all over.           |
| 14    | 29.033     | 88.9         | 89.5    | 84.5      | S. E.              | ..                | ~ scattered all over. |
| 15    | 29.001     | 88.3         | 88.0    | 83.9      | N. E.              | ..                | ~ all over.           |
| 16    | 28.983     | 81.9         | 82.2    | 80.9      | N. W.              | ..                | Ditto.                |
| 17    | 29.003     | 82.0         | 81.9    | 79.5      | N. W.              | ..                | Ditto.                |
| 18    | 28.987     | 81.0         | 81.1    | 80.0      | W.                 | ..                | Ditto.                |
| 19    | 29.041     | 80.9         | 80.6    | 79.5      | N. W.              | ..                | Ditto.                |
| 20    | 29.027     | 87.8         | 88.2    | 83.5      | N.                 | ..                | ~ scattered.          |
| 21    | 29.059     | 90.9         | 91.5    | 84.9      | N.                 | ..                | Ditto.                |
| 22    | 29.071     | 94.2         | 94.5    | 84.2      | S. E.              | ..                | Ditto.                |
| 23    | 29.071     | 92.4         | 92.1    | 82.5      | N. E.              | ..                | Ditto.                |
| 24    | 29.013     | 96.6         | 90.0    | 81.9      | E.                 | ..                | Ditto.                |
| 25    | 29.051     | 87.9         | 87.5    | 83.0      | S. E.              | ..                | Ditto.                |
| 26    | 29.045     | 85.8         | 84.5    | 82.1      | N. E.              | ..                | ~ all over.           |
| 27    | 29.003     | 87.0         | 87.5    | 82.0      | E.                 | ..                | ~ scattered.          |
| 28    | 28.955     | 86.9         | 86.9    | 81.0      | E.                 | ..                | ~ all over.           |
| 29    | 29.061     | 86.5         | 87.0    | 81.0      | E.                 | ..                | Ditto.                |
| 30    | 29.035     | 85.0         | 84.0    | 81.5      | N. E.              | ..                | Ditto.                |
| 31    | 28.995     | 85.5         | 83.0    | 80.9      | W.                 | ..                | Ditto.                |
| Mean. | 29.039     | 89.0         | 88.8    | 82.2      |                    |                   |                       |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of July, 1856.*

Minimum pressure observed at 4 p. m.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky.  | Direction of Wind. | Quantity of Rain. |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|---------------------|--------------------|-------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                     |                    |                   |
| 1     | 28.927     | 107.8        | 108.0   | 85.0      | 107.0                | 100.0    | 98.5  | ☁ scattered in zen. | N. E.              | ..                |
| 2     | 28.931     | 83.9         | 84.5    | 80.0      | 104.0                | 88.0     | 96.0  | ☁ all over.         | N.                 | 1.22              |
| 3     | 28.993     | 91.9         | 90.5    | 82.4      | 92.0                 | 79.0     | 85.5  | ☁ scattered.        | E.                 | ..                |
| 4     | 29.057     | 86.0         | 86.0    | 82.5      | 86.0                 | 81.0     | 83.5  | ☁ all over.         | N. E.              | 0.12              |
| 5     | 29.005     | 85.9         | 85.4    | 81.2      | 90.0                 | 81.0     | 85.5  | ☁ scattd. all over. | N. E.              | ..                |
| 6     | 28.987     | 95.5         | 95.0    | 84.4      | 96.0                 | 80.0     | 88.0  | ☁ scattered.        | E.                 | ..                |
| 7     | 29.031     | 88.9         | 87.2    | 79.5      | 96.2                 | 81.0     | 88.6  | ☁ all over.         | N. W.              | ..                |
| 8     | 29.005     | 90.5         | 89.9    | 81.6      | 95.0                 | 82.0     | 88.5  | ☁ scattd. all over. | W.                 | ..                |
| 9     | 28.975     | 95.2         | 94.9    | 83.5      | 95.2                 | 75.0     | 85.1  | ☁ all over.         | W.                 | ..                |
| 10    | 28.969     | 94.0         | 93.8    | 81.7      | 93.2                 | 74.5     | 83.85 | ☁ scattered in zen. | N. W.              | ..                |
| 11    | 28.933     | 97.8         | 97.4    | 82.5      | 97.2                 | 82.3     | 89.75 | Clear.              | N. W.              | ..                |
| 12    | 29.005     | 93.0         | 91.5    | 83.0      | 93.5                 | 85.0     | 89.25 | ☁ scattd. all over. | E.                 | ..                |
| 13    | 29.011     | 85.5         | 84.8    | 81.5      | 88.0                 | 82.0     | 85.0  | ☁ ditto.            | N.                 | ..                |
| 14    | 28.955     | 89.0         | 88.9    | 83.5      | 89.5                 | 80.8     | 85.15 | ☁ ditto.            | E.                 | ..                |
| 15    | 28.939     | 88.0         | 87.0    | 82.2      | 88.5                 | 81.8     | 85.15 | ☁ all over.         | N. E.              | ..                |
| 16    | 28.915     | 85.0         | 84.9    | 81.5      | 84.5                 | 75.2     | 79.85 | ☁ ditto.            | N. W.              | ..                |
| 17    | 28.959     | 83.0         | 82.9    | 80.5      | 83.0                 | 77.8     | 80.4  | ☁ ditto.            | N. W.              | ..                |
| 18    | 28.941     | 81.0         | 81.0    | 80.0      | 81.2                 | 76.8     | 79.0  | ☁ ditto.            | W.                 | 0.17              |
| 19    | 28.963     | 82.9         | 82.5    | 80.0      | 82.5                 | 78.0     | 80.25 | ☁ ditto.            | N.                 | .42               |
| 20    | 28.977     | 92.5         | 91.9    | 85.0      | 92.0                 | 77.9     | 84.95 | ☁ scattered.        | N.                 | ..                |
| 21    | 29.029     | 95.2         | 95.0    | 85.0      | 95.2                 | 84.0     | 89.6  | ☁ ditto.            | N. E.              | ..                |
| 22    | 28.977     | 97.9         | 96.8    | 84.5      | 97.1                 | 85.0     | 91.05 | ☁ ditto.            | S. E.              | ..                |
| 23    | 28.965     | 93.0         | 90.0    | 81.5      | 93.5                 | 84.0     | 88.75 | ☁ ditto.            | E.                 | ..                |
| 24    | 28.937     | 89.0         | 89.8    | 84.0      | 90.0                 | 82.5     | 86.25 | ☁ ditto.            | E.                 | ..                |
| 25    | 29.001     | 91.5         | 91.5    | 83.4      | 91.2                 | 80.8     | 86.0  | ☁ ditto.            | S. E.              | ..                |
| 26    | 28.965     | 83.0         | 82.5    | 81.0      | 87.2                 | 80.5     | 83.85 | ☁ all over.         | N.                 | 0.77              |
| 27    | 28.941     | 85.0         | 86.0    | 83.0      | 88.5                 | 79.8     | 84.15 | ☁ scattered.        | S.                 | 0.52              |
| 28    | 28.903     | 86.9         | 86.9    | 81.0      | 87.0                 | 80.2     | 83.6  | ☁ all over.         | E.                 | 0.62              |
| 29    | 29.001     | 89.9         | 89.5    | 81.9      | 89.5                 | 79.2     | 84.35 | ☁ ditto.            | S. E.              | ..                |
| 30    | 28.977     | 88.9         | 88.0    | 82.3      | 89.3                 | 81.2     | 85.25 | ☁ ditto.            | N. W.              | 0.32              |
| 31    | 28.967     | 83.9         | 84.0    | 82.0      | 88.0                 | 82.0     | 85.0  | ☁ ditto.            | S. W.              | 0.92              |
| Mean. | 28.972     | 89.7         | 89.3    | 81.3      | 91.3                 | 80.9     | 86.11 |                     |                    | 5.08              |



*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of August, 1856.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.    |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|-----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                       |
| 1     | 29.063     | 84.0         | 85.0    | 81.0      | N. E.              | ..                | ~ all over.           |
| 2     | 29.021     | 84.2         | 84.5    | 82.1      | N. E.              | 1.57              | ~ ditto.              |
| 3     | 29.073     | 84.5         | 84.0    | 81.0      | W.                 | ..                | ~ ditto.              |
| 4     | 29.157     | 81.0         | 81.0    | 79.9      | E.                 | ..                | ~ ditto.              |
| 5     | 29.181     | 84.0         | 85.5    | 81.5      | E.                 | ..                | ~ ditto.              |
| 6     | 29.201     | 83.9         | 83.5    | 79.9      | E.                 | 0.17              | ~ ditto.              |
| 7     | 29.201     | 83.0         | 83.6    | 80.0      | S. W.              | ..                | ~ scattered.          |
| 8     | 29.137     | 84.9         | 85.0    | 80.0      | W.                 | 0.20              | ~ ditto all over.     |
| 9     | 29.179     | 83.0         | 83.5    | 78.5      | N. W.              | ..                | ~ all over.           |
| 10    | 29.155     | 83.5         | 84.0    | 79.0      | N. W.              | ..                | ~ ditto.              |
| 11    | 29.177     | 84.0         | 84.3    | 79.2      | N. W.              | ..                | ~ ditto.              |
| 12    | 29.219     | 84.5         | 84.9    | 81.0      | N.                 | ..                | ~ ditto.              |
| 13    | 29.227     | 84.8         | 84.1    | 80.4      | N. W.              | ..                | ~ ditto.              |
| 14    | 29.205     | 87.0         | 88.0    | 83.4      | W.                 | ..                | ~ ditto.              |
| 15    | 29.159     | 86.2         | 86.0    | 80.9      | S. W.              | ..                | ~ ditto.              |
| 16    | 29.109     | 78.0         | 78.0    | 77.0      | W.                 | ..                | ~ ditto.              |
| 17    | 29.135     | 80.0         | 80.9    | 78.5      | S.                 | 0.92              | ~ ditto.              |
| 18    | 29.157     | 82.0         | 83.0    | 80.0      | S. E.              | 1.92              | ~ ditto.              |
| 19    | 29.205     | 85.0         | 85.4    | 81.4      | N. E.              | 0.32              | ~ ditto.              |
| 20    | 29.267     | 85.0         | 84.9    | 80.5      | N. E.              | ..                | ~ scattered.          |
| 21    | 29.243     | 84.0         | 84.0    | 80.2      | E.                 | ..                | ~ all over.           |
| 22    | 29.245     | 85.0         | 85.5    | 81.0      | E.                 | ..                | ~ ditto.              |
| 23    | 29.203     | 85.5         | 86.0    | 81.1      | E.                 | ..                | ~ scattered.          |
| 24    | 29.187     | 83.0         | 82.8    | 80.0      | S. E.              | ..                | ~ all over.           |
| 25    | 29.199     | 84.9         | 85.5    | 81.0      | W.                 | ..                | ~ ditto.              |
| 26    | 29.203     | 79.8         | 79.9    | 78.9      | W.                 | 1.42              | ~ ditto.              |
| 27    | 29.225     | 80.9         | 82.4    | 79.5      | N. E.              | 1.40              | ~ ditto.              |
| 28    | 29.255     | 83.3         | 83.9    | 79.9      | S. W.              | ..                | ~ ditto.              |
| 29    | 29.219     | 85.1         | 85.9    | 82.0      | S. W.              | ..                | ~ ditto.              |
| 30    | 29.183     | 85.9         | 86.4    | 82.1      | N. E.              | ..                | ~ scattered all over. |
| 31    | 29.115     | 82.9         | 84.0    | 81.0      | N. E.              | ..                | ~ scattered.          |
| Mean. | 29.177     | 83.6         | 84.0    | 80.3      |                    | 7.92              |                       |

Barometer Observations corrected for Capillarity only.

|          |   |   |                  |
|----------|---|---|------------------|
| Symbols. | { | \ | Cirrus.          |
|          | { | ∟ | Cirro strata.    |
|          | { | ∩ | Cumuli.          |
|          | { | ∩ | Cumulo strata.   |
|          | { | ~ | Nimbi or Nimbus. |

*Note.*—The dry bulb and maximum Register do not agree; the former always reads more than the latter. The average difference is 1.6.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of August, 1856.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.    |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|-----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                       |
| 1     | 29.047     | 86.1         | 87.0    | 82.5      | E.                 | ..                | ✓ scattered all over. |
| 2     | 29.001     | 84.9         | 88.2    | 82.1      | E.                 | ..                | „ all over.           |
| 3     | 29.063     | 85.0         | 84.5    | 81.0      | W.                 | ..                | „ ditto.              |
| 4     | 29.141     | 83.9         | 83.5    | 80.5      | E.                 | ..                | „ ditto.              |
| 5     | 29.165     | 82.8         | 83.4    | 81.9      | W.                 | ..                | „ ditto.              |
| 6     | 29.177     | 85.2         | 86.0    | 80.0      | E.                 | ..                | „ ditto.              |
| 7     | 29.183     | 86.0         | 86.9    | 81.8      | S. W.              | ..                | „ scattered.          |
| 8     | 29.105     | 86.9         | 87.0    | 81.0      | W.                 | ..                | „ ditto all over.     |
| 9     | 29.142     | 84.9         | 84.6    | 78.4      | W.                 | ..                | „ all over.           |
| 10    | 29.129     | 85.8         | 86.2    | 79.7      | N. W.              | ..                | „ ditto.              |
| 11    | 29.133     | 86.2         | 86.9    | 80.0      | N. W.              | ..                | „ ditto.              |
| 12    | 29.203     | 86.9         | 86.5    | 81.8      | N.                 | ..                | „ ditto.              |
| 13    | 29.203     | 86.0         | 86.5    | 82.2      | N. W.              | ..                | „ ditto.              |
| 14    | 29.199     | 89.0         | 87.3    | 82.5      | W.                 | ..                | „ ditto.              |
| 15    | 29.131     | 87.9         | 88.0    | 80.5      | S. W.              | ..                | „ ditto.              |
| 16    | 29.097     | 78.9         | 78.4    | 77.5      | W.                 | ..                | „ ditto.              |
| 17    | 29.109     | 83.5         | 83.5    | 79.0      | S. W.              | ..                | „ ditto.              |
| 18    | 29.135     | 84.8         | 84.5    | 80.4      | S. E.              | ..                | „ ditto.              |
| 19    | 29.189     | 85.9         | 86.5    | 81.4      | N. E.              | ..                | „ ditto.              |
| 20    | 29.243     | 86.9         | 87.9    | 81.4      | E.                 | ..                | „ scattered.          |
| 21    | 29.225     | 85.2         | 85.2    | 81.0      | S. E.              | ..                | „ all over.           |
| 22    | 29.213     | 87.5         | 88.4    | 82.4      | S. E.              | ..                | „ ditto.              |
| 23    | 29.173     | 85.5         | 83.1    | 80.4      | S. E.              | ..                | „ ditto.              |
| 24    | 29.155     | 85.5         | 85.0    | 81.0      | S. E.              | ..                | „ ditto.              |
| 25    | 29.177     | 83.5         | 79.9    | 78.0      | W.                 | ..                | „ ditto.              |
| 26    | 29.189     | 81.9         | 82.2    | 79.6      | N. W.              | ..                | „ ditto.              |
| 27    | 29.205     | 82.9         | 81.6    | 80.5      | N. E.              | ..                | „ ditto.              |
| 28    | 29.217     | 85.0         | 85.5    | 80.9      | S. W.              | ..                | „ scattered all over. |
| 29    | 29.201     | 86.9         | 87.1    | 81.5      | S. W.              | ..                | „ all over.           |
| 30    | 29.155     | 87.9         | 88.5    | 82.9      | N. E.              | ..                | „ scattered all over. |
| 31    | 29.097     | 84.0         | 85.0    | 81.9      | N. E.              | ..                | „ scattered.          |
| Mean. | 29.155     | 85.2         | 85.0    | 80.8      |                    |                   |                       |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of August, 1856.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky. | Direction of Wind. | Quantity of Rain. |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------|--------------------|-------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                    |                    |                   |
| 1     | 28.973     | 85.0         | 84.0    | 81.0      | 89.0                 | 79.0     | 84.0  | all over.          | N. W.              | ..                |
| 2     | 28.957     | 83.9         | 84.0    | 82.0      | 86.5                 | 83.8     | 85.15 | ditto.             | S.                 | 0.67              |
| 3     | 29.021     | 86.0         | 86.0    | 81.4      | 85.5                 | 78.5     | 82.0  | scattered.         | W.                 | ..                |
| 4     | 29.073     | 87.8         | 87.5    | 82.2      | 87.5                 | 78.0     | 82.75 | all over.          | S.                 | 0.17              |
| 5     | 29.085     | 86.9         | 86.7    | 83.2      | 88.2                 | 78.0     | 83.1  | ditto.             | S. W.              | 0.77              |
| 6     | 29.103     | 88.9         | 87.9    | 81.0      | 89.0                 | 78.5     | 83.75 | scattered.         | E.                 | ..                |
| 7     | 29.085     | 82.0         | 83.0    | 80.9      | 89.5                 | 78.5     | 84.0  | all over.          | N. W.              | ..                |
| 8     | 29.039     | 88.9         | 88.5    | 81.6      | 89.0                 | 79.0     | 84.0  | scat.all over      | N. W.              | ..                |
| 9     | 29.079     | 85.5         | 85.0    | 77.5      | 86.0                 | 78.8     | 82.4  | all over.          | W.                 | ..                |
| 10    | 29.069     | 84.0         | 83.6    | 77.5      | 88.5                 | 79.0     | 83.75 | ditto.             | N. W.              | 0.50              |
| 11    | 29.051     | 87.9         | 88.1    | 80.5      | 88.0                 | 79.0     | 83.5  | ditto.             | N.                 | ..                |
| 12    | 29.127     | 84.9         | 84.4    | 79.5      | 87.1                 | 78.5     | 82.8  | ditto.             | N. E.              | 0.44              |
| 13    | 29.137     | 89.9         | 89.4    | 83.1      | 89.5                 | 78.5     | 84.0  | ditto.             | N. E.              | ..                |
| 14    | 29.109     | 86.9         | 86.0    | 81.3      | 90.0                 | 81.2     | 85.6  | ditto.             | N. W.              | ..                |
| 15    | 29.051     | 85.0         | 84.0    | 80.5      | 90.0                 | 79.5     | 84.75 | ditto.             | W.                 | ..                |
| 16    | 29.027     | 78.9         | 78.5    | 77.0      | 80.5                 | 75.0     | 77.75 | ditto.             | W.                 | 5.12              |
| 17    | 29.065     | 79.5         | 79.5    | 78.5      | 84.5                 | 74.5     | 79.5  | ditto.             | N.                 | ..                |
| 18    | 29.071     | 81.0         | 81.3    | 80.1      | 84.8                 | 76.9     | 80.85 | ditto.             | N. E.              | 0.22              |
| 19    | 29.123     | 85.0         | 85.0    | 82.5      | 88.5                 | 76.9     | 82.7  | ditto.             | E.                 | 0.20              |
| 20    | 29.153     | 88.9         | 88.9    | 80.9      | 88.9                 | 79.0     | 83.95 | in horizon.        | N. E.              | ..                |
| 21    | 29.133     | 84.0         | 84.5    | 81.5      | 89.0                 | 79.8     | 84.4  | all over.          | E.                 | ..                |
| 22    | 29.129     | 89.9         | 89.2    | 81.6      | 90.0                 | 77.5     | 83.75 | ditto.             | S. E.              | ..                |
| 23    | 29.095     | 89.0         | 88.0    | 82.2      | 89.0                 | 79.0     | 84.0  | ditto.             | N. E.              | ..                |
| 24    | 29.109     | 81.0         | 81.0    | 78.6      | 85.5                 | 79.0     | 82.25 | ditto.             | S. W.              | 0.62              |
| 25    | 29.105     | 79.8         | 79.6    | 78.5      | 85.2                 | 77.0     | 81.1  | ditto.             | W.                 | 1.02              |
| 26    | 29.123     | 82.9         | 82.0    | 80.0      | 84.0                 | 75.0     | 79.5  | ditto.             | N. W.              | ..                |
| 27    | 29.139     | 79.9         | 79.6    | 78.9      | 82.0                 | 77.2     | 79.6  | ditto.             | N.                 | 0.62              |
| 28    | 29.145     | 87.8         | 87.2    | 82.0      | 88.8                 | 76.0     | 82.4  | ditto.             | S. W.              | ..                |
| 29    | 29.125     | 85.5         | 83.0    | 79.5      | 90.0                 | 76.0     | 83.0  | ditto. [over.      | S.                 | ..                |
| 30    | 29.051     | 84.9         | 83.9    | 81.0      | 88.5                 | 78.9     | 83.7  | scattered all      | E.                 | ..                |
| 31    | 29.043     | 86.3         | 86.0    | 82.0      | 87.0                 | 79.5     | 83.25 | scattered.         | E.                 | ..                |
| Mean. | 29.083     | 85.1         | 85.0    | 80.5      | 87.4                 | 78.2     | 82.81 |                    |                    | 10.35             |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of October, 1856.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | °                             | °                                             | °    | °     |
| 1     | 29.840                                          | 29.894                                    | 29.779  | 0.115   | 80.9                          | 86.2                                          | 78.4 | 7.8   |
| 2     | .811                                            | .885                                      | .741    | .144    | 81.5                          | 87.0                                          | 77.6 | 9.4   |
| 3     | .762                                            | .833                                      | .703    | .130    | 81.2                          | 84.1                                          | 79.0 | 5.1   |
| 4     | .735                                            | .807                                      | .655    | .152    | 83.6                          | 88.6                                          | 79.3 | 9.3   |
| 5     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 6     | .714                                            | .793                                      | .655    | .138    | 85.1                          | 90.4                                          | 81.6 | 8.8   |
| 7     | .738                                            | .788                                      | .699    | .089    | 82.8                          | 89.0                                          | 79.0 | 10.0  |
| 8     | .779                                            | .840                                      | .724    | .116    | 81.4                          | 87.6                                          | 79.0 | 8.6   |
| 9     | .771                                            | .850                                      | .684    | .166    | 83.7                          | 89.2                                          | 79.3 | 9.9   |
| 10    | .698                                            | .784                                      | .638    | .146    | 78.8                          | 82.4                                          | 76.2 | 6.2   |
| 11    | .624                                            | .673                                      | .577    | .096    | 81.3                          | 85.0                                          | 77.0 | 8.0   |
| 12    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 13    | .758                                            | .815                                      | .713    | .102    | 81.9                          | 85.8                                          | 78.6 | 7.2   |
| 14    | .799                                            | .853                                      | .753    | .100    | 82.7                          | 88.0                                          | 79.3 | 8.7   |
| 15    | .846                                            | .906                                      | .788    | .118    | 82.6                          | 87.8                                          | 79.3 | 8.5   |
| 16    | .844                                            | .918                                      | .777    | .141    | 84.1                          | 89.4                                          | 79.4 | 10.0  |
| 17    | .831                                            | .893                                      | .778    | .115    | 83.1                          | 86.9                                          | 80.0 | 6.9   |
| 18    | .830                                            | .907                                      | .766    | .141    | 81.4                          | 87.1                                          | 77.0 | 10.1  |
| 19    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 20    | .719                                            | .785                                      | .660    | .125    | 80.0                          | 86.6                                          | 74.4 | 12.2  |
| 21    | .738                                            | .801                                      | .696    | .105    | 79.4                          | 84.8                                          | 74.1 | 10.7  |
| 22    | .738                                            | .799                                      | .684    | .115    | 79.6                          | 84.8                                          | 74.4 | 10.4  |
| 23    | .771                                            | .834                                      | .723    | .111    | 77.7                          | 83.4                                          | 72.0 | 11.4  |
| 24    | .823                                            | .884                                      | .772    | .112    | 76.9                          | 80.4                                          | 74.2 | 6.2   |
| 25    | .887                                            | .951                                      | .838    | .113    | 77.4                          | 82.8                                          | 73.0 | 9.8   |
| 26    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 27    | .918                                            | .982                                      | .852    | .130    | 80.0                          | 86.0                                          | 74.8 | 11.2  |
| 28    | .893                                            | .972                                      | .831    | .141    | 80.5                          | 87.0                                          | 74.3 | 12.7  |
| 29    | .829                                            | .898                                      | .760    | .138    | 81.3                          | 87.5                                          | 76.4 | 11.1  |
| 30    | .817                                            | .868                                      | .763    | .105    | 80.4                          | 88.6                                          | 76.6 | 12.0  |
| 31    | .894                                            | .966                                      | .812    | .154    | 76.7                          | 79.6                                          | 74.9 | 4.7   |

