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OF THE

ASIATIC SOCIETY OF BENGAL,

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Nos. I. to IV.—1865.

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THE PHILOLOGICAL SECRETARY.

"It will flourish, if naturalists, chemists, antiquaries, philologers, 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.

CALCUTTA:

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JOURNAL

OF THE

ASIATIC SOCIETY.

PART I.—HISTORY, ARCHÆOLOGY, NUMISMATICS, PHILOLOGY AND LITERATURE.

No. I.—1865.

Description of the Buddhist Ruins at Bakariya Kund, Benares.—By the Rev. M. A. SHERRING, LL. B., *and* C. HORNE, *Esq., C. S., Judge of Benares. Illustrated by Plans and Photographs.**

[Received 15th April, 1864.] [Read 4th May, 1864.]

The fact that Benares is the birth-place of Buddhism and that in it Sákya Muni first "turned the wheel of the Law" or in other words promulgated the peculiar dogmas of the Buddhist creed, is generally believed to rest on good historic grounds. This circumstance alone, independent of the concurrent testimony of Hindu writers, gives a high antiquity to the city. If, as there is reason to believe, Sákya Muni in the early part of the sixth century, B. C., in his own estimation attained to the mysterious and mystical condition of Buddhahood under the Bodhi tree at Gya, and thence proceeded to Benares, we may fairly imagine that he did so because it was then a city of much influence, if not also of great sanctity, among the Hindus, especially the Brahmins. In this case the true epoch of ancient Benares must date from an earlier period still.

Had the Hindus been imbued with the desire of recording the memory of themselves in huge buildings of brick and stone, as the

* Copied in the lithographs issued herewith.

Buddhists confessedly were, they would not have left their most sacred city, and one of their most ancient, without some irrefragable proofs in column or cornice, of their residence there prior to the Buddhist reformation. In the present state of ignorance respecting the archæological remains in Benares, it would be hazarding too strong a conjecture that no such proofs actually exist; but this much may be said, that the probability of their existence is exceedingly small.

As the habits of the Buddhists on this point were, as just observed, so contrary to the practice of the Hindus, we are inclined to believe that a strict investigation instituted in places where Buddhism was once famous and powerful, would in most cases bring to light certain relics which they have left behind them. New discoveries of Buddhist remains are continually being made in various parts of Northern India, every instance of which is a fresh illustration of our conviction that Buddhism has preserved the footprints of itself in all places wheresoever it eminently flourished. That it existed in Benares during many centuries and was the dominant faith professed there, casting into the shade the elder creed, and asserting proudly its triumph over it, admits not of the smallest doubt. It is therefore highly interesting to inquire, what Buddhist remains are yet traceable in the city, whereby its historical position as one of the chief seats of Buddhism may be tested. Strange to say, until very recently, few or no remains in the city proper had been discovered, but the reason of this, we fully believe, was, that they had never been sought after. It is true, extensive ruins have been found at Sarnath, and have been frequently described, but these are three miles distant from the present city, although it is possible, and indeed probable, that they were once situated in, or were adjacent to the ancient city itself.

Now while the hope of finding any buildings of the early Buddhist period in Benares might be pronounced too sanguine, yet, on the other hand, he would betray a singular ignorance of the massiveness and durability of Buddhist architecture, who should venture to assert that it was otherwise than exceedingly likely that portions of buildings of the later Buddhist period were still existing, waiting to be discovered. Even as late as the seventh century, A. D., when Hinduism had regained much of its ancient prestige and influence, at the time that Hwan Thsang visited Benares, there were then in the city, according to the

testimony of that keen and accurate observer, upwards of thirty *Kia lan* or sacred monasteries,—to most or all of which, temples were probably attached—and with them about three thousand priests and disciples were associated. It cannot be for an instant supposed, that these monasteries, which were unquestionably built of strong material, have all been swept away with the lapse of ages, and have "left not a wreck behind." Indeed the existence of the Sarnath ruins, which are mostly of the later Buddhist period,—some of which were seen by Fa Hian in the fifth century, and nearly all by Hwan Thsang in the seventh, is a strong argument for believing that portions, more or less considerable, of some, perhaps of most of these edifices, are still discoverable. We must not imagine that in any instance they are existing in their original integrity, but on the contrary, that where they exist at all, they have been appropriated by Hindus and Mohammedans, and principally by the latter, for their own purposes, and that therefore they have become blended with other buildings from which they must be disintegrated. The use of numerous pillars in the cloisters of Buddhist monasteries, which were mostly on a uniform pattern, greatly aids the identification of the remains of this ancient period.

A careful examination of Benares will reveal those portions of the city which contain buildings, or parts of buildings, or sculptured stones, or other objects of undeniable antiquity. Such ancient remains are for the most part, we believe, only to be found in the northern division of the city, and among the narrow streets on its eastern border, running parallel with the Ganges, in a thin band, as far as the Man Mandil Observatory.

Under the conviction that Buddhist remains were to be met with in Benares, a search was made for some of them in the course of the year 1863. On the very first day of the search the ruins at Bakariya Kund were discovered, which we shall now proceed to describe.

These ruins are situated at the north-west corner of the city in the Alaipore Mahalla, and are visible from the Raj Ghaut road leading from the cantonments to the Ganges. The path conducting to the tank or Kund leaves the main road a short distance to the west of the 420th mile-stone. The tank commonly known as Bakariya Kund, is about 300 yards distant from this road, and upon the summit of its

banks the ruins are for the most part to be found. In the hot season very little water remains in the Kund, but in the rains it contains a considerable body of water. It is about 550 feet in length and 275 in breadth.