The Mean height of the Barometer, as likewise the Mean dry and wet Bulb Thermometers are derived, from the twenty-four hourly observations made, during the day.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of October, 1856.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon. (Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|       | °                               | °                   | °                   | °                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| 1     | 78.7                            | 2.2                 | 77.6                | 3.3                          | 0.928                            | 10.01                                            | 1.09                                                                    | 0.90                                                                |
| 2     | 79.0                            | 2.5                 | 77.7                | 3.8                          | .931                             | .02                                              | .29                                                                     | .89                                                                 |
| 3     | 79.3                            | 1.9                 | 78.3                | 2.9                          | .949                             | .22                                              | 0.99                                                                    | .91                                                                 |
| 4     | 80.4                            | 3.2                 | 78.8                | 4.8                          | .964                             | .34                                              | 1.69                                                                    | .86                                                                 |
| 5     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 6     | 81.8                            | 3.3                 | 80.1                | 5.0                          | 1.005                            | .73                                              | .84                                                                     | .85                                                                 |
| 7     | 80.2                            | 2.6                 | 78.9                | 3.9                          | 0.967                            | .39                                              | .36                                                                     | .88                                                                 |
| 8     | 78.8                            | 2.6                 | 77.5                | 3.9                          | .925                             | 9.96                                             | .31                                                                     | .88                                                                 |
| 9     | 79.8                            | 3.9                 | 77.8                | 5.9                          | .934                             | 10.01                                            | 2.06                                                                    | .83                                                                 |
| 10    | 77.1                            | 1.7                 | 76.2                | 2.6                          | .887                             | 9.60                                             | 0.84                                                                    | .92                                                                 |
| 11    | 79.4                            | 1.9                 | 78.4                | 2.9                          | .952                             | 10.25                                            | .99                                                                     | .91                                                                 |
| 12    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 13    | 79.4                            | 2.5                 | 78.1                | 3.8                          | .943                             | .14                                              | 1.30                                                                    | .89                                                                 |
| 14    | 79.2                            | 3.5                 | 77.4                | 5.3                          | .922                             | 9.91                                             | .81                                                                     | .85                                                                 |
| 15    | 79.2                            | 3.4                 | 77.5                | 5.1                          | .925                             | .94                                              | .74                                                                     | .85                                                                 |
| 16    | 80.1                            | 4.0                 | 78.1                | 6.0                          | .943                             | 10.10                                            | 2.11                                                                    | .83                                                                 |
| 17    | 79.2                            | 3.9                 | 77.2                | 5.9                          | .916                             | 9.83                                             | .03                                                                     | .83                                                                 |
| 18    | 75.2                            | 6.2                 | 72.1                | 9.3                          | .778                             | 8.38                                             | .89                                                                     | .74                                                                 |
| 19    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 20    | 74.4                            | 5.6                 | 71.6                | 8.4                          | .766                             | .27                                              | .54                                                                     | .77                                                                 |
| 21    | 74.0                            | 5.4                 | 71.3                | 8.1                          | .758                             | .20                                              | .42                                                                     | .77                                                                 |
| 22    | 73.9                            | 5.7                 | 71.0                | 8.6                          | .751                             | .10                                              | .59                                                                     | .76                                                                 |
| 23    | 71.1                            | 6.6                 | 67.8                | 9.9                          | .677                             | 7.33                                             | .77                                                                     | .73                                                                 |
| 24    | 72.8                            | 4.1                 | 70.7                | 6.2                          | .744                             | 8.08                                             | 1.78                                                                    | .82                                                                 |
| 25    | 74.3                            | 3.1                 | 72.7                | 4.7                          | .792                             | .59                                              | .42                                                                     | .86                                                                 |
| 26    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 27    | 74.7                            | 5.3                 | 72.0                | 8.0                          | .776                             | .36                                              | 2.45                                                                    | .77                                                                 |
| 28    | 74.5                            | 6.0                 | 71.5                | 9.0                          | .763                             | .23                                              | .75                                                                     | .75                                                                 |
| 29    | 76.2                            | 5.1                 | 73.6                | 7.7                          | .817                             | .79                                              | .45                                                                     | .78                                                                 |
| 30    | 76.3                            | 4.1                 | 74.2                | 6.2                          | .832                             | .98                                              | 1.96                                                                    | .82                                                                 |
| 31    | 74.4                            | 2.3                 | 73.2                | 3.5                          | .806                             | .75                                              | .05                                                                     | .89                                                                 |

If the Hygrometrical elements are computed by the Greenwich constants.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of October, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>for each hour during<br>the month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Temperature<br>for each hour during<br>the month. |      |       |
|----------------|-------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|----------------------------------------------------------------|------|-------|
|                |                                                 | Max.                                                         | Min.    | Diff.   |                               | Max.                                                           | Min. | Diff. |
|                | Inches.                                         | Inches.                                                      | Inches. | Inches. | °                             | °                                                              | °    | °     |
| Mid-<br>night. | 29.797                                          | 29.923                                                       | 29.631  | 0.292   | 79.3                          | 84.0                                                           | 74.9 | 9.1   |
| 1              | .783                                            | .922                                                         | .614    | .308    | 79.0                          | 83.8                                                           | 74.9 | 8.9   |
| 2              | .776                                            | .906                                                         | .592    | .314    | 78.6                          | 83.4                                                           | 75.0 | 8.4   |
| 3              | .764                                            | .900                                                         | .577    | .323    | 78.5                          | 83.2                                                           | 74.5 | 8.7   |
| 4              | .768                                            | .900                                                         | .581    | .319    | 78.1                          | 82.8                                                           | 73.5 | 9.3   |
| 5              | .776                                            | .921                                                         | .589    | .332    | 78.0                          | 82.6                                                           | 73.0 | 9.6   |
| 6              | .800                                            | .934                                                         | .610    | .324    | 77.7                          | 82.4                                                           | 72.6 | 9.8   |
| 7              | .821                                            | .959                                                         | .632    | .327    | 78.3                          | 83.6                                                           | 72.0 | 11.6  |
| 8              | .843                                            | .969                                                         | .667    | .302    | 80.0                          | 86.0                                                           | 73.2 | 12.8  |
| 9              | .855                                            | .980                                                         | .671    | .309    | 80.9                          | 87.2                                                           | 73.0 | 14.2  |
| 10             | .853                                            | .982                                                         | .673    | .309    | 82.1                          | 88.6                                                           | 73.6 | 15.0  |
| 11             | .836                                            | .949                                                         | .658    | .291    | 83.2                          | 89.0                                                           | 76.4 | 12.6  |
|                |                                                 |                                                              |         |         |                               |                                                                |      |       |
| Noon.          | .809                                            | .924                                                         | .627    | .297    | 84.8                          | 88.6                                                           | 75.4 | 13.2  |
| 1              | .782                                            | .904                                                         | .609    | .295    | 85.1                          | 89.1                                                           | 77.4 | 11.7  |
| 2              | .761                                            | .878                                                         | .590    | .288    | 84.7                          | 89.4                                                           | 78.4 | 11.0  |
| 3              | .745                                            | .873                                                         | .590    | .283    | 84.8                          | 90.4                                                           | 76.2 | 14.2  |
| 4              | .743                                            | .891                                                         | .585    | .306    | 84.0                          | 90.4                                                           | 75.4 | 15.0  |
| 5              | .750                                            | .914                                                         | .603    | .311    | 83.2                          | 89.6                                                           | 74.9 | 14.7  |
| 6              | .758                                            | .914                                                         | .614    | .300    | 81.8                          | 86.2                                                           | 75.5 | 10.7  |
| 7              | .778                                            | .929                                                         | .633    | .296    | 81.0                          | 85.7                                                           | 75.8 | 9.9   |
| 8              | .798                                            | .955                                                         | .648    | .307    | 80.5                          | 85.3                                                           | 75.8 | 9.5   |
| 9              | .808                                            | .965                                                         | .658    | .307    | 80.2                          | 85.0                                                           | 75.6 | 9.4   |
| 10             | .812                                            | .966                                                         | .660    | .306    | 79.9                          | 85.0                                                           | 75.2 | 9.8   |
| 11             | .808                                            | .962                                                         | .660    | .302    | 79.5                          | 84.4                                                           | 75.4 | 9.0   |

The Mean height of the Barometer, as likewise the Mean dry and wet Bulb Thermometers are derived from the Observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of October, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb<br>Thermometer. | Dry Bulb above Wet. | Computed Dew point. | Dry Bulb above Dew<br>point. | Mean elastic force of<br>Vapour. | Mean Weight of Va-<br>pour in a Cubic foot<br>of Air. | Additional weight of<br>vapour required for<br>complete saturation. | Mean degree of hu-<br>midity, complete satu-<br>ration being unity. |
|----------------|-------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                             | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                           |                                                                     |
| Mid-<br>night. | 76.9                          | 2.4                 | 75.7                | 3.6                          | 0.873                            | 9.43                                                  | 1.16                                                                | 0.89                                                                |
| 1              | 76.8                          | 2.2                 | 75.7                | 3.3                          | .873                             | .45                                                   | .05                                                                 | .90                                                                 |
| 2              | 76.4                          | 2.2                 | 75.3                | 3.3                          | .862                             | .34                                                   | .04                                                                 | .90                                                                 |
| 3              | 76.4                          | 2.1                 | 75.3                | 3.2                          | .862                             | .34                                                   | .01                                                                 | .90                                                                 |
| 4              | 76.0                          | 2.1                 | 74.9                | 3.2                          | .851                             | .22                                                   | .00                                                                 | .90                                                                 |
| 5              | 75.9                          | 2.1                 | 74.8                | 3.2                          | .849                             | .20                                                   | 0.99                                                                | .90                                                                 |
| 6              | 75.6                          | 2.1                 | 74.5                | 3.2                          | .840                             | .12                                                   | .98                                                                 | .90                                                                 |
| 7              | 76.1                          | 2.2                 | 75.0                | 3.3                          | .854                             | .25                                                   | 1.03                                                                | .90                                                                 |
| 8              | 76.8                          | 3.2                 | 75.2                | 4.8                          | .860                             | .28                                                   | .53                                                                 | .86                                                                 |
| 9              | 76.9                          | 4.0                 | 74.9                | 6.0                          | .851                             | .17                                                   | .93                                                                 | .83                                                                 |
| 10             | 77.4                          | 4.7                 | 75.0                | 7.1                          | .854                             | .18                                                   | 2.33                                                                | .80                                                                 |
| 11             | 77.6                          | 5.6                 | 74.8                | 8.4                          | .849                             | .11                                                   | .78                                                                 | .77                                                                 |
|                |                               |                     |                     |                              |                                  |                                                       |                                                                     |                                                                     |
| Noon.          | 78.3                          | 6.5                 | 75.0                | 9.8                          | .854                             | .12                                                   | 3.34                                                                | .73                                                                 |
| 1              | 78.6                          | 6.5                 | 75.3                | 9.8                          | .862                             | .21                                                   | .36                                                                 | .73                                                                 |
| 2              | 78.3                          | 6.4                 | 75.1                | 9.6                          | .857                             | .15                                                   | .27                                                                 | .74                                                                 |
| 3              | 78.1                          | 6.7                 | 74.7                | 10.1                         | .846                             | .05                                                   | .41                                                                 | .73                                                                 |
| 4              | 77.8                          | 6.2                 | 74.7                | 9.3                          | .846                             | .06                                                   | .11                                                                 | .74                                                                 |
| 5              | 77.8                          | 5.4                 | 75.1                | 8.1                          | .857                             | .19                                                   | 2.70                                                                | .77                                                                 |
| 6              | 77.6                          | 4.2                 | 75.5                | 6.3                          | .868                             | .35                                                   | .05                                                                 | .82                                                                 |
| 7              | 77.7                          | 3.3                 | 76.0                | 5.0                          | .882                             | .50                                                   | 1.64                                                                | .85                                                                 |
| 8              | 77.6                          | 2.9                 | 76.1                | 4.4                          | .885                             | .55                                                   | .43                                                                 | .87                                                                 |
| 9              | 77.4                          | 2.8                 | 76.0                | 4.2                          | .882                             | .52                                                   | .36                                                                 | .88                                                                 |
| 10             | 77.2                          | 2.7                 | 75.8                | 4.1                          | .876                             | .46                                                   | .32                                                                 | .88                                                                 |
| 11             | 76.9                          | 2.6                 | 75.6                | 3.9                          | .871                             | .40                                                   | .26                                                                 | .88                                                                 |

All the Hygrometrical elements are computed by the Greenwich constants.

# Meteorological Observations.

v

Solar radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                 |
|-------|-----------------------|---------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------|
|       | o                     | Inches.                         |                                   | [o'clock.                                                                                                  |
| 1     | ..                    | 0.39                            | S. E. & E.                        | Cloudy, also occasionally raining after 12                                                                 |
| 2     | ..                    | 2.13                            | S. & S. E.                        | Cloudy, also raining in the morning & at 5 P. M.                                                           |
|       | ..                    | 0.56                            | S. E. & S.                        | Cloudless till 4 A. M., cloudy till 9 P. M. cloudless afterwards. Also raining at 9 A. M.                  |
| 4     | ..                    | ..                              | S.                                | Cloudless till 6 A. M. scattered ci till 6 P. M. cloudless afterwards.                                     |
| 5     | Sunday.               |                                 |                                   |                                                                                                            |
| 6     | 144.5                 | 0.16                            | W. & S. E.                        | Cloudless till 4 A. M. scatd. ci till 6 P. M. cloudless afterwards. Also slight rain at 10 A. M. & 6 P. M. |
| 7     | ..                    | 2.00                            | S.                                | Cloudless till 4 A. M. cloudy afterwards, also heavy rain from 2 P. M. to 3 P. M.                          |
| 8     | 140.0                 | 0.16                            | N. E.                             | Cloudless till 4 A. M. scatd. \i & ci till Noon, cloudy afterwards, also slight rain between 2 & 4 P. M.   |
| 9     | 141.0                 | ..                              | E. & N. & N. E.                   | Scattered clouds of various kinds.                                                                         |
| 10    | ..                    | 1.84                            | N. E.                             | Cloudy with incessant rain from 7 A. M. till midnight.                                                     |
| 11    | ..                    | 0.52                            | E. & S. E. (both blowing high.)   | Cloudy, also constantly drizzling between midnight & 10 A. M.                                              |
| 12    | Sunday.               | 0.63                            |                                   |                                                                                                            |
| 13    | ..                    | 0.49                            | S. & E. & S. E.                   | Cloudy, also raining heavily at midnight.                                                                  |
| 14    | 141.0                 | ..                              | S. & S. W.                        | Scatd. clouds of various kinds. [wards.                                                                    |
| 15    | 136.0                 | ..                              | Variable.                         | Cloudless till 6 A. M. scatd. clouds afterwards.                                                           |
| 16    | 148.0                 | ..                              | Variable.                         | Cloudless till 7 A. M. scatd. clouds till 5 P. M. cloudless afterwards.                                    |
| 17    | 133.0                 | ..                              | N. W. & N. & S. W.                | Scatd. \i & ci till 9 A. M. cloudy till 4                                                                  |
| 18    | 143.0                 | ..                              | N. W.                             | Cloudless. [P. M. cloudless afterwards,                                                                    |
| 19    | Sunday.               |                                 |                                   |                                                                                                            |
| 20    | 143.5                 | ..                              | N. W.                             | Cloudless till 5 A. M. scatd. \i & \i till 3 P. M. cloudless afterwards. [wards.                           |
| 21    | 131.2                 | ..                              | N. W.                             | Scatd. \i & \i till 7 P. M., cloudless afterwards.                                                         |
| 22    | 132.0                 | ..                              | N. W.                             | Cloudless till 4 A. M. scatd. \i till 6 P. M. cloudless afterwards. [wards.                                |
| 23    | 128.0                 | ..                              | N. W. & W.                        | Cloudless till 4 A. M. scatd. clouds afterwards.                                                           |
| 24    | ..                    | ..                              | N. W.                             | Cloudy.                                                                                                    |
| 25    | 132.8                 | 0.10                            | S.                                | Scatd. clouds and occasionally drizzling before sunrise.                                                   |
| 26    | Sunday.               |                                 |                                   |                                                                                                            |
| 27    | 140.2                 | ..                              | N. W.                             | Cloudless till 10 A. M. scatd. \i & \i & ci till 4 P. M. cloudless afterwards.                             |
| 28    | 143.6                 | ..                              | N. W.                             | Cloudless till 8 A. M. scatd. \i & ci till 8 P. M. cloudless afterwards.                                   |
| 29    | 134.0                 | ..                              | N. & S.                           | Cloudless till 3 A. M. scatd. \i & ci till 6 P. M. cloudless afterwards.                                   |
| 30    | 143.0                 | 0.10                            | N. & S. E.                        | Scatd. clouds of various kinds till 3 P. M. cloudy with little rain till 7 P. M. cloudless afterwards.     |
| 31    | ..                    | 0.13                            | N. E. & S.                        | Cloudless till 3 A. M. cloudy afterwards with little rain between 2 and 5 P. M.                            |

\i Cirri, \i cirro strati, ci cumuli, ci cumulo strati, \i nimbi, —i strati, \i cirro cumuli.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of October, 1856.*

MONTHLY RESULTS.

|                                                                 |     |     | Inches. |
|-----------------------------------------------------------------|-----|-----|---------|
| Mean height of the Barometer for the month,                     | ... | ... | 29.793  |
| Max. height of the Barometer, occurred at 10 A. M. on the 27th, | ... | ... | 29.982  |
| Min. height of the Barometer, occurred at 3 A. M. on the 11th,  | ... | ... | 29.577  |
| Extreme Range of the Barometer during the month,                | ... | ... | 0.405   |

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|                                                       |     |     | °    |
|-------------------------------------------------------|-----|-----|------|
| Mean Dry Bulb Thermometer for the month,              | ... | ... | 81.0 |
| Max. Temperature, occurred at 3 & 4 P. M. on the 6th, | ... | ... | 90.4 |
| Min. Temperature, occurred at 7 A. M. on the 23rd,    | ... | ... | 72.0 |
| Extreme Range of the Temperature during the month,    | ... | ... | 18.4 |

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|                                                            |     |     |       |
|------------------------------------------------------------|-----|-----|-------|
| Mean Wet Bulb Thermometer for the month,                   | ... | ... | 77.2  |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, | ... | ... | 3.8   |
| Computed Mean Dew Point for the month,                     | ... | ... | 75.3  |
| Mean Dry Bulb Thermometer above computed Mean Dew Point,   | ... | ... | 5.7   |
| Mean Elastic force of vapour for the month,                | ... | ... | 0.862 |

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|                                                                         |     |     | Troy grains. |
|-------------------------------------------------------------------------|-----|-----|--------------|
| Mean weight of vapour for the month,                                    | ... | ... | 9.29         |
| Additional weight of vapour required for complete saturation,           | ... | ... | 1.85         |
| Mean degree of Humidity for the month, complete saturation being unity, | ... | ... | 0.83         |

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|                                                    |     |     | Inches. |
|----------------------------------------------------|-----|-----|---------|
| Rained 15 days. Max. fall of rain during 24 hours, | ... | ... | 2.13    |
| Total amount of rain during the month,             | ... | ... | 9.21    |
| Prevailing direction of the Wind N. W. & S.        |     |     |         |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of October, 1856.*

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind  
blew, together with the number of days on which at the same hour,  
when any particular wind was blowing it rained.

| Hour.     | N.           | Rain on. | N. E. | Rain on. | E. | Rain on. | S. E. | Rain on. | S. | Rain on. | S. W. | Rain on. | W. | Rain on. | N. W. | Rain on. | Calm. | Rain on. |
|-----------|--------------|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|-------|----------|
|           | No. of days. |          |       |          |    |          |       |          |    |          |       |          |    |          |       |          |       |          |
| Midnight. | 1            | 3        | 1     | 2        |    | 3        |       | 3        | 1  | 1        |       | 1        |    | 7        | 1     | 6        |       |          |
| 1         | 2            | 3        | 1     | 2        |    | 2        |       | 4        |    | 1        |       | 1        |    | 6        |       | 6        |       |          |
| 2         | 2            | 1        | 1     | 3        |    | 1        | 3     | 4        |    | 1        |       | 1        |    | 6        |       | 5        |       |          |
| 3         | 1            | 2        |       | 3        |    | 1        | 3     | 4        |    | 1        |       | 1        |    | 7        |       | 5        |       |          |
| 4         | 3            | 2        |       | 3        |    | 3        |       | 4        |    | 1        |       | 1        |    | 8        |       | 2        |       |          |
| 5         | 2            | 2        |       | 3        |    | 1        | 4     | 1        | 4  | 1        |       | 1        | 1  | 7        | 1     | 2        |       |          |
| 6         | 2            | 2        |       | 2        |    | 1        | 6     | 2        | 3  | 1        |       | 1        | 2  | 7        |       | 2        |       |          |
| 7         | 3            | 2        |       | 2        |    | 5        | 1     | 4        |    | 3        |       | 3        | 3  | 5        |       |          |       |          |
| 8         | 5            | 2        | 1     | 3        |    | 1        | 2     | 1        |    | 1        | 2     | 2        | 2  | 7        | 1     |          |       |          |
| 9         | 6            | 2        | 1     | 4        |    | 2        | 2     | 1        | 3  | 2        | 2     | 2        | 2  | 6        | 1     |          |       |          |
| 10        | 6            | 2        | 1     | 4        |    | 1        | 1     | 1        | 3  | 1        | 1     | 4        | 1  | 6        | 1     |          |       |          |
| 11        | 7            | 1        | 1     | 3        |    |          | 2     | 1        | 2  |          | 3     | 1        | 3  | 6        |       |          |       |          |
| Noon.     | 5            | 2        | 1     |          |    | 4        |       | 3        |    | 2        |       | 4        |    | 7        |       |          |       |          |
| 1         | 5            | 2        | 1     |          | 1  | 4        | 1     | 1        |    | 2        |       | 3        |    | 9        |       |          |       |          |
| 2         | 4            | 3        | 2     |          |    | 4        | 2     | 5        |    | 1        |       | 5        |    | 6        |       |          |       |          |
| 3         | 4            | 1        | 3     | 2        | 2  | 1        | 2     | 2        |    | 3        |       | 5        |    | 6        |       |          |       |          |
| 4         | 1            | 3        | 2     | 2        |    | 2        | 1     | 4        |    | 2        |       | 4        | 1  | 9        |       |          |       |          |
| 5         | 1            | 4        | 1     |          |    | 2        |       | 6        |    | 2        | 1     | 4        | 1  | 9        |       |          |       |          |
| 6         |              | 2        | 1     | 1        |    | 6        | 2     | 8        |    |          |       | 2        |    | 8        |       |          |       |          |
| 7         |              | 2        | 1     | 1        |    | 4        |       | 9        |    |          |       | 1        |    | 7        |       | 3        |       |          |
| 8         |              | 3        | 1     | 1        |    | 3        | 1     | 8        |    |          |       | 1        |    | 7        |       | 4        |       |          |
| 9         | 1            | 3        | 1     | 1        |    | 2        |       | 8        |    |          |       | 2        |    | 7        |       | 3        |       |          |
| 10        | 1            | 3        | 1     | 1        |    | 2        |       | 8        |    |          |       | 2        |    | 7        |       | 3        |       |          |
| 11        |              | 4        | 1     | 1        |    | 3        | 1     | 7        |    |          |       | 2        |    | 7        |       | 3        |       |          |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
for the month of November, 1856.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Height of the Cistern of the Standard Barometer above the Sea level, <sup>feet.</sup> 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | 29.966                                          | 30.042                                    | 29.924  | 0.118   | 80.1                          | 87.4                                          | 74.5 | 12.9  |
| 2     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 3     | .961                                            | .029                                      | .904    | .135    | 80.6                          | 87.3                                          | 74.2 | 13.1  |
| 4     | .916                                            | .001                                      | .854    | .147    | 81.0                          | 87.3                                          | 75.6 | 11.7  |
| 5     | .906                                            | 29.982                                    | .841    | .141    | 80.9                          | 86.9                                          | 76.6 | 10.3  |
| 6     | .934                                            | 30.008                                    | .886    | .122    | 80.9                          | 87.2                                          | 76.7 | 10.5  |
| 7     | .955                                            | .028                                      | .900    | .128    | 80.5                          | 86.8                                          | 75.4 | 11.4  |
| 8     | .932                                            | 29.998                                    | .879    | .119    | 79.6                          | 86.6                                          | 74.4 | 12.2  |
| 9     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 10    | .990                                            | 30.055                                    | .946    | .109    | 76.7                          | 84.4                                          | 69.2 | 15.2  |
| 11    | .985                                            | .065                                      | .927    | .138    | 75.0                          | 82.6                                          | 69.7 | 12.9  |
| 12    | 30.006                                          | .079                                      | .958    | .121    | 74.9                          | 83.4                                          | 67.4 | 16.0  |
| 13    | .022                                            | .105                                      | .958    | .147    | 74.3                          | 82.9                                          | 67.4 | 15.5  |
| 14    | .007                                            | .087                                      | .949    | .138    | 73.2                          | 82.0                                          | 66.2 | 15.8  |
| 15    | 29.980                                          | .055                                      | .932    | .123    | 74.1                          | 82.8                                          | 67.2 | 15.6  |
| 16    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 17    | 30.001                                          | .076                                      | .932    | .144    | 75.0                          | 82.9                                          | 68.3 | 14.6  |
| 18    | 29.965                                          | .041                                      | .914    | .127    | 75.1                          | 82.6                                          | 69.0 | 13.6  |
| 19    | .949                                            | .011                                      | .901    | .110    | 74.4                          | 81.8                                          | 68.6 | 13.2  |
| 20    | .973                                            | .054                                      | .932    | .122    | 73.9                          | 80.2                                          | 69.0 | 11.2  |
| 21    | .986                                            | .055                                      | .948    | .107    | 73.6                          | 82.2                                          | 67.6 | 14.6  |
| 22    | .978                                            | .039                                      | .935    | .104    | 71.8                          | 76.6                                          | 68.4 | 8.2   |
| 23    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 24    | .964                                            | .037                                      | .911    | .126    | 71.0                          | 74.2                                          | 67.2 | 7.0   |
| 25    | .977                                            | .030                                      | .925    | .105    | 73.2                          | 77.8                                          | 70.8 | 7.0   |
| 26    | .988                                            | .071                                      | .928    | .143    | 71.8                          | 79.4                                          | 66.4 | 13.0  |
| 27    | .973                                            | .050                                      | .898    | .152    | 70.0                          | 77.4                                          | 63.9 | 13.5  |
| 28    | .950                                            | .028                                      | .896    | .132    | 68.8                          | 77.6                                          | 61.9 | 15.7  |
| 29    | .971                                            | .047                                      | .921    | .126    | 69.5                          | 78.4                                          | 62.3 | 16.1  |
| 30    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |

The Mean height of the Barometer, as likewise the Mean dry and wet Bulb Thermometers are derived, from the Twenty-four hourly observations made, during the day.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
for the month of November, 1856.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of Air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity<br>complete saturation be-<br>ing unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                  |
| 1     | 75.1                            | 5.0                 | 72.6                | 7.5                          | 0.790                            | 8.52                                             | 2.32                                                                    | 0.79                                                             |
| 2     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                  |
| 3     | 75.8                            | 4.8                 | 73.4                | 7.2                          | .811                             | .75                                              | .26                                                                     | .80                                                              |
| 4     | 76.1                            | 4.9                 | 73.6                | 7.4                          | .817                             | .80                                              | .34                                                                     | .79                                                              |
| 5     | 76.4                            | 4.5                 | 74.1                | 6.8                          | .830                             | .94                                              | .16                                                                     | .81                                                              |
| 6     | 76.0                            | 4.9                 | 73.5                | 7.4                          | .814                             | .78                                              | .32                                                                     | .79                                                              |
| 7     | 75.2                            | 5.3                 | 72.5                | 8.0                          | .787                             | .49                                              | .49                                                                     | .77                                                              |
| 8     | 73.3                            | 6.3                 | 70.1                | 9.5                          | .729                             | 7.87                                             | .82                                                                     | .74                                                              |
| 9     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                  |
| 10    | 69.1                            | 7.6                 | 65.3                | 11.4                         | .623                             | 6.78                                             | 3.02                                                                    | .69                                                              |
| 11    | 67.4                            | 7.6                 | 63.6                | 11.4                         | .590                             | .43                                              | 2.88                                                                    | .69                                                              |
| 12    | 68.1                            | 6.8                 | 64.7                | 10.2                         | .611                             | .66                                              | .62                                                                     | .72                                                              |
| 13    | 67.3                            | 7.0                 | 63.8                | 10.5                         | .593                             | .46                                              | .66                                                                     | .71                                                              |
| 14    | 66.5                            | 6.7                 | 63.1                | 10.1                         | .580                             | .34                                              | .48                                                                     | .72                                                              |
| 15    | 67.5                            | 6.6                 | 64.2                | 9.9                          | .601                             | .56                                              | .51                                                                     | .72                                                              |
| 16    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                  |
| 17    | 69.0                            | 6.0                 | 66.0                | 9.0                          | .638                             | .95                                              | .36                                                                     | .75                                                              |
| 18    | 68.9                            | 6.2                 | 65.8                | 9.3                          | .634                             | .91                                              | .43                                                                     | .74                                                              |
| 19    | 69.5                            | 4.9                 | 67.0                | 7.4                          | .659                             | 7.20                                             | 1.95                                                                    | .79                                                              |
| 20    | 69.0                            | 4.9                 | 66.5                | 7.4                          | .648                             | .09                                              | .92                                                                     | .79                                                              |
| 21    | 68.0                            | 5.6                 | 65.2                | 8.4                          | .621                             | 6.80                                             | 2.13                                                                    | .76                                                              |
| 22    | 67.4                            | 4.4                 | 65.2                | 6.6                          | .621                             | .81                                              | 1.64                                                                    | .81                                                              |
| 23    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                  |
| 24    | 69.2                            | 1.8                 | 68.3                | 2.7                          | .688                             | 7.55                                             | 0.70                                                                    | .92                                                              |
| 25    | 70.6                            | 2.6                 | 69.3                | 3.9                          | .711                             | .77                                              | 1.05                                                                    | .88                                                              |
| 26    | 67.6                            | 4.2                 | 65.5                | 6.3                          | .628                             | 6.90                                             | .55                                                                     | .82                                                              |
| 27    | 63.8                            | 6.2                 | 60.7                | 9.3                          | .536                             | 5.89                                             | 2.11                                                                    | .74                                                              |
| 28    | 63.1                            | 5.7                 | 60.2                | 8.6                          | .527                             | .80                                              | 1.91                                                                    | .75                                                              |
| 29    | 64.0                            | 5.5                 | 61.2                | 8.3                          | .544                             | 6.00                                             | .88                                                                     | .76                                                              |
| 30    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                  |

All the Hygrometrical elements are computed by the Greenwich constants.