On approaching the tank you pass along the foot of a high mound on its northern side, on the top of which lie several blocks of stone. Proceeding to the western bank you perceive a massive breastwork formed by large stones, bearing upon them various masonic signs, some of which are similar to those inscribed on the stones at Sarnath, and sustaining a solid platform or terrace, which runs by the side of the Kund to a great distance. This terrace is 20 feet above the tank, and supports two others of smaller dimensions, one above the other, each of which is girded by a breastwork of huge stones. The lower terrace is 130 feet broad, and 270 feet long on its western face, and 330 on its eastern face overlooking the tank. It was originally held up by the wall of heavy stones just alluded to, but this wall is in many places much broken down, especially towards the Kund, the great blocks lying in disorder at its ancient base. Nevertheless extensive portions are still standing. On the northern face about 70 feet are visible, while the western wall, which extends to 267 feet, is almost continuous throughout. The height of the terrace is constant, but the height of the wall varies greatly, owing partly to its being in a state of ruin, and partly to the circumstance of its forming in one place the flank of an old edifice, where it attains a height of at least 30 feet, measured from the ground on the western side, which is on a higher level than the tank. Two small windows or doorways open through this part of the wall, and over each a single stone projects, forming its eaves. The bare appearance which the wall would here have presented to the eye, is obviated by a broad moulding half-way down, a foot in width, and by a noble cornice parallel with it above.

Ascending the terrace, you come to the building itself, which is occupied by Mussalmans, one portion being partitioned off and used as a zenana. The beams and slabs constituting the roof are in some cases 9 feet in length, and the roof is supported by three rows of immensely thick stone columns, the capitals of which are in the form of a cross. The cornice decorating the walls is not of modern narrowness, but is twelve inches deep, and is ornamented with carvings of

various elegant devices. As the building is divided into two distinct sections, and moreover as the spaces between the pillars are in several instances filled up with a mud wall, it is impossible to gain a correct idea of its original grandeur. The outer wall on the western side is strengthened by a huge buttress of stone, 14 feet wide and 15 feet high.

With pillars, breastwork, and buttress, of such prodigious strength, it seems not improbable that formerly there were several stories above this lower one, but this point is merely conjectural and is not easy to be decided. Moreover it is not unlikely that other structures once existed along the border of the terrace throughout a considerable portion of its extent, not only on its western side, but also on its northern and eastern sides.

Directly in front of the ancient building just described, are two other extensive elevations of the ground or terraces, one over the other, as already stated. The lower elevation is 86 feet long by $62\frac{1}{2}$ broad, and about 4 feet in heighth. The upper is $48\frac{1}{2}$ feet by 24, and is crowned with an ornamental cornice, which runs in an unbroken band throughout a large portion of the circuit of the terrace, but this may possibly be of comparatively modern date, the Mohammedans having selected this spot for a mausoleum, and in many cases adopted the prevailing forms of ancient ornamentation. The breastworks of the two terraces by which the enclosed soil is sustained, although they have been evidently at times extensively repaired, nevertheless appear as ancient as the neighbouring building.

Beyond the two upper terraces is another raised terrace, which in all likelihood was originally connected with one of them, but is now isolated from them. On this possibly stood a Buddhist shrine, connected by a cloister with a building on the main terrace. A short distance further on also, are remains of the foundations of probably another, but the traces of this are almost obliterated.

On the eastern side of the Kund is a mound 220 feet long by 90 broad, running parallel with it, which might be taken for a mud embankment thrown up from the tank, were it not for the circumstance that layers of large Buddhist bricks, lying *in situ*, crop out from its side, and that upon its summit and slopes are numerous blocks of sculptured stones, symbols of bygone glory. One brick measured 20 inches in

length, and the bricks of an entire layer were $3\frac{3}{4}$ inches in thickness. Among the stones was an enormous segment of a kalas or jagged circular stone found on the pinnacles of temples. The original kalas of which this segment is exactly the fourth part, was not less than 9 feet in diameter, and of proportionate thickness, and must have belonged to a temple of vast strength and dimensions. Several small kalases are lying not far from this segment. Eight of these were counted at one time. Excavations into the mound would probably throw some light on the buildings formerly standing here.

To the east of the mound is a small round structure called Jogí-bír, on the site of which, we were informed, a devotee buried himself alive. It is made of earth, but on the top is a hollow circular stone, the exterior surface of which is divided into sixteen equal sections, each of which exhibits the sculpture of a man, with one leg turned up, and the hands apparently grasping a garland which encinctures and connects together all the figures. The stone is in a reversed position. A portion of one similar to it found at the foot of a tree, was afterwards removed, and forms one of a group of sculptured stones taken from Bakariya Kund and photographed. Both of these stones were probably capitals of highly enriched columns.

To the south of the tank is a ghaut, the stones of which are scattered about in great disorder, so that looking at it from a distance, it has the appearance of an utter ruin. And such it really is. But it is nevertheless a comparatively modern structure, for the stones of which it is composed, judging from the elaborate and finished carvings on many of them, have been contributions from fallen edifices in the neighbourhood.

At the south-west corner of the tank is a water-course, depressed considerably below the ground on either side. It is not improbable that formerly this was the main source of water supply to the tank. To the south of this water-course, overhanging the Kund, is a huge breast-work of stone, on the top of which is a spacious courtyard and a Mohammedan Dargah or place of prayer. It is difficult by reason of the carved stones used in the foundations, the underlying mortar and the evident frequent repairs, to say whether any portion of this breast-work or of the buttress jutting out at its base, is really ancient, although some portions seem to be so. The buttress is continuous with the stone ghaut, and merges into it.

To the east of the Dargah is a small mosque, 37 feet long by 19½ feet broad, open to the east, and supported by three rows of pillars, five in each row. The pillars in the second row have deep scroll carvings on their sides, with ornamented corners consisting of lotus seed-pods, one on another. Each pillar is 7 feet 9 inches high, including the capital, and the latter is 2 feet 6 inches in length and 2 feet 4 inches in width. The capitals of the outer pillars are somewhat larger than those of the inner, and are in the form of a cross, the extremities being rounded off; while the upper surface of each limb exhibits a convex curve, the line of which rises higher in proportion as it recedes from the extremity. The architrave is about a foot in thickness, and on it the flat stone roof rests. Seven niches are placed at intervals round the three walls of the room. The entire building is of stone. The western wall, on its outer side, is strengthened by a buttress, at the base of which runs a beautifully carved band, 11 inches broad, which projects a couple of inches from the wall, and below it is a cornice 10 inches in width and 7 in depth, bearing on its front a broad band of exquisite carving. Some parts of this building are certainly original; and there can be no doubt of the antiquity of the pillars, which belonged to some Buddhist cloister, or of the fact of the modern character of the enclosing wall.

A few steps off, is an enclosure in the form of an irregular parallelogram, a wall being on either side, and two small Buddhist buildings at its extremities. That situated at the northern extremity is in some respects like the mosque just described. Its carvings, however, are not all the same, and its ornamented band is of a very ancient type. There is a small building used as a Ranza attached to its north-west angle, and sustained by ancient pillars and modern walls. The building is surmounted by a low cupola of primitive construction. It is not unlikely that originally there were cloisters on this bank of the Kund, and that the three small buildings just described were all at one time connected together.

The edifice at the southern extremity of the enclosure well displays the old Hindu and Buddhist method of making a roof by the imposition of stone beams, one upon another, cross and corner-wise until they met in the middle. The roof of this building exhibits a mass of such beams piled upon each other, exactly like the roof of a house which

children build with their little wooden bricks. A second object of interest here is a cut stone screen, which serves the place of a window.

Nearly a hundred and fifty feet to the east of the last mentioned buildings, is another which has evidently been erected with old materials, and is of doubtful antiquity. It has four pillars, two outer and two inner, exclusive of others imbedded in the walls, and has five recesses on its three sides. The carvings have been to some extent obliterated by the whitewash with which the mosque is bedaubed.

Still further on eastwards, at a distance of 75 feet, is a terrace walled round by a stone breastwork 48 feet long by 36 broad, on which stand four exquisitely carved columns, sustaining an ancient roof, the remains probably of a chaitya or Buddhist temple, or of its innermost shrine. Its position is exactly opposite the Buddhist temple to the west, yet to be described, from which it is distant 550 feet. The columns are 7 feet 7 inches in height including the base, and are elaborately ornamented; in which respect they differ from the pillars of the other temple, which, for the most part, are destitute of ornamentation. The four sides of the base display an elegant carving of a vase with flowers drooping low over the brim—a device always found in these parts in Buddhist shrine-pillars. The well-known representation of a face with a floreated scroll streaming forth from the mouth, eyes and moustache, is repeated four times on each column, and above it runs a band of beads, each of which is nearly an inch in diameter. An arc of the sun's disk rests upon this band, and higher up, the column becomes octagonal. It then becomes quadrilateral again, and on each side is an exquisite design, exceedingly well executed, of an overflowing vase. The pillar is crowned with a capital, beneath which is a broad double moulding. The cornice above the architrave is also beautifully cut. But the ceiling of this shrine, consisting of overlapping stones built as before described, is perhaps its most striking feature. Each stone is richly carved, and was originally coloured, while representations of suns and lotuses are depicted upon them in bold relief. Taking it altogether, this little remnant of antiquity is a charming piece of art, and is in itself a proof of the delicacy in taste and expertness in chiselling of the architects of those times, and is also a proof of the sad degeneracy of their posterity.

This Chaitya seems to have been the eastern extremity of the

range of ancient buildings under notice. Leaving it, the boundary line took a southerly direction and probably included several buildings similar to those on the northern side, very faint traces of the foundations of which, at the most, are visible. The boundary line, however, on its southern side takes in a remarkable structure, consisting of a massive stone breastwork, 130 feet long, 90 feet wide, and 5 feet 4 inches high, sustaining a terrace now used as a Mohammedan burial-ground. The breastwork is in some places in decay, but to a great extent is in good condition. Its stones, especially where exposed in the foundations, have masonic marks upon them, and some have as many as three symbols in a row. It is surmounted by a fine cornice six inches deep. Ascending the terrace no buildings besides Mohammedan tombs are visible, but it is probable that an extensive Buddhist edifice stood on this spacious area. On the western side, exactly in the centre, is a projecting buttress, originally the Singhasun, round which the moulding also runs. On this spot may have stood a gigantic figure of Buddha, visible to every one entering the court—for such we hold it originally to have been. Indeed the large terraces which have been described, may all have been cloistered courts, where disciples and devotees congregated for religious purposes. An inspection of the Atallah and Juma mosques at Jaunpore, formerly Buddhist monasteries, confirms this view.

The most remarkable of these Buddhist ruins yet remains. This is the temple, to which allusion has been already made, and of which a separate Ground Plan has been drawn. The Mohammedans have appropriated this temple and capped it with a dome, and now use it as a mausoleum. It stands on forty-two pillars, all of which are in good order with the exception of one in the southern portico, which has been twisted by the fall of a large tree upon it. Formerly, there were evidently two pillars more than there are at present, sustaining the heavy entablature of the southern portico, so that the whole number of pillars originally, was forty-four. Of these, thirty-two supported the temple proper, and four the roof of each of the northern, southern and eastern porticos. To the west, there is no portico, but simply a sort of projecting buttress or Singhasun, on which probably the chief idol stood, and was at once seen by persons coming in through the main entrance on the east. The northern and southern porticos are

15 feet long by 10 wide, while the eastern is only 12 feet by 10. The inner part of the temple is 18 feet square. Round the whole of the exterior of the temple, above the capitals of the columns, and supported by their external limb, runs an eave-stone nearly 3 feet in width, and, as at the Atallah, Juma Musjid, Pan Dareba at Juanpore, this eaves-stone has been made to imitate wood, thus confirming Fergusson when writing about this class of structures.