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in the month of November, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer for<br>each hour during the<br>month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture for each hour<br>during the<br>month. |      |       |
|----------------|-------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|---------------------------------------------------------------------|------|-------|
|                |                                                 | Max.                                                         | Min.    | Diff.   |                               | Max.                                                                | Min. | Diff. |
|                | Inches.                                         | Inches.                                                      | Inches. | Inches. | o                             | o                                                                   | o    | o     |
| Mid-<br>night. | 29.968                                          | 30.028                                                       | 29.906  | 0.122   | 72.3                          | 78.7                                                                | 65.2 | 13.5  |
| 1              | .962                                            | .020                                                         | .897    | .123    | 71.7                          | 78.4                                                                | 64.4 | 14.0  |
| 2              | .953                                            | .012                                                         | .893    | .119    | 71.3                          | 77.8                                                                | 63.7 | 14.1  |
| 3              | .948                                            | .002                                                         | .886    | .116    | 71.0                          | 77.6                                                                | 63.4 | 14.2  |
| 4              | .947                                            | .004                                                         | .888    | .116    | 70.2                          | 77.0                                                                | 62.7 | 14.3  |
| 5              | .960                                            | .013                                                         | .907    | .106    | 69.9                          | 77.0                                                                | 62.2 | 14.8  |
| 6              | .981                                            | .048                                                         | .927    | .121    | 69.6                          | 76.7                                                                | 61.9 | 14.8  |
| 7              | 30.004                                          | .060                                                         | .957    | .103    | 70.1                          | 77.2                                                                | 62.2 | 15.0  |
| 8              | .029                                            | .088                                                         | .975    | .113    | 72.8                          | 80.1                                                                | 65.0 | 15.1  |
| 9              | .043                                            | .105                                                         | .982    | .123    | 75.5                          | 82.0                                                                | 69.2 | 12.8  |
| 10             | .038                                            | .082                                                         | .977    | .105    | 77.1                          | 83.0                                                                | 70.6 | 12.4  |
| 11             | .015                                            | .068                                                         | .945    | .123    | 79.1                          | 86.1                                                                | 73.2 | 12.9  |
| Noon.          | 29.984                                          | .040                                                         | .912    | .128    | 80.8                          | 86.8                                                                | 73.4 | 13.4  |
| 1              | .952                                            | .011                                                         | .884    | .127    | 81.6                          | 87.4                                                                | 73.8 | 13.6  |
| 2              | .932                                            | 29.994                                                       | .854    | .140    | 82.2                          | 87.3                                                                | 74.2 | 13.1  |
| 3              | .921                                            | .975                                                         | .841    | .134    | 81.7                          | 87.3                                                                | 73.4 | 13.9  |
| 4              | .919                                            | .970                                                         | .845    | .125    | 80.1                          | 85.8                                                                | 73.2 | 12.6  |
| 5              | .925                                            | .976                                                         | .853    | .123    | 79.0                          | 85.6                                                                | 72.9 | 12.7  |
| 6              | .934                                            | .985                                                         | .861    | .124    | 77.2                          | 83.6                                                                | 71.2 | 12.4  |
| 7              | .951                                            | 30.007                                                       | .887    | .120    | 75.9                          | 82.0                                                                | 69.6 | 12.4  |
| 8              | .966                                            | .024                                                         | .900    | .124    | 75.0                          | 81.2                                                                | 68.2 | 13.0  |
| 9              | .976                                            | .039                                                         | .910    | .129    | 74.1                          | 80.4                                                                | 67.6 | 12.8  |
| 10             | .982                                            | .034                                                         | .905    | .129    | 73.1                          | 79.8                                                                | 66.8 | 13.0  |
| 11             | .973                                            | .034                                                         | .898    | .136    | 72.7                          | 79.4                                                                | 66.0 | 13.4  |

The Mean height of the Barometer, as likewise the Mean dry and wet Bulb Thermometers are derived from the Observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of November, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic Force<br>of Vapour. | Mean Weight of Va-<br>pour in a cubic<br>foot of Air. | Additional Weight of<br>Vapour required<br>for complete satu-<br>ration. | Mean degree of Hu-<br>midity complete<br>saturation being<br>unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                                | T. gr.                                                                   |                                                                     |
| Mid-<br>night. | 69.2                            | 3.1                 | 67.6                | 4.7                          | 0.672                            | 7.37                                                  | 1.21                                                                     | 0.86                                                                |
| 1              | 68.7                            | 3.0                 | 67.2                | 4.5                          | .664                             | .28                                                   | .15                                                                      | .86                                                                 |
| 2              | 68.5                            | 2.8                 | 67.1                | 4.2                          | .661                             | .26                                                   | .07                                                                      | .87                                                                 |
| 3              | 68.1                            | 2.9                 | 66.6                | 4.4                          | .651                             | .15                                                   | .10                                                                      | .87                                                                 |
| 4              | 67.6                            | 2.6                 | 66.3                | 3.9                          | .644                             | .09                                                   | 0.96                                                                     | .88                                                                 |
| 5              | 67.4                            | 2.5                 | 66.1                | 3.8                          | .640                             | .04                                                   | .94                                                                      | .88                                                                 |
| 6              | 67.3                            | 2.3                 | 66.1                | 3.5                          | .640                             | .04                                                   | .86                                                                      | .89                                                                 |
| 7              | 67.6                            | 2.5                 | 66.3                | 3.8                          | .644                             | .09                                                   | .94                                                                      | .88                                                                 |
| 8              | 68.7                            | 4.1                 | 66.6                | 6.2                          | .651                             | .12                                                   | 1.59                                                                     | .82                                                                 |
| 9              | 69.8                            | 5.7                 | 66.9                | 8.6                          | .657                             | .15                                                   | 2.31                                                                     | .76                                                                 |
| 10             | 70.1                            | 7.0                 | 66.6                | 10.5                         | .651                             | .05                                                   | .87                                                                      | .71                                                                 |
| 11             | 70.9                            | 8.2                 | 66.8                | 12.3                         | .655                             | .09                                                   | 3.44                                                                     | .67                                                                 |
|                |                                 |                     |                     |                              |                                  |                                                       |                                                                          |                                                                     |
| Noon.          | 71.2                            | 9.6                 | 66.4                | 14.4                         | .646                             | 6.97                                                  | 4.10                                                                     | .63                                                                 |
| 1              | 71.5                            | 10.1                | 66.4                | 15.2                         | .646                             | .95                                                   | .39                                                                      | .61                                                                 |
| 2              | 72.0                            | 10.2                | 66.9                | 15.3                         | .657                             | 7.06                                                  | .48                                                                      | .61                                                                 |
| 3              | 71.4                            | 10.3                | 66.2                | 15.5                         | .642                             | 6.89                                                  | .48                                                                      | .61                                                                 |
| 4              | 70.8                            | 9.3                 | 66.1                | 14.0                         | .640                             | .90                                                   | 3.94                                                                     | .64                                                                 |
| 5              | 71.0                            | 8.0                 | 67.0                | 12.0                         | .659                             | 7.12                                                  | .38                                                                      | .68                                                                 |
| 6              | 71.3                            | 5.9                 | 68.3                | 8.9                          | .688                             | .46                                                   | 2.49                                                                     | .75                                                                 |
| 7              | 70.9                            | 5.0                 | 68.4                | 7.5                          | .690                             | .50                                                   | .07                                                                      | .78                                                                 |
| 8              | 70.7                            | 4.3                 | 68.5                | 6.5                          | .692                             | .54                                                   | 1.77                                                                     | .81                                                                 |
| 9              | 70.2                            | 3.9                 | 68.2                | 5.9                          | .686                             | .49                                                   | .58                                                                      | .83                                                                 |
| 10             | 69.5                            | 3.6                 | 67.7                | 5.4                          | .674                             | .39                                                   | .40                                                                      | .84                                                                 |
| 11             | 69.3                            | 3.4                 | 67.6                | 5.1                          | .672                             | .37                                                   | .31                                                                      | .85                                                                 |

All the Hygrometrical elements are computed by the Greenwich constants.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of November, 1856.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                         |
|-------|-----------------------|---------------------------------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------|
|       | 0                     | Inches.                         |                                   |                                                                                                                    |
| 1     | 144.4                 | ..                              | S.                                | Scattered clouds till 6 P. M. cloudless afterwards.                                                                |
| 2     | <i>Sunday.</i>        |                                 |                                   |                                                                                                                    |
| 3     | 141.0                 | ..                              | W. & S.                           | Cloudless.                                                                                                         |
| 4     | 145.8                 | ..                              | S. W. & W.                        | Cloudless nearly the whole day.                                                                                    |
| 5     | 136.7                 | ..                              | S. W. & W.                        | Cloudless till 5 A. M. scattered \i and \i till 6 P. M. cloudless afterwards.                                      |
| 6     | 139.0                 | ..                              | N.                                | Cloudless till 9 A. M. scattered \i till 5 P. M. cloudless afterwards.                                             |
| 7     | 141.5                 | ..                              | N. & N. W.                        | Cloudless till 9 A. M. scattered \i till 5 P. M. cloudless afterwards.                                             |
| 8     | 142.0                 | ..                              | N. & W.                           | Cloudless till 9 A. M. scattered \i till 5 P. M. cloudless afterwards.                                             |
| 9     | <i>Sunday.</i>        |                                 |                                   |                                                                                                                    |
| 10    | 144.0                 | ..                              | N. W. & W. & N.                   | Cloudless.                                                                                                         |
| 11    | 138.2                 | ..                              | N. W.                             | Cloudless.                                                                                                         |
| 12    | 141.0                 | ..                              | N. W. & W.                        | Cloudless.                                                                                                         |
| 13    | 140.6                 | ..                              | N. W.                             | Cloudless.                                                                                                         |
| 14    | 139.7                 | ..                              | N. W. & W. & S.                   | Cloudless.                                                                                                         |
| 15    | 139.0                 | ..                              | N. W.                             | Cloudless.                                                                                                         |
| 16    | <i>Sunday.</i>        |                                 |                                   |                                                                                                                    |
| 17    | 140.4                 | ..                              | N. W.                             | Clouds of various kinds.                                                                                           |
| 18    | 136.0                 | ..                              | N. W.                             | Cloudless till 11 A. M. scattered \i till 4 P. M. cloudless afterwards.                                            |
| 19    | 133.0                 | ..                              | N. W. & S. W.                     | Cloudless till 8 A. M. scattered \i & \i till 2 P. M. cloudy till 6 P. M. cloudless afterwards.                    |
| 20    | ..                    | ..                              | N.                                | Cloudless till 6 A. M. cloudy till 7 P. M. cloudless afterwards.                                                   |
| 21    | 139.2                 | ..                              | N. & N. E.                        | Cloudless till 6 A. M. scattered clouds of all kinds afterwards. [ally.                                            |
| 22    | ..                    | ..                              | N. E.                             | Cloudy and slightly drizzling occasion-                                                                            |
| 23    | <i>Sunday.</i>        |                                 |                                   |                                                                                                                    |
| 24    | ..                    | ..                              | N. E. & N.                        | Cloudy.                                                                                                            |
| 25    | ..                    | ..                              | N. W. & N.                        | Cloudy till 8 P. M. cloudless afterwards.                                                                          |
| 26    | 128.0                 | ..                              | N. W.                             | Cloudless till 3 A. M. cloudy till 6 A. M. cloudless till 10 A. M. scattered \i till 5 P. M. cloudless afterwards. |
| 27    | 130.5                 | ..                              | N. W. & W.                        | Cloudless.                                                                                                         |
| 28    | 135.0                 | ..                              | W. & N. W.                        | Cloudless.                                                                                                         |
| 29    | 132.0                 | ..                              | N. & W.                           | Cloudless.                                                                                                         |
| 30    | <i>Sunday.</i>        |                                 |                                   |                                                                                                                    |

\i Cirri, \i Cirro strati, \i Cumuli, \i Cumulo strati, \i Nimbi, —i Strati, \i Cirro cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of November, 1856.*

MONTHLY RESULTS.

|                                                               |    |    | Inches. |
|---------------------------------------------------------------|----|----|---------|
| Mean height of the Barometer for the month,                   | .. | .. | 29.969  |
| Max. height of the Barometer occurred at 9 A. M. on the 13th, | .. | .. | 30.105  |
| Min. height of the Barometer occurred at 3 P. M. on the 5th,  | .. | .. | 29.841  |
| Extreme range of the Barometer during the month,              | .. | .. | 0.264   |

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|                                                    |    |    | °    |
|----------------------------------------------------|----|----|------|
| Mean Dry Bulb Thermometer for the month,           | .. | .. | 75.2 |
| Max. Temperature occurred at 1 P. M. on the 1st,   | .. | .. | 87.4 |
| Min. Temperature occurred at 6 A. M. on the 28th,  | .. | .. | 61.9 |
| Extreme range of the Temperature during the month, | .. | .. | 25.5 |

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|                                                            |    |    | °       |
|------------------------------------------------------------|----|----|---------|
| Mean Wet Bulb Thermometer for the month,                   | .. | .. | 69.7    |
| Mean Dry Bulb Thermometer above mean Wet Bulb Thermometer, | .. | .. | 5.5     |
| Computed Mean Dew-point for the month,                     | .. | .. | 66.9    |
| Mean Dry Bulb Thermometer above computed mean Dew-point,   | .. | .. | 8.3     |
|                                                            |    |    | Inches. |
| Mean Elastic force of Vapour for the month,                | .. | .. | 0.657   |

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|                                                                         |    |    | Troy grains. |
|-------------------------------------------------------------------------|----|----|--------------|
| Mean Weight of Vapour for the month,                                    | .. | .. | 7.16         |
| Additional Weight of Vapour required for complete saturation,           | .. | .. | 2.21         |
| Mean degree of humidity for the month, complete saturation being unity, | .. | .. | 0.76         |

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|                                                               |    |    | Inches.       |
|---------------------------------------------------------------|----|----|---------------|
| Slightly Drizzling 2 days, Max. fall of rain during 24 hours, | .. | .. | Nil.          |
| Total amount of rain during the month,                        | .. | .. | Nil.          |
| Prevailing direction of the Wind,                             | .. | .. | .. N. W. & N. |

From Saturday the 22nd to Tuesday the 25th, it was cloudy day and night : the sun being scarcely once visible, also it was drizzling occasionally which rain was so small that it was not indicated by the Pluviometer. The readings of the Barometer were very steady during the four cloudy days in question.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of November, 1856.*

## MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind  
blew, together with the number of days on which at the same hour when  
any particular wind was blowing it rained.

| Hour.     | N.           | Rain on. | N. E. | Rain on. | E. | Rain on. | S. E. | Rain on. | S. | Rain on. | S. W. | Rain on. | W. | Rain on. | N. W. | Rain on. | Calm. | Rain on. |
|-----------|--------------|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|-------|----------|
|           | No. of days. |          |       |          |    |          |       |          |    |          |       |          |    |          |       |          |       |          |
| Midnight. | 7            | 1        | 1     |          |    |          |       |          | 1  |          | 1     |          | 6  |          | 7     |          | 2     |          |
| 1         | 6            |          | 2     |          |    |          |       |          | 1  |          | 2     |          | 5  |          | 7     |          | 2     |          |
| 2         | 7            |          | 1     |          |    |          |       |          | 1  |          | 2     |          | 3  |          | 8     |          | 1     |          |
| 3         | 7            |          | 1     |          |    |          |       |          | 1  |          | 2     |          | 4  |          | 8     |          | 1     |          |
| 4         | 7            |          | 2     |          |    |          |       |          | 1  |          | 2     |          | 5  |          | 7     |          | 1     |          |
| 5         | 7            |          | 2     |          |    |          |       |          | 1  |          | 2     |          | 6  |          | 6     |          | 1     |          |
| 6         | 8            |          | 2     |          |    |          |       |          | 1  |          | 2     |          | 6  |          | 7     |          |       |          |
| 7         | 7            |          | 2     |          |    |          |       |          | 1  |          | 1     |          | 5  |          | 9     |          |       |          |
| 8         | 8            |          | 3     |          |    |          |       |          | 1  |          |       |          | 4  |          | 9     |          |       |          |
| 9         | 8            |          | 3     |          |    |          |       |          | 1  |          |       |          | 3  |          | 10    |          |       |          |
| 10        | 8            |          | 4     |          | 1  |          |       |          |    |          | 1     |          | 3  |          | 8     |          |       |          |
| 11        | 6            |          | 4     | 1        | 1  |          |       |          | 1  |          | 1     |          | 4  |          | 8     |          |       |          |
| Noon.     | 6            |          | 4     |          | 1  |          | 1     |          |    |          | 1     |          | 4  |          | 8     |          |       |          |
| 1         | 6            |          | 3     |          | 1  |          |       |          | 1  |          | 1     |          | 6  |          | 7     |          |       |          |
| 2         | 6            |          | 3     | 1        |    |          |       |          | 1  |          | 3     |          | 3  |          | 9     |          |       |          |
| 3         | 3            |          | 2     | 1        |    |          |       |          |    |          | 2     |          | 7  |          | 11    |          |       |          |
| 4         | 4            |          | 4     |          |    |          |       |          |    |          | 3     |          | 6  |          | 8     |          |       |          |
| 5         | 4            |          | 3     |          | 1  |          |       |          | 1  |          | 1     |          | 6  |          | 9     |          |       |          |
| 6         | 4            |          | 2     |          | 1  |          |       |          | 2  |          | 3     |          | 3  |          | 10    |          |       |          |
| 7         | 3            |          | 1     |          | 1  |          |       |          | 4  |          | 3     |          | 3  |          | 9     |          | 1     |          |
| 8         | 3            |          | 1     |          | 1  |          |       |          | 3  |          | 3     |          | 3  |          | 9     |          | 2     |          |
| 9         | 3            |          | 2     |          |    |          |       |          | 2  |          | 4     |          | 4  |          | 8     |          | 2     |          |
| 10        | 4            |          | 2     |          |    |          |       |          | 2  |          | 3     |          | 3  |          | 8     |          | 2     |          |
| 11        | 3            |          | 2     |          |    |          |       |          | 2  |          | 3     |          | 4  |          | 9     |          | 2     |          |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of December, 1856.*

Latitude 22° 33' 1" North. Longitude 88° 20' 24" East.

Height of the Cistern of the Standard Barometer above the Sea level, 18.11 <sup>feet.</sup>

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | 29.983                                          | 30.051                                    | 29.931  | 0.120   | 71.8                          | 80.2                                          | 65.8 | 14.4  |
| 2     | .980                                            | .045                                      | .928    | .117    | 71.9                          | 79.9                                          | 66.5 | 13.4  |
| 3     | .991                                            | .053                                      | .937    | .116    | 71.6                          | 79.0                                          | 66.2 | 12.8  |
| 4     | 30.019                                          | .086                                      | .967    | .119    | 71.4                          | 80.2                                          | 65.0 | 15.2  |
| 5     | .032                                            | .095                                      | .974    | .121    | 71.9                          | 80.8                                          | 65.3 | 15.5  |
| 6     | .039                                            | .109                                      | .975    | .134    | 71.3                          | 79.9                                          | 64.6 | 15.3  |
| 7     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 8     | .053                                            | .113                                      | .993    | .120    | 69.9                          | 79.0                                          | 62.4 | 16.6  |
| 9     | .067                                            | .139                                      | 30.016  | .123    | 69.7                          | 77.0                                          | 64.0 | 13.0  |
| 10    | .071                                            | .141                                      | .016    | .125    | 69.8                          | 75.2                                          | 66.1 | 9.1   |
| 11    | .050                                            | .125                                      | 29.988  | .137    | 69.1                          | 78.9                                          | 62.0 | 16.9  |
| 12    | .052                                            | .121                                      | .987    | .134    | 69.2                          | 78.3                                          | 62.7 | 15.6  |
| 13    | .070                                            | .151                                      | 30.028  | .123    | 68.0                          | 78.4                                          | 60.7 | 17.7  |
| 14    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 15    | .015                                            | .100                                      | 29.948  | .152    | 67.5                          | 77.5                                          | 59.8 | 17.7  |
| 16    | 29.987                                          | .054                                      | .922    | .132    | 67.8                          | 77.6                                          | 60.6 | 17.0  |
| 17    | .998                                            | .078                                      | .942    | .136    | 67.5                          | 77.5                                          | 60.0 | 17.5  |
| 18    | .985                                            | .068                                      | .937    | .131    | 65.0                          | 75.3                                          | 57.0 | 18.3  |
| 19    | 30.001                                          | .070                                      | .953    | .117    | 65.2                          | 76.0                                          | 56.9 | 19.1  |
| 20    | .038                                            | .125                                      | .990    | .135    | 64.6                          | 75.4                                          | 56.4 | 19.0  |
| 21    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 22    | .083                                            | .172                                      | 30.035  | .137    | 65.5                          | 75.0                                          | 59.4 | 15.6  |
| 23    | .075                                            | .146                                      | 29.999  | .147    | 64.8                          | 75.6                                          | 55.8 | 19.8  |
| 24    | .029                                            | .102                                      | .957    | .145    | 66.6                          | 76.2                                          | 57.2 | 19.0  |
| 25    | <i>Xmas.</i>                                    |                                           |         |         |                               |                                               |      |       |
| 26    | .041                                            | .103                                      | .992    | .111    | 69.6                          | 80.6                                          | 61.6 | 19.0  |
| 27    | .069                                            | .151                                      | 30.007  | .144    | 70.1                          | 80.6                                          | 62.2 | 18.4  |
| 28    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 29    | 29.966                                          | .059                                      | .916    | .143    | 67.0                          | 77.2                                          | 58.8 | 18.4  |
| 30    | .984                                            | .061                                      | .927    | .134    | 68.0                          | 77.4                                          | 60.0 | 17.4  |
| 31    | .973                                            | .045                                      | .906    | .139    | 67.4                          | 76.6                                          | 60.1 | 16.5  |

The Mean height of the Barometer, as likewise the Mean dry and wet Bulb Thermometers are derived from the twenty-four hourly Observations made during the day.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of December, 1856.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Wet Bulb Thermometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew Point. | Mean Elastic force of Vapour. | Mean Weight of Vapour in a Cubic foot of Air. | Additional weight of vapour required for complete saturation. | Mean degree of Humidity, complete saturation being unity. |
|-------|----------------------------|---------------------|---------------------|---------------------------|-------------------------------|-----------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------|
|       | o                          | o                   | o                   | o                         | Inches.                       | T. gr.                                        | T. gr.                                                        |                                                           |
| 1     | 67.0                       | 4.8                 | 64.6                | 7.2                       | 0.609                         | 6.69                                          | 1.76                                                          | .079                                                      |
| 2     | 66.9                       | 5.0                 | 64.4                | 7.5                       | .605                          | .63                                           | .85                                                           | .78                                                       |
| 3     | 66.7                       | 4.9                 | 64.2                | 7.4                       | .601                          | .60                                           | .80                                                           | .79                                                       |
| 4     | 65.9                       | 5.5                 | 63.1                | 8.3                       | .580                          | .37                                           | .98                                                           | .76                                                       |
| 5     | 65.8                       | 6.1                 | 62.7                | 9.2                       | .572                          | .27                                           | 2.21                                                          | .74                                                       |
| 6     | 65.3                       | 6.0                 | 62.3                | 9.0                       | .565                          | .20                                           | .13                                                           | .74                                                       |
| 7     | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 8     | 63.1                       | 6.8                 | 59.7                | 10.2                      | .518                          | 5.70                                          | .28                                                           | .71                                                       |
| 9     | 64.3                       | 5.4                 | 61.6                | 8.1                       | .552                          | 6.07                                          | 1.86                                                          | .77                                                       |
| 10    | 64.3                       | 5.5                 | 61.5                | 8.3                       | .550                          | .06                                           | .89                                                           | .76                                                       |
| 11    | 63.3                       | 5.8                 | 60.4                | 8.7                       | .530                          | 5.84                                          | .94                                                           | .75                                                       |
| 12    | 62.9                       | 6.3                 | 59.7                | 9.5                       | .518                          | .70                                           | 2.11                                                          | .73                                                       |
| 13    | 61.5                       | 6.5                 | 57.6                | 10.4                      | .483                          | .33                                           | .20                                                           | .71                                                       |
| 14    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 15    | 61.9                       | 5.6                 | 58.5                | 9.0                       | .498                          | .50                                           | 1.92                                                          | .74                                                       |
| 16    | 62.3                       | 5.5                 | 59.0                | 8.8                       | .506                          | .59                                           | .89                                                           | .75                                                       |
| 17    | 61.9                       | 5.6                 | 58.5                | 9.0                       | .498                          | .50                                           | .92                                                           | .74                                                       |
| 18    | 59.0                       | 6.0                 | 55.4                | 9.6                       | .449                          | 4.98                                          | .89                                                           | .73                                                       |
| 19    | 58.9                       | 6.3                 | 55.1                | 10.1                      | .444                          | .94                                           | .97                                                           | .72                                                       |
| 20    | 58.5                       | 6.1                 | 54.8                | 9.8                       | .440                          | .88                                           | .90                                                           | .72                                                       |
| 21    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 22    | 58.7                       | 6.8                 | 54.6                | 10.9                      | .437                          | .85                                           | 2.13                                                          | .70                                                       |
| 23    | 58.3                       | 6.5                 | 54.4                | 10.4                      | .434                          | .82                                           | .01                                                           | .71                                                       |
| 24    | 60.6                       | 6.0                 | 57.0                | 9.6                       | .473                          | 5.23                                          | 1.98                                                          | .73                                                       |
| 25    | <i>Xmas.</i>               |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 26    | 63.3                       | 6.3                 | 60.1                | 9.5                       | .525                          | .77                                           | 2.13                                                          | .73                                                       |
| 27    | 63.4                       | 6.7                 | 60.0                | 10.1                      | .523                          | .75                                           | .28                                                           | .72                                                       |
| 28    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 29    | 62.2                       | 4.8                 | 59.3                | 7.7                       | .511                          | .65                                           | 1.65                                                          | .77                                                       |
| 30    | 63.4                       | 4.6                 | 60.6                | 7.4                       | .534                          | .90                                           | .63                                                           | .78                                                       |
| 31    | 62.8                       | 4.6                 | 60.0                | 7.4                       | .523                          | .79                                           | .60                                                           | .78                                                       |

All the Hygrometrical elements are computed by the Greenwich constants.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of December, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.      | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | °                          | °                                                        | °    | °     |
| Mid-night. | 30.026                                    | 30.107                                                 | 29.953  | 0.154   | 65.1                       | 69.4                                                     | 59.8 | 9.6   |
| 1          | .024                                      | .100                                                   | .954    | .146    | 64.4                       | 69.0                                                     | 59.1 | 9.9   |
| 2          | .015                                      | .080                                                   | .955    | .125    | 63.7                       | 68.7                                                     | 58.6 | 10.1  |
| 3          | .007                                      | .067                                                   | .952    | .115    | 63.2                       | 68.4                                                     | 58.2 | 10.2  |
| 4          | .005                                      | .063                                                   | .954    | .109    | 62.8                       | 68.1                                                     | 57.5 | 10.6  |
| 5          | .011                                      | .071                                                   | .959    | .112    | 62.2                       | 67.5                                                     | 56.8 | 10.7  |
| 6          | .031                                      | .087                                                   | .969    | .118    | 61.7                       | 66.9                                                     | 56.4 | 10.5  |
| 7          | .053                                      | .108                                                   | 30.000  | .108    | 61.5                       | 66.6                                                     | 55.8 | 10.8  |
| 8          | .081                                      | .139                                                   | .032    | .107    | 63.6                       | 68.5                                                     | 56.8 | 11.7  |
| 9          | .097                                      | .165                                                   | .045    | .120    | 67.1                       | 72.8                                                     | 61.0 | 11.8  |
| 10         | .096                                      | .172                                                   | .039    | .133    | 70.0                       | 75.2                                                     | 64.4 | 10.8  |
| 11         | .077                                      | .143                                                   | .019    | .124    | 72.6                       | 77.0                                                     | 68.4 | 8.6   |
| Noon.      | .043                                      | .115                                                   | 29.978  | .137    | 74.9                       | 79.1                                                     | 71.8 | 7.3   |
| 1          | .008                                      | .073                                                   | .954    | .119    | 76.7                       | 80.4                                                     | 73.6 | 6.8   |
| 2          | 29.986                                    | .047                                                   | .930    | .117    | 77.8                       | 80.7                                                     | 75.0 | 5.7   |
| 3          | .972                                      | .039                                                   | .910    | .129    | 77.5                       | 80.8                                                     | 74.8 | 6.0   |
| 4          | .971                                      | .040                                                   | .906    | .134    | 75.5                       | 78.2                                                     | 72.8 | 5.4   |
| 5          | .979                                      | .038                                                   | .920    | .118    | 74.0                       | 77.6                                                     | 71.4 | 6.2   |
| 6          | .989                                      | .038                                                   | .920    | .118    | 71.6                       | 74.8                                                     | 68.4 | 6.4   |
| 7          | 30.006                                    | .068                                                   | .941    | .127    | 69.9                       | 73.1                                                     | 66.0 | 7.1   |
| 8          | .020                                      | .086                                                   | .950    | .136    | 68.6                       | 71.8                                                     | 64.3 | 7.5   |
| 9          | .031                                      | .098                                                   | .958    | .140    | 67.5                       | 71.4                                                     | 62.0 | 9.4   |
| 10         | .038                                      | .107                                                   | .959    | .148    | 66.6                       | 70.2                                                     | 61.2 | 9.0   |
| 11         | .033                                      | .110                                                   | .951    | .159    | 65.8                       | 69.8                                                     | 60.4 | 9.4   |

The Mean height of the Barometer, as likewise the Mean dry and wet bulb Thermometers are derived from the Observations made at the several hours during the day.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of December, 1856.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of Air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity,<br>complete saturation be-<br>ing unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                   |
| Mid-<br>night. | 61.4                            | 3.7                 | 59.2                | 5.9                          | 0.509                            | 5.66                                             | 1.23                                                                    | 0.82                                                              |
| 1              | 60.9                            | 3.5                 | 58.4                | 6.0                          | .496                             | .51                                              | .23                                                                     | .82                                                               |
| 2              | 60.3                            | 3.4                 | 57.9                | 5.8                          | .488                             | .42                                              | .17                                                                     | .82                                                               |
| 3              | 59.9                            | 3.3                 | 57.6                | 5.6                          | .483                             | .37                                              | .12                                                                     | .83                                                               |
| 4              | 59.7                            | 3.1                 | 57.5                | 5.3                          | .481                             | .38                                              | .03                                                                     | .84                                                               |
| 5              | 59.2                            | 3.0                 | 57.1                | 5.1                          | .475                             | .31                                              | 0.98                                                                    | .84                                                               |
| 6              | 58.8                            | 2.9                 | 56.8                | 4.9                          | .470                             | .26                                              | .93                                                                     | .85                                                               |
| 7              | 58.8                            | 2.7                 | 56.9                | 4.6                          | .472                             | .27                                              | .89                                                                     | .86                                                               |
| 8              | 60.0                            | 3.6                 | 57.5                | 6.1                          | .481                             | .36                                              | 1.21                                                                    | .82                                                               |
| 9              | 61.9                            | 5.2                 | 58.8                | 8.3                          | .503                             | .56                                              | .76                                                                     | .76                                                               |
| 10             | 63.5                            | 6.5                 | 60.2                | 9.8                          | .527                             | .79                                              | 2.21                                                                    | .72                                                               |
| 11             | 65.0                            | 7.6                 | 61.2                | 11.4                         | .544                             | .97                                              | .69                                                                     | .69                                                               |
| Noon.          | 65.8                            | 9.1                 | 61.2                | 13.7                         | .544                             | .93                                              | 3.35                                                                    | .64                                                               |
| 1              | 66.4                            | 10.3                | 61.2                | 15.5                         | .544                             | .90                                              | .90                                                                     | .60                                                               |
| 2              | 66.6                            | 11.2                | 61.0                | 16.8                         | .541                             | .85                                              | 4.28                                                                    | .58                                                               |
| 3              | 66.2                            | 11.3                | 60.5                | 17.0                         | .532                             | .77                                              | .27                                                                     | .58                                                               |
| 4              | 65.1                            | 10.4                | 59.9                | 15.6                         | .521                             | .66                                              | 3.80                                                                    | .60                                                               |
| 5              | 65.2                            | 8.8                 | 60.8                | 13.2                         | .537                             | .86                                              | .18                                                                     | .65                                                               |
| 6              | 65.4                            | 6.2                 | 62.3                | 9.3                          | .565                             | 6.20                                             | 2.20                                                                    | .74                                                               |
| 7              | 64.7                            | 5.2                 | 62.1                | 7.8                          | .561                             | .17                                              | 1.81                                                                    | .77                                                               |
| 8              | 64.0                            | 4.6                 | 61.7                | 6.9                          | .554                             | .10                                              | .57                                                                     | .80                                                               |
| 9              | 63.3                            | 4.2                 | 60.8                | 6.7                          | .537                             | 5.94                                             | .48                                                                     | .80                                                               |
| 10             | 62.6                            | 4.0                 | 60.2                | 6.4                          | .527                             | .84                                              | .37                                                                     | .81                                                               |
| 11             | 61.9                            | 3.9                 | 59.6                | 6.2                          | .516                             | .73                                              | .31                                                                     | .81                                                               |

All the Hygrometrical elements are computed by the Greenwich constants.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of December, 1856.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                         |
|-------|-----------------------|---------------------------------|-----------------------------------|------------------------------------------------------------------------------------|
|       | o                     | Inches.                         |                                   |                                                                                    |
| 1     | 135.0                 | ..                              | N. W. & N.                        | Cloudless till 10 A. M. scattered ☉ till 5 P. M. cloudless afterwards.             |
| 2     | 130.5                 | ..                              | N. W. & N.                        | Cloudless till 11 A. M. scattered ☉ till 6 P. M. cloudless afterwards.             |
| 3     | 132.0                 | ..                              | S. W. & N. W.                     | Cloudless till 10 A. M. scattered ☉ & ☾ till 6 P. M. cloudless & foggy afterwards. |
| 4     | 140.0                 | ..                              | N. W. & N. & S. W.                | Cloudless till 11 A. M. scattered ☾ & ☉ till 9 P. M. cloudless afterwards.         |
| 5     | 136.0                 | ..                              | N. W. & N.                        | Cloudless till 11 A. M. scattered ☉ & ☾ till 5 P. M. cloudless afterwards.         |
| 6     | 133.4                 | ..                              | N. W. & N.                        | Cloudless till 11 A. M. scattered ☉ till 3 P. M. cloudless afterwards.             |
| 7     | <i>Sunday.</i>        |                                 |                                   |                                                                                    |
| 8     | 133.4                 | ..                              | N. W. & N.                        | Cloudless till 1 P. M. scattered clouds                                            |
| 9     | ..                    | ..                              | N.                                | Cloudy. [afterwards.                                                               |
| 10    | ..                    | ..                              | N. W. & N.                        | Cloudy.                                                                            |
| 11    | 136.5                 | ..                              | N. W. & W.                        | Scattered ☾. [wards.                                                               |
| 12    | 132.0                 | ..                              | N.                                | Scattered ☾ till 3 A. M. cloudless after-                                          |
| 13    | 133.2                 | ..                              | N.                                | Cloudless.                                                                         |
| 14    | <i>Sunday.</i>        |                                 |                                   | [7 P. M. cloudless afterwards.                                                     |
| 15    | 134.0                 | ..                              | N.                                | Cloudless till 3 P. M. scattered ☾ till                                            |
| 16    | 130.2                 | ..                              | N. W.                             | Cloudless.                                                                         |
| 17    | 135.0                 | ..                              | N. W. & N. & N. E.                | Cloudless, also foggy before sunrise.                                              |
| 18    | 131.6                 | ..                              | N. & N. W.                        | Cloudless.                                                                         |
| 19    | 132.0                 | ..                              | N. W. & N.                        | Cloudless.                                                                         |
| 20    | 133.0                 | ..                              | N. W. & N.                        | Cloudless.                                                                         |
| 21    | <i>Sunday.</i>        |                                 |                                   | [8 A. M. cloudless afterwards.                                                     |
| 22    | 131.0                 | ..                              | N. & N. W.                        | Cloudless till 2 A. M. scattered ☾ till                                            |
| 23    | 126.5                 | ..                              | N. W.                             | Cloudless.                                                                         |
| 24    | 129.8                 | ..                              | N. & N. W.                        | Cloudless.                                                                         |
| 25    | Xmas.                 |                                 |                                   |                                                                                    |
| 26    | 134.3                 | ..                              | N. W.                             | Cloudless.                                                                         |
| 27    | 135.6                 | ..                              | N. W. & N.                        | Cloudless.                                                                         |
| 28    | <i>Sunday.</i>        |                                 |                                   |                                                                                    |
| 29    | 135.0                 | ..                              | Variable.                         | Cloudless.                                                                         |
| 30    | 132.0                 | ..                              | Calm & N. W.                      | Cloudless till 11 A. M. scattered ☾ till 4 P. M. cloudless afterwards.             |
| 31    | 131.0                 | ..                              | Calm & W.                         | Cloudless till 6 A. M. scattered ☾ & ☾ till 8 P. M. cloudless afterwards.          |

☉ Cirri, ☾ Cirro strati, ☉ Cumuli, ☉ Cumulo strati, ☾ Nimbi, — Stra  
☾ Cirro cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of December, 1856.*