Each column is $8\frac{1}{4}$ feet in height, of which the quadrilateral shaft between the capital and the plinth is $4\frac{1}{2}$ feet. The capital is in the form of a cross, each limb consisting of two portions, the lower being bell-shaped with an ornament in the corners. The columns in the temple proper stand two or four together, and the abacus or square stone upon them, between the capital and architrave, is 13 inches deep, and is beautifully carved. The architrave has a rich double band sculptured upon it, which passes all round the temple including the porticos. Above this is a flat stone, and above it again a row of niches which are probably of Mohammedan origin.

Viewing the temple from the outside, a practised eye soon distinguishes between the ancient portion and that added by the Mohammedans. Above the portico, all below the octagonal breastwork is undoubtedly of Buddhist workmanship, and the remainder of Mohammedan; but the Mohammedans, there is reason to suppose, availed themselves of old materials. At the termination of the breastwork at each corner, rests a small kalas, about two-thirds of the circular disk of which is exposed, the remainder being inserted into the wall. Although so many ages have elapsed since this temple was erected, and although it has been exposed to the alternate ruthlessness of Hindu and Mohammedan fanaticism, nevertheless with such wonderful skill have its proportions been designed and its blocks of stone been joined together—yet without cement of any kind—that at the present moment, in spite of its aspect of hoary antiquity, it seems almost if not quite as durable as on the day on which it was finished; and it is unquestionable that if it be not barbarously damaged by uncivilized hands, it will continue to stand for centuries to come. The simplicity combined with the great strength of its parts, and the symmetrical arrangement of the whole, give to the building, notwithstanding the general scantiness of its ornamentation, an appearance which

the most fastidious must pronounce to be of no mean order of beauty. A small cloister was originally connected with the south-west corner of the temple, as is shown by the continuation of the ancient basement moulding, a moulding which surrounds indeed all Buddhist buildings in these parts. This was probably the vestry or retiring room of the officiating priests. Some of its walls are still visible.

It is greatly to be regretted that a large portion of the site of these ruins is in a disgustingly filthy state, so that none but the most ardent investigator would care to visit a place so foul and abominable.

As to the date of the buildings which have been briefly described, some of them at least must have been erected as early as the large tower at Sarnath, which General Cunningham considers was in existence in the beginning of the fifth century of our era, and was then seen by the traveller Fa Hian. They formed probably one of the thirty monasteries referred to by Hwan Thsang, to which allusion has already been made. When looking upon these extensive ruins, we cannot fail to recall the time when they were frequented by crowds of priests and disciples of the Buddhist faith. Then probably the tank was surrounded on three sides by a lofty terrace of stone, while a large ghaut or flight of steps was on its southern side. Around the edges of this terrace, both to the south and west, ran cloisters, and to the east there must have been massive temples capable of carrying such caps or 'kalases,' one of them nine feet in diameter, as have been referred to in this description. It is a matter of much interest to the archæologist, to try and save from total oblivion these few traces of the past, when the Buddhists, who long ages since were expelled from the country, were still famous, if not powerful, and were already engaged in that tremendous struggle with the Brahmins, which eventually terminated in their own utter extinction in India.

We propose shortly submitting some notes relating to the numerous symbols found on the stones at Bakariya Kund and elsewhere, commonly known as mason's marks, and would invite correspondence with any parties interested in the subject. A comparison of symbols found in various places would be curious, and would render our paper more complete.

In illustration of the foregoing paper, there are herewith submitted two Plans, one representing this entire locality, and the other the

Buddhist Temple still standing; and in addition three Photographic Plates, of which the description is as follows: —

Plate, No. 1, shews the Temple before alluded to, a full account of which has already been given.

Plate, No. 2, exhibits the remains of a Buddhist shrine consisting of four handsomely carved pillars, standing on an ancient platform, with the usual Singhasun facing to the east. The ceiling, which has been described in another place, is unfortunately coucealed from view in the photograph.

Plate, No. 3, represents a group of stones and pillars brought from Bakariya Kund. To the right and left arc two exqnisitely chiselled shrine pillars, which are in many respects alike, but the grotesque faces on the four sides of the apex of each pillar, are in no two cases the same. The two bases also are different, for on the pillar to the right, one-half of the chakra is depicted, the symbol from which Buddha derived his title of Chakravarti, while the left pillar displays in this position a deeply compressed human face. Above these portions of the base, the columns become octagonal, and at each angle is a comical face, half ou oue side and half on the other, with flowing scrolls proceeding from the same. Over the faces a beaded band encompasses the columns, upon which rests the arc of a disc on each of the eight sides. Higher up, the columns again become quadrilateral, and exhibit flattened urns in bas-relief, overflowing with wreathed scrolls, a device exceedingly commou on pillars of this age, (about 500, A. D., as we imagiue). The uppermost portion of the pillars, on which the human faces are represented, is somewhat larger in circumference than the base. The dimensions of the pillars are as follows. Height 2 feet 8 inches, each face at apex 13 inches.