## MONTHLY RESULTS.

|                                                                |    |    | Inches. |
|----------------------------------------------------------------|----|----|---------|
| Mean height of the Barometer for the month,                    | .. | .. | 30.025  |
| Max. height of the Barometer occurred at 10 A. M. on the 22nd, | .. | .. | 30.172  |
| Min. height of the Barometer occurred at 4 P. M. on the 31st,  | .. | .. | 29.906  |
| Extreme range of the Barometer during the month,               | .. | .. | 0.266   |

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|                                                    |    |    | °    |
|----------------------------------------------------|----|----|------|
| Mean Dry Bulb Thermometer for the month,           | .. | .. | 68.5 |
| Max. Temperature occurred at 3 P. M. on the 5th,   | .. | .. | 80.8 |
| Min. Temperature occurred at 7 A. M. on the 23rd,  | .. | .. | 55.8 |
| Extreme range of the Temperature during the month, | .. | .. | 25.0 |

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|                                                            |    |    | °                |
|------------------------------------------------------------|----|----|------------------|
| Mean Wet Bulb Thermometer for the month,                   | .. | .. | 62.8             |
| Mean Dry Bulb Thermometer above mean Wet Bulb Thermometer, | .. | .. | 5.7              |
| Computed Mean Dew-point for the month,                     | .. | .. | 59.9             |
| Mean Dry Bulb Thermometer above computed mean Dew-point,   | .. | .. | 8.6              |
| Mean Elastic force of Vapour for the month,                | .. | .. | Inches.<br>0.521 |

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|                                                                         |    |    | Troy grains. |
|-------------------------------------------------------------------------|----|----|--------------|
| Mean Weight of Vapour for the month,                                    | .. | .. | 5.74         |
| Additional Weight of Vapour required for complete saturation,           | .. | .. | 1.91         |
| Mean degree of humidity for the month, complete saturation being unity, | .. | .. | 0.75         |

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|                                        |                                    |    | Inches. |
|----------------------------------------|------------------------------------|----|---------|
| Rained No.                             | Max. fall of rain during 24 hours, | .. | Nil.    |
| Total amount of rain during the month, | ..                                 | .. | Nil.    |
| Prevailing direction of the Wind,      | N. W. & N.                         |    |         |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of December, 1856.*

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour when any particular wind was blowing it rained.

| Hour.          | N. | Rain on.<br>N. E. | Rain on.<br>E | Rain on.<br>S. E. | Rain on.<br>S. | Rain on.<br>S. W. | Rain on.<br>W. | Rain on.<br>N. W. | Rain on.<br>Calm. | Rain on. |
|----------------|----|-------------------|---------------|-------------------|----------------|-------------------|----------------|-------------------|-------------------|----------|
|                |    |                   |               |                   | No. of days.   |                   |                |                   |                   |          |
| Mid-<br>night. | 9  |                   |               |                   |                | 1                 | 2              | 9                 | 5                 |          |
| 1              | 8  |                   |               |                   |                | 1                 | 2              | 10                | 5                 |          |
| 2              | 8  | 1                 |               |                   |                | 1                 | 2              | 9                 | 5                 |          |
| 3              | 10 | 1                 |               |                   |                | 1                 | 2              | 9                 | 3                 |          |
| 4              | 10 | 1                 |               |                   |                | 1                 | 1              | 9                 | 3                 |          |
| 5              | 10 | 1                 |               |                   |                | 1                 | 1              | 10                | 2                 |          |
| 6              | 10 | 2                 |               |                   |                | 1                 | 1              | 10                | 2                 |          |
| 7              | 8  | 3                 | 1             |                   |                |                   | 1              | 12                | 1                 |          |
| 8              | 12 | 2                 |               |                   |                |                   | 1              | 11                |                   |          |
| 9              | 10 | 2                 |               |                   |                |                   |                | 14                |                   |          |
| 10             | 11 | 2                 |               |                   |                |                   |                | 13                |                   |          |
| 11             | 10 | 1                 | 1             |                   | 1              |                   |                | 13                |                   |          |
| Noon.          | 9  |                   | 1             |                   |                | 1                 | 1              | 14                |                   |          |
| 1              | 7  |                   |               |                   |                |                   | 2              | 17                |                   |          |
| 2              | 8  |                   |               |                   |                | 1                 | 2              | 14                |                   |          |
| 3              | 8  |                   |               |                   |                | 3                 | 1              | 14                |                   |          |
| 4              | 12 |                   |               |                   |                | 2                 | 2              | 10                |                   |          |
| 5              | 9  |                   |               |                   |                | 2                 | 1              | 14                |                   |          |
| 6              | 10 |                   |               |                   |                | 3                 | 1              | 12                |                   |          |
| 7              | 9  |                   |               |                   |                | 2                 | 1              | 13                |                   |          |
| 8              | 9  |                   |               | 1                 |                | 2                 | 1              | 13                |                   |          |
| 9              | 11 |                   |               | 1                 |                | 1                 | 2              | 11                |                   |          |
| 10             | 11 |                   |               | 1                 |                | 1                 | 1              | 12                |                   |          |
| 11             | 11 |                   |               | 1                 |                | 1                 | 1              | 11                | 1                 |          |



*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of September, 1856.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.     |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                        |
| 1     | 29.135     | 85.9         | 86.0    | 82.6      | S. W.              | ...               | ✓ scattered.           |
| 2     | 29.093     | 83.2         | 83.5    | 80.5      | N. W.              | ...               | „ ditto                |
| 3     | 29.131     | 84.5         | 85.0    | 80.0      | N. W.              | 0.12              | „ all over.            |
| 4     | 29.205     | 84.9         | 85.0    | 78.9      | N. W.              | ...               | „ scattered.           |
| 5     | 29.179     | 82.5         | 83.5    | 80.5      | N. E.              | 0.62              | „ all over.            |
| 6     | 29.053     | 78.1         | 78.5    | 77.0      | N. W.              | ...               | „ ditto.               |
| 7     | 29.105     | 77.5         | 78.1    | 76.7      | N. W.              | ...               | „ ditto.               |
| 8     | 29.329     | 83.9         | 84.4    | 77.5      | N. W.              | ...               | ✓ scattered in zenith. |
| 9     | 29.339     | 84.9         | 84.9    | 76.9      | N. W.              | ...               | Clear.                 |
| 10    | 29.285     | 84.8         | 84.9    | 75.0      | N. W.              | ...               | Ditto.                 |
| 11    | 29.323     | 84.8         | 85.0    | 76.0      | N. W.              | ...               | ✓ scattered in zenith. |
| 12    | 29.345     | 85.5         | 85.5    | 76.0      | N. W.              | ...               | Clear.                 |
| 13    | 29.389     | 86.9         | 87.4    | 75.9      | N. W.              | ...               | Ditto.                 |
| 14    | 29.401     | 89.5         | 89.7    | 81.0      | N. W.              | ...               | ✓ scattered.           |
| 15    | 29.381     | 88.9         | 88.5    | 81.2      | N. E.              | ...               | „ ditto.               |
| 16    | 29.271     | 88.9         | 88.5    | 81.9      | N. E.              | ...               | „ ditto.               |
| 17    | 29.271     | 88.9         | 88.5    | 80.2      | N. E.              | ...               | „ ditto.               |
| 18    | 29.329     | 91.0         | 91.0    | 82.6      | N. W.              | ...               | „ ditto.               |
| 19    | 29.341     | 87.0         | 87.5    | 79.0      | S. E.              | ...               | „ ditto.               |
| 20    | 29.335     | 85.7         | 85.0    | 76.9      | E.                 | ...               | ✓ scattered.           |
| 21    | 29.343     | 84.0         | 84.3    | 77.5      | S. E.              | ...               | ✓ all over.            |
| 22    | 29.337     | 84.2         | 85.0    | 78.5      | S.                 | 1.72              | ✓ scattered.           |
| 23    | 29.381     | 83.5         | 84.0    | 79.0      | S.                 | 0.40              | ✓ ditto.               |
| 24    | 29.369     | 82.9         | 83.9    | 76.5      | N. W.              | ...               | ✓ ditto in zenith.     |
| 25    | 29.329     | 84.9         | 85.0    | 78.0      | N. W.              | ...               | ✓ scattered.           |
| 26    | 29.373     | 85.9         | 85.9    | 74.5      | W.                 | ...               | Clear.                 |
| 27    | 29.399     | 85.9         | 86.0    | 74.5      | S. W.              | ...               | Ditto.                 |
| 28    | 29.405     | 86.0         | 85.5    | 74.2      | N. W.              | ...               | Ditto.                 |
| 29    | 29.413     | 86.5         | 87.2    | 74.5      | N. W.              | ...               | Ditto.                 |
| 30    | 29.453     | 86.9         | 87.4    | 77.0      | N. W.              | ...               | Ditto.                 |
| Mean. | 29.301     | 84.9         | 85.5    | 78.0      |                    |                   |                        |

NOTE.—The dry bulb and maximum Register do not agree; the former always reads more than the latter. The average difference is 1.6.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of September, 1856.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.     |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                        |
| 1     | 29.091     | 87.7         | 88.0    | 82.5      | S. W.              | ..                | ~ scattered.           |
| 2     | 29.067     | 86.0         | 86.5    | 80.5      | N. W.              | ..                | „ ditto.               |
| 3     | 29.105     | 85.5         | 86.0    | 80.5      | N. W.              | ..                | „ all over.            |
| 4     | 29.215     | 87.9         | 88.0    | 80.0      | N. W.              | ..                | „ scattered.           |
| 5     | 29.141     | 84.0         | 84.4    | 79.5      | N. E.              | ..                | „ all over.            |
| 6     | 29.037     | 78.9         | 78.4    | 77.4      | W.                 | ..                | „ ditto.               |
| 7     | 29.089     | 78.5         | 78.8    | 77.5      | N. W.              | 0.10              | „ ditto.               |
| 8     | 29.311     | 86.0         | 86.5    | 78.5      | N. W.              | ..                | ? scattered in zenith. |
| 9     | 29.323     | 86.9         | 86.9    | 77.9      | N. W.              | ..                | ? ditto.               |
| 10    | 29.271     | 86.0         | 86.4    | 76.9      | N. W.              | ..                | Clear.                 |
| 11    | 29.325     | 87.0         | 87.5    | 76.2      | N. W.              | ..                | ~ scattered in zenith. |
| 12    | 29.327     | 88.0         | 88.9    | 76.6      | N. W.              | ..                | Clear.                 |
| 13    | 29.371     | 89.0         | 89.9    | 76.0      | N. W.              | ..                | Ditto.                 |
| 14    | 29.381     | 91.5         | 91.5    | 82.0      | N. W.              | ..                | ~ scattered.           |
| 15    | 29.345     | 90.2         | 90.9    | 80.5      | N. W.              | ..                | „ ditto.               |
| 16    | 29.233     | 90.9         | 91.9    | 81.9      | N. E.              | ..                | „ ditto.               |
| 17    | 29.253     | 90.5         | 90.2    | 81.5      | N. E.              | ..                | „ ditto.               |
| 18    | 29.273     | 91.2         | 91.8    | 81.0      | N. W.              | ..                | „ ditto.               |
| 19    | 29.331     | 88.2         | 88.5    | 78.9      | S. E.              | ..                | „ ditto.               |
| 20    | 29.311     | 85.0         | 84.0    | 76.5      | E.                 | ..                | „ all over.            |
| 21    | 29.309     | 86.0         | 86.5    | 78.5      | S. E.              | ..                | „ scattered.           |
| 22    | 29.229     | 86.5         | 87.5    | 80.2      | S. E.              | ..                | ? all over.            |
| 23    | 29.347     | 85.0         | 85.5    | 79.9      | S.                 | ..                | ~ scattered.           |
| 24    | 29.339     | 85.1         | 85.1    | 77.0      | N. W.              | ..                | „ ditto all over.      |
| 25    | 29.209     | 86.8         | 87.0    | 78.0      | N. W.              | ..                | ? scattered.           |
| 26    | 29.355     | 87.9         | 88.5    | 73.9      | N. W.              | ..                | Clear.                 |
| 27    | 29.377     | 87.8         | 88.5    | 72.9      | N. W.              | ..                | Ditto.                 |
| 28    | 29.389     | 88.2         | 88.6    | 74.5      | N. W.              | ..                | Ditto.                 |
| 29    | 29.397     | 88.9         | 88.5    | 73.2      | N. W.              | ..                | Ditto.                 |
| 30    | 29.431     | 88.0         | 89.0    | 76.9      | N. W.              | ..                | Ditto.                 |
| Mean. | 29.272     | 86.9         | 87.3    | 78.2      |                    |                   |                        |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of September, 1856.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky.  | Direction of Wind. | Quantity of Rain. |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|---------------------|--------------------|-------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                     |                    |                   |
| 1     | 29.017     | 82.0         | 81.0    | 79.1      | 88.0                 | 78.5     | 83.25 | ~ all over.         | S. E.              | 0.79              |
| 2     | 28.997     | 89.4         | 89.0    | 82.0      | 89.5                 | 77.0     | 83.25 | „ scattered.        | N. W.              | ..                |
| 3     | 29.057     | 89.0         | 89.5    | 82.0      | 89.5                 | 76.9     | 83.2  | „ ditto.            | N. W.              | ..                |
| 4     | 29.189     | 81.9         | 81.5    | 78.9      | 90.0                 | 76.9     | 83.45 | „ all over.         | N. E.              | 0.12              |
| 5     | 29.063     | 80.9         | 80.9    | 78.6      | 82.0                 | 77.0     | 79.5  | „ ditto.            | E.                 | 0.14              |
| 6     | 29.001     | 80.9         | 80.5    | 78.5      | 80.5                 | 75.0     | 77.75 | „ ditto.            | N. W.              | 0.4               |
| 7     | 29.039     | 88.0         | 88.8    | 79.0      | 80.5                 | 75.5     | 78.0  | „ scattered.        | N. W.              | ..                |
| 8     | 29.267     | 90.5         | 89.5    | 80.4      | 89.5                 | 75.5     | 82.5  | „ ditto.            | N. W.              | ..                |
| 9     | 29.255     | 90.9         | 90.0    | 78.5      | 90.0                 | 75.8     | 82.9  | Clear.              | N. W.              | ..                |
| 10    | 29.217     | 88.8         | 87.2    | 77.5      | 89.5                 | 74.9     | 82.2  | ~ all over.         | N. W.              | ..                |
| 11    | 29.245     | 90.0         | 89.0    | 77.9      | 91.0                 | 76.5     | 85.25 | „ scattered in zen. | N. W.              | ..                |
| 12    | 29.275     | 92.5         | 91.5    | 76.5      | 92.0                 | 75.5     | 83.75 | Clear.              | N. W.              | ..                |
| 13    | 29.319     | 94.1         | 93.2    | 75.4      | 93.5                 | 75.5     | 84.5  | Ditto.              | N. W.              | ..                |
| 14    | 29.303     | 95.0         | 94.9    | 83.0      | 94.9                 | 79.0     | 86.95 | ~ scattered.        | N. W.              | ..                |
| 15    | 29.237     | 93.8         | 92.5    | 81.5      | 94.0                 | 79.8     | 86.9  | „ ditto.            | N. E.              | ..                |
| 16    | 29.143     | 93.5         | 93.9    | 81.6      | 94.8                 | 79.5     | 87.15 | „ ditto.            | N. E.              | ..                |
| 17    | 29.173     | 90.0         | 89.0    | 81.2      | 92.0                 | 79.9     | 85.95 | „ all over.         | S. E.              | ..                |
| 18    | 29.235     | 91.1         | 90.5    | 82.4      | 93.1                 | 82.0     | 87.55 | „ ditto.            | N.                 | ..                |
| 19    | 29.275     | 91.5         | 89.4    | 78.9      | 89.5                 | 77.9     | 83.7  | „ scattered above   | S. E.              | ..                |
| 20    | 29.233     | 82.9         | 82.0    | 77.5      | 86.0                 | 77.9     | 81.95 | „ all over. [hor.   | E.                 | ..                |
| 21    | 29.229     | 89.0         | 88.9    | 80.5      | 89.2                 | 75.0     | 82.1  | „ scattered.        | S. E.              | ..                |
| 22    | 29.237     | 88.0         | 87.5    | 79.0      | 88.5                 | 75.6     | 82.05 | ~ all over.         | S. E.              | ..                |
| 23    | 29.289     | 87.2         | 87.5    | 79.8      | 87.8                 | 74.9     | 81.35 | ~ scattered.        | N. E.              | ..                |
| 24    | 29.263     | 89.0         | 88.4    | 77.4      | 88.0                 | 76.8     | 82.4  | ~ ditto all over.   | N. W.              | ..                |
| 25    | 29.237     | 90.9         | 90.9    | 78.0      | 90.0                 | 77.0     | 83.5  | Clear.              | N. W.              | ..                |
| 26    | 29.291     | 91.2         | 91.0    | 76.1      | 91.2                 | 76.5     | 83.85 | Ditto.              | N. W.              | ..                |
| 27    | 29.337     | 91.9         | 91.0    | 74.6      | 91.0                 | 75.8     | 83.4  | Ditto.              | N. W.              | ..                |
| 28    | 29.309     | 91.5         | 91.0    | 75.5      | 91.2                 | 75.0     | 83.1  | Ditto.              | N. W.              | ..                |
| 22    | 29.331     | 92.5         | 91.9    | 71.1      | 92.0                 | 74.0     | 83.0  | Ditto.              | N. W.              | ..                |
| 30    | 29.359     | 92.8         | 91.5    | 74.0      | 92.5                 | 77.0     | 84.75 | Ditto.              | N. W.              | ..                |
| Mean. | 29.214     | 89.3         | 88.7    | 78.5      | 89.8                 | 76.8     | 83.30 |                     |                    |                   |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of October, 1856.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky. |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|--------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                    |
| 1     | 29.465     | 85.5         | 85.5    | 76.0      | N. E.              | ...               | Clear.             |
| 2     | 29.439     | 84.8         | 85.1    | 73.0      | N. W.              | ...               | Ditto.             |
| 3     | 29.425     | 83.9         | 84.5    | 74.0      | N. W.              | ...               | Ditto.             |
| 4     | 29.383     | 84.9         | 86.0    | 72.0      | N. W.              | ...               | Ditto.             |
| 5     | 29.386     | 85.0         | 86.0    | 70.0      | N. W.              | ...               | Ditto.             |
| 6     | 29.389     | 85.0         | 86.5    | 68.0      | N. W.              | ...               | Ditto.             |
| 7     | 29.401     | 85.9         | 86.6    | 71.4      | S. E.              | ...               | Ditto.             |
| 8     | 29.415     | 88.0         | 89.4    | 70.0      | N.                 | ...               | Ditto.             |
| 9     | 29.405     | 86.0         | 86.7    | 70.0      | N. E.              | ...               | Ditto.             |
| 10    | 29.393     | 84.0         | 85.0    | 69.0      | N. W.              | ...               | Ditto.             |
| 11    | 29.341     | 82.8         | 84.0    | 66.0      | N. W.              | ...               | Ditto.             |
| 12    | 29.285     | 82.5         | 83.6    | 64.5      | N. W.              | ...               | Ditto.             |
| 13    | 29.343     | 83.0         | 84.9    | 69.4      | S. E.              | ...               | Ditto.             |
| 14    | 29.417     | 83.2         | 83.9    | 65.5      | W.                 | ...               | Ditto.             |
| 15    | 29.471     | 81.9         | 83.0    | 68.0      | N. W.              | ...               | Ditto.             |
| 16    | 29.505     | 82.0         | 84.4    | 66.4      | N. W.              | ...               | Ditto.             |
| 17    | 29.485     | 83.9         | 84.9    | 69.5      | N. W.              | ...               | Ditto.             |
| 18    | 29.479     | 83.4         | 84.4    | 66.2      | N. W.              | ...               | Ditto.             |
| 19    | 29.426     | 83.7         | 84.5    | 66.6      | N. W.              | ...               | Ditto.             |
| 20    | 29.373     | 84.8         | 85.0    | 67.0      | W.                 | ...               | Ditto.             |
| 21    | 29.419     | 82.0         | 85.5    | 65.0      | N. W.              | ...               | Ditto.             |
| 22    | 29.441     | 79.1         | 80.2    | 63.0      | W.                 | ...               | Ditto.             |
| 23    | 29.449     | 77.1         | 79.2    | 60.0      | W.                 | ...               | Ditto.             |
| 24    | 29.469     | 78.0         | 78.8    | 60.0      | W.                 | ...               | Ditto.             |
| 25    | 29.511     | 76.8         | 78.5    | 60.5      | N. W.              | ...               | Ditto.             |
| 26    | 29.523     | 77.6         | 79.0    | 62.7      | N. W.              | ...               | Ditto.             |
| 27    | 29.535     | 77.5         | 79.4    | 65.0      | N. W.              | ...               | Ditto.             |
| 28    | 29.559     | 80.0         | 81.2    | 64.9      | W.                 | ...               | Ditto.             |
| 29    | 29.523     | 78.5         | 80.4    | 64.5      | N. W.              | ...               | Ditto.             |
| 30    | 29.475     | 77.1         | 79.4    | 65.0      | N. W.              | ...               | Ditto.             |
| 31    | 29.531     | 77.9         | 80.5    | 66.4      | N. W.              | ...               | Ditto.             |
| Mean. | 29.440     | 82.1         | 83.4    | 67.0      |                    |                   |                    |

NOTE.—The dry bulb and Maximum Register do not agree ; the former always reads more than the latter. The average difference is 1.6.



*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of October, 1856.*

## Observations at Apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky. |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|--------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                    |
| 1     | 29.445     | 87.1         | 88.0    | 74.9      | N. E.              | ...               | Clear.             |
| 2     | 29.409     | 88.0         | 89.0    | 73.6      | N. W.              | ...               | Ditto.             |
| 3     | 29.399     | 87.9         | 88.9    | 71.5      | N. W.              | ...               | Ditto.             |
| 4     | 29.367     | 89.2         | 90.5    | 70.5      | N. W.              | ...               | Ditto.             |
| 5     | 29.357     | 88.5         | 89.6    | 70.5      | N. W.              | ...               | Ditto.             |
| 6     | 29.363     | 89.0         | 90.5    | 68.5      | N. W.              | ...               | Ditto.             |
| 7     | 29.387     | 90.0         | 90.0    | 69.0      | N. E.              | ...               | Ditto.             |
| 8     | 29.391     | 89.9         | 90.5    | 70.0      | N.                 | ...               | Ditto.             |
| 9     | 29.385     | 87.5         | 88.0    | 70.6      | N. E.              | ...               | Ditto.             |
| 10    | 29.369     | 88.6         | 89.0    | 68.4      | N. W.              | ...               | Ditto.             |
| 11    | 29.309     | 88.0         | 89.0    | 66.4      | N. W.              | ...               | scattered.         |
| 12    | 29.259     | 85.5         | 86.9    | 65.0      | N. W.              | ...               | Clear.             |
| 13    | 29.325     | 85.0         | 88.0    | 68.5      | S. W.              | ...               | Ditto.             |
| 14    | 29.393     | 87.2         | 88.0    | 66.0      | W.                 | ...               | Ditto.             |
| 15    | 29.447     | 86.8         | 87.5    | 67.5      | N. W.              | ...               | Ditto.             |
| 16    | 29.475     | 85.5         | 87.9    | 66.9      | N. W.              | ...               | Ditto.             |
| 17    | 29.459     | 87.0         | 88.0    | 69.9      | N. W.              | ...               | Ditto.             |
| 18    | 29.439     | 86.0         | 87.4    | 67.4      | N. W.              | ...               | Ditto.             |
| 19    | 29.405     | 85.0         | 86.4    | 67.2      | N. W.              | ...               | Ditto.             |
| 20    | 29.345     | 85.8         | 86.5    | 67.6      | W.                 | ...               | Ditto.             |
| 21    | 29.397     | 85.0         | 86.5    | 65.4      | N. W.              | ...               | Ditto.             |
| 22    | 29.417     | 82.9         | 83.2    | 64.5      | W.                 | ...               | Ditto.             |
| 23    | 29.415     | 82.9         | 84.0    | 60.5      | W.                 | ...               | Ditto.             |
| 24    | 29.455     | 81.1         | 83.0    | 61.2      | W.                 | ...               | Ditto.             |
| 25    | 29.481     | 80.1         | 81.9    | 60.9      | N. W.              | ...               | Ditto.             |
| 26    | 29.493     | 81.5         | 83.1    | 63.4      | N. W.              | ...               | Ditto.             |
| 27    | 29.505     | 82.9         | 84.4    | 66.0      | N. W.              | ...               | Ditto.             |
| 28    | 29.527     | 85.0         | 86.0    | 64.4      | N. W.              | ...               | Ditto.             |
| 29    | 29.489     | 83.9         | 85.5    | 64.9      | N. W.              | ...               | Ditto.             |
| 30    | 29.443     | 84.5         | 86.0    | 65.5      | N. W.              | ...               | Ditto.             |
| 31    | 29.505     | 81.5         | 83.9    | 66.6      | N. W.              | ...               | Ditto.             |
| Mean. | 29.414     | 85.7         | 87.0    | 67.2      |                    |                   |                    |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of October, 1856.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky. | Direction of Wind. | Quantity of Rain. |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------|--------------------|-------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                    |                    |                   |
| 1     | 29.365     | 92.5         | 92.4    | 75.4      | 92.6                 | 76.0     | 84.3  | Clear.             | N.                 | ::                |
| 2     | 29.355     | 93.0         | 93.0    | 73.5      | 92.5                 | 72.9     | 82.7  | Ditto.             | N. W.              | ::                |
| 3     | 29.335     | 93.0         | 92.5    | 72.0      | 92.5                 | 72.5     | 82.5  | Ditto.             | N. W.              | ::                |
| 4     | 29.305     | 93.9         | 93.2    | 71.5      | 93.5                 | 71.5     | 82.5  | Ditto.             | N. W.              | ::                |
| 5     | 29.315     | 94.5         | 93.8    | 93.8      | 94.0                 | 70.5     | 82.25 | Ditto.             | N. W.              | ::                |
| 6     | 29.315     | 94.5         | 93.3    | 70.5      | 94.0                 | 69.9     | 81.95 | Ditto.             | N. W.              | ::                |
| 7     | 29.223     | 94.5         | 93.0    | 72.3      | 93.0                 | 71.0     | 82.0  | Ditto.             | N. E.              | ::                |
| 8     | 29.355     | 95.0         | 94.0    | 72.0      | 94.0                 | 75.9     | 84.95 | Ditto.             | N.                 | ::                |
| 9     | 29.307     | 94.0         | 94.0    | 71.0      | 94.0                 | 74.0     | 84.0  | Ditto.             | N. E.              | ::                |
| 10    | 29.283     | 94.9         | 96.0    | 72.0      | 96.7                 | 69.0     | 82.85 | Ditto.             | N. W.              | ::                |
| 11    | 29.223     | 90.9         | 90.0    | 69.5      | 90.5                 | 67.0     | 78.75 | \ scattered.       | N. W.              | ::                |
| 12    | 29.205     | 90.8         | 89.5    | 66.8      | 90.0                 | 66.0     | 78.0  |                    | N. W.              | ::                |
| 13    | 29.287     | 92.0         | 91.5    | 72.9      | 91.0                 | 67.5     | 79.25 | Ditto.             | S. W.              | ::                |
| 14    | 29.353     | 91.0         | 90.0    | 70.0      | 91.1                 | 68.5     | 79.8  | Ditto.             | N. W.              | ::                |
| 15    | 29.405     | 91.0         | 90.5    | 70.0      | 91.0                 | 71.0     | 81.0  | Ditto.             | N. W.              | ::                |
| 16    | 29.425     | 89.9         | 89.9    | 69.4      | 89.5                 | 67.9     | 78.7  | Ditto.             | W.                 | ::                |
| 17    | 29.412     | 91.0         | 90.5    | 71.0      | 91.0                 | 70.5     | 80.75 | Ditto.             | N. W.              | ::                |
| 18    | 29.381     | 92.0         | 91.5    | 67.9      | 92.0                 | 69.5     | 80.75 | Ditto.             | N. W.              | ::                |
| 19    | 29.355     | 90.0         | 91.5    | 69.4      | 91.5                 | 65.5     | 78.5  | Ditto.             | N. W.              | ::                |
| 20    | 29.313     | 90.0         | 89.9    | 68.9      | 89.5                 | 65.0     | 77.25 | Ditto.             | N. W.              | ::                |
| 21    | 29.373     | 89.5         | 89.0    | 67.5      | 90.0                 | 65.0     | 77.5  | Ditto.             | N. W.              | ::                |
| 22    | 29.381     | 87.8         | 86.9    | 64.0      | 88.0                 | 66.0     | 77.0  | Ditto.             | N.                 | ::                |
| 23    | 29.397     | 85.4         | 85.4    | 62.4      | 86.0                 | 61.5     | 73.75 | Ditto.             | N.                 | ::                |
| 24    | 29.423     | 85.5         | 85.4    | 61.0      | 86.1                 | 61.0     | 73.55 | Ditto.             | W.                 | ::                |
| 25    | 29.437     | 85.0         | 84.4    | 63.0      | 85.5                 | 61.0     | 73.25 | Ditto.             | N. W.              | ::                |
| 26    | 29.449     | 86.4         | 86.4    | 63.5      | 87.0                 | 62.0     | 74.5  | Ditto.             | N. W.              | ::                |
| 27    | 29.461     | 87.9         | 87.6    | 65.0      | 88.0                 | 62.5     | 75.25 | Ditto.             | N. W.              | ::                |
| 28    | 29.475     | 88.8         | 88.5    | 66.1      | 90.0                 | 64.8     | 77.4  | Ditto.             | N. W.              | ::                |
| 29    | 29.437     | 88.9         | 88.5    | 65.1      | 90.0                 | 62.8     | 76.4  | Ditto.             | N. W.              | ::                |
| 30    | 29.407     | 88.0         | 87.5    | 67.4      | 89.1                 | 61.9     | 75.5  | Ditto.             | N. W.              | ::                |
| 31    | 29.471     | 85.9         | 86.0    | 69.9      | 86.0                 | 63.9     | 74.95 | Ditto.             | N. W.              | ::                |
| Mean. | 29.362     | 90.5         | 90.1    | 69.5      | 90.6                 | 67.5     | 79.09 |                    |                    |                   |

*Meteorological Register kept at the Office of the Secretary to  
Government, N. W. P. Agra, for the month of  
November, 1856.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.        |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|---------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                           |
| 1     | 29.585     | 80.5         | 81.9    | 72.5      | N. E.              | ...               | Clear.                    |
| 2     | 29.575     | 81.6         | 81.5    | 71.0      | S.                 | ...               | Ditto.                    |
| 3     | 29.569     | 82.8         | 84.0    | 73.0      | S.                 | ...               | Ditto.                    |
| 4     | 29.533     | 82.0         | 83.4    | 71.9      | N. W.              | ...               | Ditto.                    |
| 5     | 29.529     | 81.0         | 82.0    | 68.6      | N. W.              | ...               | Ditto.                    |
| 6     | 29.555     | 77.0         | 78.5    | 65.0      | W.                 | ...               | Ditto.                    |
| 7     | 29.573     | 78.1         | 79.0    | 64.9      | W.                 | ...               | Ditto.                    |
| 8     | 29.547     | 74.5         | 75.3    | 60.4      | W.                 | ...               | Ditto.                    |
| 9     | 29.583     | 72.8         | 73.4    | 58.2      | N. W.              | ...               | Ditto.                    |
| 10    | 29.621     | 71.0         | 71.5    | 56.0      | W.                 | ...               | Ditto.                    |
| 11    | 29.611     | 70.0         | 70.5    | 57.4      | W.                 | ...               | Ditto.                    |
| 12    | 29.585     | 70.9         | 73.5    | 58.4      | S.                 | ...               | Ditto.                    |
| 13    | 29.641     | 72.9         | 73.5    | 60.0      | N.                 | ...               | Ditto.                    |
| 14    | 29.631     | 73.0         | 74.0    | 60.5      | S. E.              | ...               | Ditto.                    |
| 15    | 29.609     | 74.0         | 75.0    | 61.9      | S.                 | ...               | Ditto.                    |
| 16    | 29.611     | 73.9         | 74.8    | 61.7      | S. W.              | ...               | Ditto.                    |
| 17    | 29.611     | 73.9         | 74.5    | 62.5      | S. W.              | ...               | ✓ scattered towards [hor. |
| 18    | 29.603     | 74.9         | 75.5    | 62.0      | S.                 | ...               | Clear.                    |
| 19    | 29.555     | 69.0         | 70.0    | 58.0      | W.                 | ...               | Ditto.                    |
| 20    | 29.593     | 66.2         | 67.9    | 54.0      | N.                 | ...               | Ditto.                    |
| 21    | 29.595     | 65.0         | 66.5    | 55.0      | N.                 | ...               | ✓ scattered.              |
| 22    | 29.577     | 65.0         | 67.5    | 53.5      | N.                 | ...               | Ditto.                    |
| 23    | 29.593     | 66.8         | 68.4    | 58.0      | N. E.              | ...               | ✓ all over.               |
| 24    | 29.609     | 68.5         | 69.2    | 62.5      | S. E.              | ...               | Clear.                    |
| 25    | 29.647     | 67.0         | 68.0    | 54.5      | N. E.              | ...               | Ditto.                    |
| 26    | 29.617     | 65.9         | 67.0    | 54.0      | N.                 | ...               | Ditto.                    |
| 27    | 29.567     | 66.1         | 68.0    | 54.5      | W.                 | ...               | Ditto.                    |
| 28    | 29.535     | 67.0         | 69.0    | 56.0      | W.                 | ...               | Ditto.                    |
| 29    | 29.549     | 68.5         | 70.5    | 58.0      | W.                 | ...               | Ditto.                    |
| 30    | 29.535     | 69.9         | 71.5    | 62.0      | S.                 | ...               | Ditto.                    |
| Mean. | 29.584     | 72.3         | 73.5    | 60.8      |                    |                   |                           |

NOTE.—The dry bulb and Maximum Register do not agree ; the former always reads more than the latter. The average difference is 1.6.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the month of November, 1856.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky. |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|--------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                    |
| 1     | 29.449     | 82.5         | 83.9    | 71.5      | N. E.              | ...               | Clear.             |
| 2     | 29.541     | 82.9         | 83.9    | 71.5      | S.                 | ...               | Ditto.             |
| 3     | 29.533     | 84.0         | 85.0    | 72.0      | S. W.              | ...               | Ditto.             |
| 4     | 29.501     | 85.0         | 86.4    | 71.9      | N. W.              | ...               | Ditto.             |
| 5     | 29.505     | 84.0         | 85.0    | 68.6      | N. W.              | ...               | Ditto.             |
| 6     | 29.531     | 81.5         | 83.5    | 65.4      | W.                 | ...               | Ditto.             |
| 7     | 29.541     | 81.0         | 83.0    | 65.5      | W.                 | ...               | Ditto.             |
| 8     | 29.515     | 76.4         | 77.5    | 61.0      | W.                 | ...               | Ditto.             |
| 9     | 29.551     | 74.5         | 76.6    | 58.8      | N. W.              | ...               | Ditto.             |
| 10    | 29.587     | 73.0         | 75.0    | 56.5      | W.                 | ...               | Ditto.             |
| 11    | 29.573     | 74.9         | 76.0    | 57.9      | W.                 | ...               | Ditto.             |
| 12    | 29.575     | 74.0         | 76.4    | 59.5      | S.                 | ...               | Ditto.             |
| 13    | 29.609     | 75.3         | 76.8    | 60.5      | N.                 | ...               | Ditto.             |
| 14    | 29.589     | 76.0         | 77.0    | 62.0      | S. E.              | ...               | Ditto.             |
| 15    | 29.581     | 77.8         | 78.5    | 62.5      | S. W.              | ...               | Ditto.             |
| 16    | 29.593     | 75.9         | 76.9    | 62.5      | S. W.              | ...               | Ditto.             |
| 17    | 29.573     | 77.9         | 79.0    | 63.2      | S. W.              | ...               | ↳ scattered.       |
| 18    | 29.571     | 77.9         | 79.0    | 62.5      | S.                 | ...               | Clear.             |
| 19    | 29.533     | 74.6         | 75.9    | 60.0      | N. W.              | ...               | Ditto.             |
| 20    | 29.563     | 71.0         | 72.5    | 54.4      | N.                 | ...               | Ditto.             |
| 21    | 29.561     | 68.5         | 70.5    | 56.0      | N.                 | ...               | ↳ scattered.       |
| 22    | 29.543     | 69.9         | 72.0    | 53.6      | N. E.              | ...               | Ditto.             |
| 23    | 29.555     | 68.5         | 69.5    | 59.0      | N. E.              | ...               | ↳ all over.        |
| 24    | 29.571     | 71.0         | 72.0    | 63.4      | E.                 | ...               | ↳ scattered.       |
| 25    | 29.617     | 71.9         | 72.5    | 56.5      | N. W.              | ...               | Clear.             |
| 26    | 29.563     | 72.0         | 72.5    | 54.5      | W.                 | ...               | Ditto.             |
| 27    | 29.525     | 71.9         | 73.4    | 55.5      | W.                 | ...               | Ditto.             |
| 28    | 29.501     | 71.9         | 74.9    | 58.4      | W.                 | ...               | Ditto.             |
| 29    | 29.529     | 72.8         | 74.5    | 59.0      | S. E.              | ...               | Ditto.             |
| 30    | 29.513     | 73.5         | 75.0    | 63.5      | S.                 | ...               | Ditto.             |
| Mean. | 29.549     | 75.7         | 77.1    | 61.5      |                    |                   |                    |