Between these pillars are two large blocks of stone, which, like the topmost stone of the group, appear to have formed portions of a frieze running round some sculptured chamber, but as they are of different proportions, they probably belonged to different structures. The figures appear very bacchanalian. In the top stone, the man rests his left arm on a large wine jar of a Grecian pattern, whilst with his right he lifts the wine-cup. The other two figures are in nearly the same attitude. A narrow band, beaded or plain, ran round the figures, and by drooping between them, connected together all the portions of the

On Stone from a Photograph by H. L. Frazer.

Lith. by H. M. Smith, S. G. O. Calcutta, April, 1865.

ANCIENT BUDDHIST TEMPLE AT BAKARYA KUND NEAR BENARES.

n Stone from a Photograph by H. L. Frazer

BUDHIST TEMPLE Nº 2
BAKARYA KUND
(BENARES.)

Lith. by H. M. Smith, S. G. O. Calcutta. June 1865.

Stone from a Photograph by H. L. Frazer.

Lith. by H. M. Smith, S. G. O. Calcutta June 1865.

GROUP OF STONES

BROUGHT FROM BAKARYA KUND 1864

ON STONE FROM A PHOTOGRAPH BY H.L. FRAZER.

LITH. BY H M SMITH, S. G. O. CALCUTTA. MAY, 1865.

BUDDIHST REMAINS FROM JOUNPORE

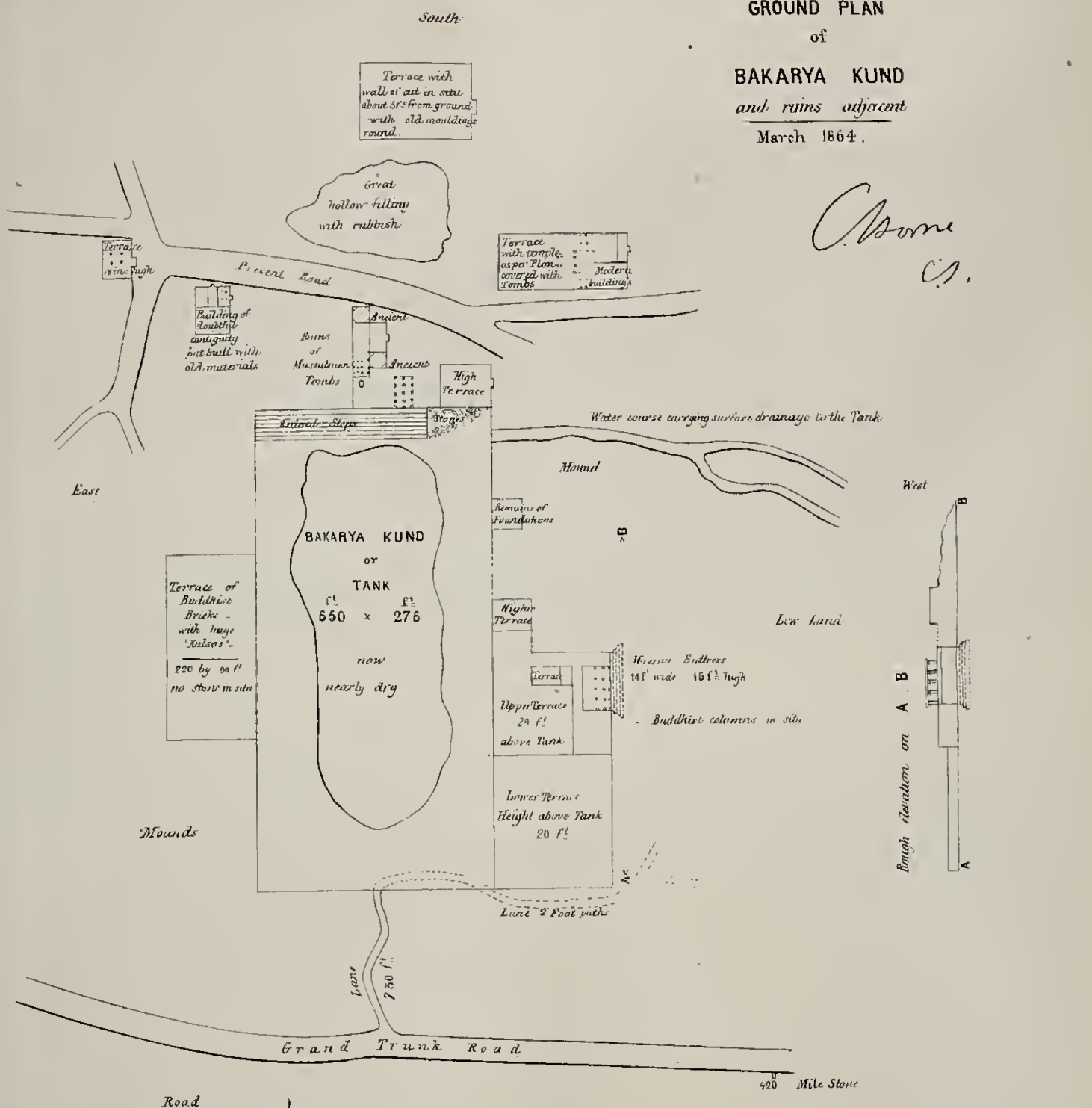
SOUTH END OF TANK IN KUND

n stone from a Photograph by H. L. Frazer.

WEST BANK OF KUND SHEWING RETAINING WALL.

Lith by H.M. Smith, Surveyor General's Office Calcutta Aug. 18

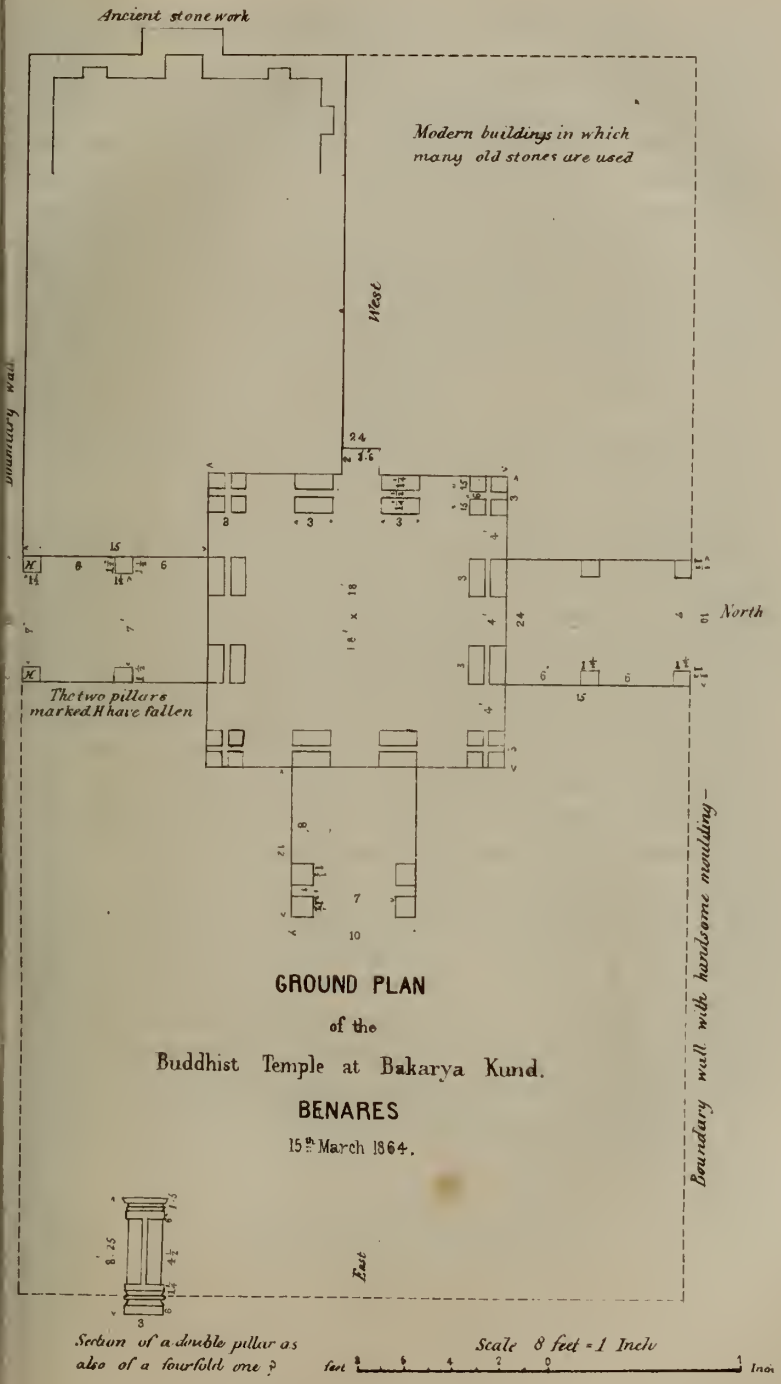
GROUND PLAN
of
BAKARYA KUND
and ruins adjacent
March 1864.



Road
Scale 400 feet to 1 Inch.

Tank 2 buildings
100 feet to 1 Inch

North.



GROUND PLAN

of the

Buddhist Temple at Bakarya Kund.

BENARES

15th March 1864.

Section of a double pillar as also of a fourfold one ?

Scale 8 feet = 1 Inch

original frieze. Beneath the loop of the drooping cord is the representation of a gem carved in the stone. Many figures similar to those now described, have been lately found among the ancient buildings in Jaunpore. Plate, No. 4, which represents a group of stones taken from these buildings, is added for the sake of comparison, as it pourtrays strikingly this similitude. In the College grounds in Benares, are some magnificent sculptures brought from Sarnath, one of which is a long frieze, cut with great boldness, the figures of which are connected by a narrow band or garland. A photograph of this frieze may perhaps at some future time be sent to the Society. The length of what remains of it is 26½ feet.

The topmost stone shews the projecting position it occupied, by its under-cutting, but it is hard to say in what part of the building this found a place. The next stone beneath it consists of a circle, formed by a narrow band, and surmounted by an elegant ornamentation indicating the central position which it originally occupied, which was probably the crowning decoration of a niche. In the circle itself a very merry face is depicted, by no means that of an ascetic. The large circular stone below this, represents eight human figures standing in most uncomfortable postures and supporting a cord or garland. This was probably the capital of an ornamental column; and there is reason to think that it must be assigned to a later date, on the ground that ancient Buddhist sculptures rarely if ever exhibit any distortion of limbs, while the Jains and modern Brahmins twist and distort their figures in every possible manner. The other half of this circular stone lies at the College, and as Major Kittoe is stated to have taken stones from Bakariya Kund until stopped by the people, may have been brought from this place.

In addition to these Plates which have now been described, Mr. Tresham has kindly taken two others, one representing the south end of the Kund, No. 5, and the other a portion of the retaining wall on the western bank, No. 6, copies of which are also forwarded.

Ancient Indian Weights.—*By* E. Thomas, *Esq.*

(Continued from p. 266 *of Vol. XXXIII.)*

[Received 28th September, 1864.]