*Meteorological Register kept at the Office of the Secretary to  
Government, N. W. P. Agra, for the month of  
November, 1856.*

Maximum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky. | Direction of Wind. | Quantity of Rain. |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------|--------------------|-------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                    |                    |                   |
| 1     | 29.489     | 86.2         | 86.4    | 71.0      | 87.0                 | 70.3     | 78.65 | Clear.             | N. E.              | ...               |
| 2     | 29.467     | 88.9         | 89.4    | 72.8      | 89.5                 | 70.0     | 79.75 | Ditto.             | W.                 | ...               |
| 3     | 29.483     | 87.0         | 87.0    | 73.9      | 87.5                 | 73.0     | 80.25 | Ditto.             | W.                 | ...               |
| 4     | 29.433     | 89.9         | 89.0    | 72.1      | 90.0                 | 71.5     | 80.75 | ~ ditto.           | E.                 | ...               |
| 5     | 29.469     | 88.5         | 87.5    | 66.5      | 89.0                 | 70.0     | 79.5  | Ditto.             | N. W.              | ...               |
| 6     | 29.495     | 87.1         | 87.4    | 66.4      | 87.1                 | 62.0     | 74.55 | Ditto.             | W.                 | ...               |
| 7     | 29.489     | 84.0         | 85.0    | 70.5      | 86.0                 | 65.0     | 75.5  | Ditto.             | W.                 | ...               |
| 8     | 29.485     | 80.1         | 80.5    | 63.0      | 81.0                 | 64.1     | 72.55 | Ditto.             | W.                 | ...               |
| 9     | 29.505     | 77.5         | 78.0    | 60.0      | 79.0                 | 62.0     | 70.5  | Ditto.             | N. W.              | ...               |
| 10    | 29.545     | 80.0         | 80.0    | 58.5      | 80.0                 | 57.8     | 68.9  | Ditto.             | W.                 | ...               |
| 11    | 29.527     | 80.2         | 80.4    | 59.4      | 81.0                 | 57.0     | 69.0  | Ditto.             | N. W.              | ...               |
| 12    | 29.547     | 79.9         | 79.9    | 62.4      | 81.9                 | 56.9     | 69.4  | Ditto.             | N. W.              | ...               |
| 13    | 29.553     | 78.9         | 78.5    | 64.0      | 79.5                 | 59.5     | 69.5  | Ditto.             | N.                 | ...               |
| 14    | 29.535     | 79.8         | 79.4    | 64.4      | 80.2                 | 61.9     | 71.05 | Ditto.             | S. E.              | ...               |
| 15    | 29.531     | 80.8         | 80.4    | 63.5      | 81.1                 | 61.0     | 71.05 | Ditto.             | S. W.              | ...               |
| 16    | 29.513     | 81.9         | 81.5    | 64.5      | 83.0                 | 62.0     | 72.5  | ~ scattered.       | S. W.              | ...               |
| 17    | 29.513     | 81.9         | 81.0    | 65.5      | 83.1                 | 62.0     | 72.55 | Ditto.             | S. W.              | ...               |
| 18    | 29.515     | 81.9         | 81.9    | 64.0      | 82.5                 | 61.0     | 71.75 | Ditto.             | W.                 | ...               |
| 19    | 29.503     | 80.9         | 81.0    | 59.5      | 82.5                 | 57.8     | 70.15 | Ditto.             | N. W.              | ...               |
| 20    | 28.505     | 76.0         | 75.9    | 57.0      | 76.5                 | 51.5     | 64.0  | Ditto.             | N.                 | ...               |
| 21    | 29.511     | 74.9         | 75.0    | 56.5      | 76.0                 | 47.9     | 61.95 | Ditto.             | N.                 | ...               |
| 22    | 29.571     | 73.0         | 73.0    | 54.4      | 74.5                 | 49.0     | 61.75 | Ditto.             | N. E.              | ...               |
| 23    | 29.465     | 70.0         | 71.0    | 61.0      | 71.1                 | 52.8     | 61.95 | ~ all over.        | N. E.              | ...               |
| 24    | 29.529     | 74.0         | 74.0    | 62.5      | 74.0                 | 58.9     | 66.45 | ~ scattered.       | E.                 | ...               |
| 25    | 29.567     | 76.5         | 75.5    | 59.0      | 78.0                 | 55.5     | 66.75 | Clear.             | N. W.              | ...               |
| 26    | 29.525     | 75.5         | 75.1    | 55.6      | 76.0                 | 50.0     | 63.0  | Ditto.             | W.                 | ...               |
| 27    | 29.479     | 76.9         | 76.5    | 58.5      | 78.0                 | 50.0     | 64.0  | Ditto.             | W.                 | ...               |
| 28    | 29.465     | 79.0         | 78.9    | 58.4      | 81.0                 | 53.5     | 67.25 | Ditto.             | W.                 | ...               |
| 29    | 29.487     | 79.9         | 80.0    | 60.5      | 80.5                 | 52.5     | 66.5  | Ditto.             | S. W.              | ...               |
| 30    | 29.483     | 79.0         | 79.0    | 65.0      | 79.5                 | 55.5     | 67.5  | Ditto.             | S.                 | ...               |
| Mean. | 29.506     | 80.3         | 80.2    | 63.0      | 81.2                 | 59.4     | 70.29 |                    |                    |                   |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of December, 1856.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.  |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|---------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                     |
| 1     | 29.599     | 69.5         | 71.8    | 61.0      | S.                 | ..                | Clear.              |
| 2     | 29.585     | 69.5         | 71.0    | 61.0      | S.                 | ..                | Ditto.              |
| 3     | 29.561     | 68.9         | 70.4    | 62.0      | S. E.              | ..                | [S. E.              |
| 4     | 29.655     | 65.0         | 65.5    | 59.5      | N. E.              | ..                | ~ scattered towards |
| 5     | 29.673     | 64.4         | 65.5    | 56.3      | N.                 | ..                | Clear.              |
| 6     | 29.691     | 63.8         | 65.5    | 54.0      | N.                 | ..                | Ditto.              |
| 7     | 29.661     | 63.0         | 64.8    | 52.0      | N. W.              | ..                | Ditto.              |
| 8     | 29.673     | 58.9         | 60.0    | 49.0      | W.                 | ..                | Ditto.              |
| 9     | 29.695     | 60.9         | 62.4    | 51.0      | S. W.              | ..                | Ditto.              |
| 10    | 29.695     | 58.9         | 61.0    | 50.6      | W.                 | ..                | Ditto.              |
| 11    | 29.667     | 59.8         | 61.5    | 53.2      | N.                 | ..                | Ditto.              |
| 12    | 29.633     | 61.0         | 62.9    | 51.9      | N.                 | ..                | Ditto.              |
| 13    | 29.665     | 62.9         | 64.0    | 54.5      | N. E.              | ..                | Ditto.              |
| 14    | 29.639     | 63.0         | 64.5    | 54.5      | N. E.              | ..                | Ditto.              |
| 15    | 29.611     | 61.0         | 62.4    | 53.5      | N. E.              | ..                | ~ all over.         |
| 16    | 29.597     | 59.0         | 60.4    | 53.0      | N. E.              | ..                | Clear.              |
| 17    | 29.605     | 58.9         | 60.5    | 53.9      | N. W.              | ..                | Ditto.              |
| 18    | 29.557     | 59.0         | 61.0    | 54.0      | N. W.              | ..                | Ditto.              |
| 19    | 29.587     | 60.2         | 62.0    | 52.5      | N. E.              | ..                | Ditto.              |
| 20    | 29.643     | 59.0         | 60.0    | 52.5      | W.                 | ..                | Ditto.              |
| 21    | 29.605     | 60.0         | 61.4    | 49.5      | W.                 | ..                | Ditto.              |
| 22    | 29.693     | 58.0         | 60.0    | 49.0      | N.                 | ..                | Ditto.              |
| 23    | 29.617     | 56.0         | 57.5    | 48.0      | N.                 | ..                | Ditto.              |
| 24    | 29.657     | 58.0         | 60.1    | 47.5      | W.                 | ..                | Ditto.              |
| 25    | 29.595     | 60.0         | 62.2    | 52.8      | N. E.              | ..                | Ditto.              |
| 26    | 29.635     | 58.8         | 60.5    | 50.0      | N. E.              | ..                | Ditto.              |
| 27    | 29.711     | 55.9         | 57.8    | 51.0      | N. E.              | ..                | Ditto.              |
| 28    | 29.545     | 60.2         | 61.7    | 56.6      | N. E.              | ..                | Ditto.              |
| 29    | 29.529     | 59.2         | 61.0    | 52.0      | N. E.              | ..                | Ditto.              |
| 30    | 29.527     | 62.0         | 64.6    | 53.9      | N. E.              | ..                | Ditto.              |
| 31    | 29.489     | 63.8         | 66.4    | 55.5      | E.                 | ..                | ~ scattered.        |
| Mean. | 29.625     | 61.2         | 62.2    | 53.3      |                    |                   |                     |

NOTE.—The dry bulb and maximum Register do not agree; the former always reads more than the latter. The average difference is 1.6.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of December, 1856.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.       |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|--------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                          |
| 1     | 29.565     | 74.2         | 76.4    | 61.0      | S. E.              | ...               | Clear.                   |
| 2     | 29.547     | 74.2         | 75.0    | 60.5      | S. E.              | ...               | Ditto.                   |
| 3     | 29.529     | 72.1         | 73.4    | 62.5      | S. E.              | ...               | ~ scattered towds. S. E. |
| 4     | 29.597     | 69.5         | 71.5    | 61.0      | N. E.              | ...               | Clear.                   |
| 5     | 29.423     | 69.3         | 70.2    | 57.8      | N.                 | ...               | Ditto.                   |
| 6     | 29.649     | 69.0         | 69.0    | 54.5      | N. W.              | ...               | Ditto.                   |
| 7     | 29.641     | 69.0         | 70.0    | 52.0      | N. W.              | ...               | Ditto.                   |
| 8     | 29.655     | 64.2         | 66.9    | 51.5      | W.                 | ...               | Ditto.                   |
| 9     | 29.665     | 65.2         | 67.9    | 52.5      | W.                 | ...               | Ditto.                   |
| 10    | 29.669     | 65.0         | 67.9    | 53.9      | W.                 | ...               | Ditto.                   |
| 11    | 29.631     | 64.9         | 67.5    | 54.0      | N.                 | ...               | Ditto.                   |
| 12    | 29.597     | 65.9         | 68.0    | 54.0      | N.                 | ...               | Ditto.                   |
| 13    | 29.629     | 67.1         | 69.0    | 55.0      | N. E.              | ...               | Ditto.                   |
| 14    | 29.591     | 68.0         | 69.0    | 55.0      | N. E.              | ...               | ~ all over.              |
| 15    | 29.571     | 65.0         | 66.5    | 55.0      | N. E.              | ...               | Clear.                   |
| 16    | 29.547     | 64.0         | 65.9    | 54.0      | N. E.              | ...               | Ditto.                   |
| 17    | 29.571     | 63.9         | 65.5    | 55.5      | N.                 | ...               | Ditto.                   |
| 18    | 29.533     | 65.0         | 66.9    | 54.9      | N. W.              | ...               | Ditto.                   |
| 19    | 29.551     | 67.0         | 68.5    | 53.5      | N. W.              | ...               | Ditto.                   |
| 20    | 29.627     | 67.5         | 68.9    | 53.5      | W.                 | ...               | Ditto.                   |
| 21    | 29.579     | 66.9         | 67.9    | 61.0      | W.                 | ...               | Ditto.                   |
| 22    | 29.661     | 63.2         | 65.5    | 51.5      | N.                 | ...               | Ditto.                   |
| 23    | 29.687     | 64.0         | 66.4    | 50.4      | N. W.              | ...               | Ditto.                   |
| 24    | 29.611     | 63.0         | 65.1    | 50.4      | W.                 | ...               | Ditto.                   |
| 25    | 29.573     | 64.2         | 65.6    | 53.5      | N. E.              | ...               | Ditto.                   |
| 26    | 29.621     | 61.0         | 63.0    | 51.0      | N. E.              | ...               | Ditto.                   |
| 27    | 29.671     | 61.2         | 63.8    | 53.0      | N. E.              | ...               | Ditto.                   |
| 28    | 29.509     | 65.0         | 66.4    | 58.5      | N. E.              | ...               | Ditto.                   |
| 29    | 29.489     | 64.8         | 67.4    | 54.0      | N. E.              | ...               | Ditto.                   |
| 30    | 29.489     | 68.5         | 71.5    | 56.5      | E.                 | ...               | Ditto.                   |
| 31    | 29.441     | 70.0         | 72.6    | 57.5      | S. E.              | ...               | Ditto.                   |
| Mean. | 29.584     | 66.5         | 68.3    | 55.0      |                    |                   |                          |

Meteorological Register kept at the Office of the Secretary to Government, N. W. P., Agra, for the month of December, 1856.

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky. | Direction of Wind. | Quantity of Rain. |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------|--------------------|-------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                    |                    |                   |
| 1     | 29.507     | 77.5         | 77.0    | 62.0      | 78.0                 | 53.5     | 65.75 | Clear.             | S. E.              |                   |
| 2     | 29.493     | 76.9         | 75.9    | 61.5      | 77.1                 | 53.8     | 65.45 | Ditto.             | S. E.              | ..                |
| 3     | 29.481     | 71.2         | 69.5    | 59.5      | 75.5                 | 54.8     | 65.15 | ~ scattered.       | S. E.              | ..                |
| 4     | 29.567     | 74.5         | 73.5    | 62.5      | 74.5                 | 54.0     | 64.25 | Clear.             | N. E.              | ..                |
| 5     | 29.591     | 73.2         | 72.2    | 58.8      | 73.5                 | 50.0     | 61.75 | Ditto.             | N. W.              | ..                |
| 6     | 29.605     | 71.9         | 70.9    | 54.5      | 75.0                 | 47.0     | 61.0  | Ditto.             | N. W.              | ..                |
| 7     | 29.621     | 73.0         | 73.2    | 54.0      | 74.5                 | 45.5     | 60.0  | Ditto.             | N. W.              | ..                |
| 8     | 29.619     | 70.9         | 71.0    | 54.0      | 72.0                 | 42.8     | 57.4  | Ditto.             | N. W.              | ..                |
| 9     | 29.623     | 70.5         | 70.5    | 55.0      | 72.0                 | 44.9     | 58.45 | Ditto.             | W.                 | ..                |
| 10    | 29.617     | 72.0         | 71.9    | 55.4      | 73.5                 | 43.0     | 58.25 | Ditto.             | W.                 | ..                |
| 11    | 29.571     | 72.5         | 72.0    | 56.2      | 73.5                 | 44.9     | 59.2  | Ditto.             | W.                 | ..                |
| 12    | 29.555     | 72.5         | 72.5    | 57.2      | 73.0                 | 45.8     | 59.4  | Ditto.             | N.                 | ..                |
| 13    | 29.591     | 71.0         | 70.5    | 58.5      | 72.0                 | 49.9     | 60.95 |                    | N. E.              | ..                |
| 14    | 29.549     | 70.9         | 70.4    | 56.9      | 71.1                 | 50.0     | 60.55 |                    | N. E.              | ..                |
| 15    | 29.511     | 69.0         | 69.0    | 55.9      | 69.5                 | 49.0     | 59.25 |                    |                    | ..                |
| 16    | 29.509     | 69.0         | 69.0    | 55.8      | 70.5                 | 47.0     | 58.75 |                    |                    | ..                |
| 17    | 29.513     | 69.5         | 69.5    | 57.1      | 70.0                 | 46.8     | 58.4  | Clear. [over.      | N. W.              | ..                |
| 18    | 29.501     | 72.5         | 72.0    | 55.1      | 73.8                 | 44.5     | 59.15 | ~ scattered all    | N. W.              | ..                |
| 19    | 29.511     | 73.5         | 73.0    | 55.5      | 75.0                 | 44.8     | 59.9  | Clear.             | N. W.              | ..                |
| 20    | 29.589     | 73.0         | 72.1    | 55.0      | 76.0                 | 45.8     | 60.9  | Ditto.             | W.                 | ..                |
| 21    | 29.527     | 70.0         | 70.0    | 53.0      | 72.5                 | 45.0     | 58.95 | Ditto.             | W.                 | ..                |
| 22    | 29.633     | 70.0         | 69.4    | 52.5      | 71.0                 | 44.0     | 57.5  | Ditto.             | N.                 | ..                |
| 23    | 29.637     | 70.9         | 70.4    | 52.5      | 72.1                 | 41.0     | 56.55 | Ditto.             | N. W.              | ..                |
| 24    | 29.579     | 69.0         | 69.0    | 53.0      | 70.4                 | 41.8     | 56.1  | Ditto.             | W.                 | ..                |
| 25    | 29.645     | 68.5         | 68.5    | 55.0      | 69.2                 | 42.0     | 55.6  | Ditto.             | N. E.              | ..                |
| 26    | 29.591     | 67.0         | 67.0    | 53.8      | 67.5                 | 42.0     | 54.75 | Ditto.             | N. E.              | ..                |
| 27    | 29.617     | 68.6         | 68.6    | 54.4      | 69.0                 | 43.2     | 56.1  | Ditto.             | N. E.              | ..                |
| 28    | 29.469     | 69.0         | 69.0    | 60.0      | 70.5                 | 43.0     | 56.75 | Ditto.             | N. E.              | ..                |
| 29    | 29.441     | 70.0         | 70.0    | 56.0      | 71.2                 | 49.0     | 60.1  | Ditto.             | N. E.              | ..                |
| 30    | 29.449     | 74.0         | 74.0    | 58.4      | 74.1                 | 50.5     | 62.3  | Ditto.             | E.                 | ..                |
| 31    | 29.397     | 74.5         | 74.5    | 58.5      | 75.0                 | 49.0     | 62.0  | ~ scattered.       | E.                 | ..                |
| Mean. | 29.552     | 71.4         | 71.1    | 56.3      | 72.6                 | 46.7     | 59.69 |                    |                    |                   |

