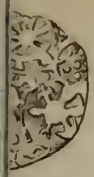
I concluded the first portion of this article with a suggestive rectification of the reading of a passage in Manu, tending to prove that coined money was in use at the period of the compilation of the text of India's earliest lawgiver. Any question that might have remained on this subject may be satisfactorily set at rest by the testimony of the published Sanskrit version of Yájnavalkya,* the commentary on which, known as the *Mitákshará*, defines *the Kárshika* as "measured by a Kársha" *(Karsheṇonmita)*; while the copper Kársha itself is described as *Támrasya Vikára*, or "copper transformed," *i. e.*, worked up from its crude metallic state into some recognised shape.† This proves, in the one case, that the interpretation of the term *Kársha*, as a *coin*, or fabricated piece of whatever description, is fully authorised; and, in the other, that the copper *Kárshápaṇa*, as Manu's text would imply, constituted the ready referee of weight, which its general currency as a coin of the period was calculated to ensure. Indeed it is curious to note how near an adherence to very primitive customs this state of things discloses, in that the original idea of the use of definite and subdivided weights of metal for commercial purposes, is still so closely identified with the secondary function these fixed units had come to fulfil in the guise of money, as circulating measures of value, while they retained their hereditary acceptance as bases of the metric system.‡ This duality of function remained so essentially associated in the minds of the people, that the revised scales of weights of the British Government, in compliance with local predilections, were adapted and adjusted under a similar system,—the current *Rupee* recommending itself as the

* Mitákshará, i. 364.

† Professor Wilson missed the full force of this explanation in adhering to the old translation of Manu—where "*Kársha* or *Paṇa*" are given.—"Ariana Antiqua," p. 404; Prinsep's "Essays," i. 53, note.

‡ An early example of the use of the Kársha as a weight is given in the Buddhist Legends (Burnouf, Introd. Hist. Bud., p. 258), where one *Kársha* weight of sandal wood is stated to have cost "500 Kárshápaṇas." The custom of employing current coins as measures of weight appears to have become subsequently so much of a recognised system in Hindustán, that Sikandar bin Bahlol extendod their metric functions into tests of measures of length—41½ diameters of his copper coins being assigned to the *Guz* or local yard.—Num. Chron., xv. 164.

HINDU PUNCH COINS.



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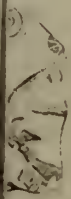

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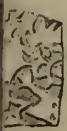

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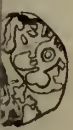

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initial datum and "foundation of the *Ser* and *Man*,"* and as the criterion and handy test of the higher weights.

To the most casual inquirer, perusing the precepts and enactments embodied in the Statutes of Manu, the existence of some conventional means of meeting the ordinary wants of commerce and exchange, incident to the state of society therein typified, would be, so to say, self-evident. The scale of fines, the subdivisions of the assessments of tolls, the elaboration of the rates of interest, and even the mere buyings and sellings adverted to, so far in advance of any remnant of a system of barter, would necessitate the employment of *coined* money, or some introductory scheme of equable divisions of metal, authoritatively or otherwise current by tale,† without the need of weighing and testing each unit as it passed from hand to hand. We need not attempt to settle the correct technical definition of coined money, or what amount of mechanical contrivance is required to constitute a coin *proper*,—it is sufficient to say that we have flat pieces of metal, some round, some square or oblong, adjusted with considerable accuracy to a fixed weight, and usually of an uniform purity, seemingly verified and stamped anew with distinctive symbols by succeeding generations, which clearly represented an effective currency long before the ultimate date of the engrossment of the Laws of Manu. The silver pieces of this class, the *Puráṇas*, are found in unusual numbers, and over an almost unlimited extent of the entire breadth of Hindustán: from the banks of the sacred Saraswati; under eighteen feet of the soil which now covers the buried city of Behat;‡ down the Ganges to the sea; on the eastern and western coasts; and in the "Kistvaens" of the ancient races of the Dakhin.§ That the silver coins should have been preserved to the present time, in larger numbers than their more perishable and less esteemed copper equivalents, was to be expected, especially looking to the reconversion of the latter into newer dynastic mintages,

* Prinsep's Useful Tables, ii. 95, 104-6; "Jour. As. Soc., Bengal," 1834, *Appendix*, p. 61, &c. See also "Jour. As. Soc., Bengal," i. 445.

† One example may suffice. "The toll at a ferry is one *paṇa* for an empty cart; half a *paṇa* for a man with a load; a quarter for a beast used in agriculture, or for a woman; and an eighth for an unloaded man."—Manu, viii. 404.

‡ "Jour. As. Soc., Bengal," iii. 44. Prinsep's "Essays," i. 73. For range of localities, see also A. Cunningham, "Bhilsa Topes," p. 354.

§ Caldwell, "Drávidian Grammar," p. 526. Walter Elliot, "Madras Journal Lit. and Science," 1858, p. 227.

and their proverbial absorption for the construction of domestic utensils. But with all this, the relative proportions of each, which reward modern collectors,* would seem to indicate that, of the joint currencies, the silver issues must have already constituted a large measure of the circulating media of the day; and this evidence is by no means unimportant, as showing that while the standard of value was, from the first, *copper*, the interchangeable rates of the two metals must have been in a measure recognised, while these imperfect currencies were in the course of formation and reception into the commerce of the country.

The tenor of the entire text of Manu conclusively demonstrates that the primitive standard of the currencies of the Indians, like that of the geographically less isolated, though equally independent originators of their own proper civilisation, the Egyptians, was based upon copper, a lower metal, which, however it may astound our golden predilections of modern times, was clearly in so far preferable in the early conception of interchangeable metallic equivalents, that it necessarily constituted the most widely distributed and diffused representative of value, brought home to the simplest man's comprehension, and obviously in its very spread the least liable to sudden fluctuation from external causes, such as would more readily affect the comparatively limited available amounts of either of the higher metals. Hence, in remote ages, under an imperfect philosophy of exchange, copper may be said to have been the safest and most equable basis for the determination of all relative values; and so well did it seemingly fulfil its mission in India, that as civilisation advanced with no laggard pace, and foreign conquest brought repeated changes of dominant power, and whatever of superior intelligence may have accompanied the intrusive dynasties, the copper standard continued so much of a fixed institution in the land, that it was only in Akbar's reign (A. D. 1556—1605)† that it even began to

* Col. Stacey's collection contributes 373 silver coins of this class to 30 copper pieces ("Jour. As. Soc. Bengal," vol. xxvii. p. 256; 1858). The British Museum cabinets show 227 silver against 2 copper *punch* coins. Of the former 57 are round; the rest are square, oblong, or irregularly shaped.

† The revenues of Akbar's magnificent empire were all assessed in *Dáms;* a copper coin weighing about 324 grains [N. C., xv. pp. 163—172]. The total demand of the state in A.D. 1596 is given as 3,62,97,55,246 *dáms*. The payments in kind, in the province of Kashmír, are consistently reduced into equivalents in dáms, and the single exception to the copper estimate occurs in the Trans-Indus *Sirkár*, of Kandahár, where the taxes were collected in Persian *gold* Tománs and

lose its position as the general arbiter of all fiscal and mercantile transactions. With the accumulated increase of wealth, its cumbrous volume made an opening for the silver *Rupee*, which established itself permanently in its place, and as time went on, gold *Muhurs* had an exceptional and temporary acceptance; but, like the *rupees* of that monarch, they were left to find their own level in the market, as certain inexperienced servants of the East India Company discovered, to their astonishment, to be still the ruling idea of the community at large, when, in subsequent times, they incautiously declared gold a legal tender.*

I have already extracted from the ancient Sanskrit code the contemporaneous definition of the weights of metal in use "for the purpose of worldly business." I will now examine how much of an approximation to the conventional notion of a money currency had been reached, at the period of the composition of the Vedas and other archaic writings.

Professor Wilson was under the impression that he had discovered a reference to coined money in the Vedas, where, in the enumeration of the gifts bestowed upon the *Rishi* Garga, mention is made of "ten purses" *of gold*;† unfortunately, the contents of these "*purses*, *bags*, or *chests*," or whatever may have been the intentional meaning of *kosayih* in this place, do not figure in the original text of the hymn, but form part of the conjectural additions of the commentator *Sáyaṇa*.‡ As such, it is useless to speculate further on the passage; but the words *dasa hiraṇya piṇḍán*, "ten lumps of gold," in the succeeding verse, seem to have a much more direct bearing on the general question, and would almost in themselves establish a reckoning by tale. Had the text merely confined itself to the expression "lumps of gold" in the generic sense, crude and undefined fragments of metal

Dínárs [Gladwin's "Ayín Akbari," ii. pp. 3, 107, 110. See also i. pp. 2, 3, 4, 35, 37, 39]. I do not lose sight of the fact of the long-continued use of an intermediate mixed silver and copper currency, which filled in the divisions between, and co-existed with higher and lower coinage of unalloyed metals [N. C., xv. pp. 153, 163; Prinsep's "Essays," Useful Tables, p. 71]. *Dáms*, like the old *Kársha*, were also occasionally used as weights (See Ayin-Akbari i. 307).

* Sir James Steuart, "The Principles of Money, &c., in Bengal." Calcutta, 1772, p. 26; Prinsep's "Essays," Useful Tables, pp, 73, 76, 77.

† "Rig Veda Sanhitá," iii. pp. xvi. and 474.

‡ "Rig Veda," text, vol. i. p. 699; Max Müller. See also Wilson, "R. V. S.," i. p. xlix. and iii; and note 4, page 474.

might have been understood; but the deliberate enumeration of ten horses and ten lumps of gold,* would seemingly enforce the conclusion that those lumps were fixed and determined sections of the metal of habitually recognised value, or precisely such divisional portions of gold as we see in the parallel cases of the silver and copper of which Manu speaks, and whose extant survivors find a place in our medal cabinets.

In addition to this allusion to what I suppose to have been *Suvarṇas*, the Vedas, on two occasions, distinctly name the *Nishka*. The first reference to this money-weight is to be found in a hymn by that most mercenary *Rishi*, KAKSHÍVAT,† devoted to no deity, but to the glorification of a mundane prince dwelling on the Indus, whose beneficence is eulogised, in an extended play upon the number of his gifts, among which the *Rishi* confesses to having "unhesitatingly accepted 100 *Nishkas*, 100 vigorous steeds, and 100 bulls;" evidencing, as in the previous instance, a numerical computation by pieces of recognised value—much in advance of the primitive test of scales and weights. Again, in a subsequent *Súkta*, GRITSAMADA, a *Rishi* of some celebrity,‡ in addressing the divinity RUDRA, says, "He shines with brilliant golden ornaments."* * "Worthy thou bearest arrows and a bow; worthy thou wearest an adorable omniform necklace."§

The mediæval scholiast substitutes the word *hára*, a necklace, for the *Nishka* of the original text,‖ an interpretation which is followed by the modern translator. It would seem that one of the derivative meanings of the word *Nishka*, as in the parallel instance of *Dínára*,¶

* "Rig Veda Sanhitá," 4th Ashṭaka, 7th Adhyáya; "Súkta," xlvii. verse 23—"I have received ten horses, ten purses, clothes, and ample food, and ten lumps of gold, from Divodása."

I should prefer the substitution of "cakes or balls" of gold for the "lumps" of the translator. Mr. W. Elliot mentions that "the Canarese *gulige* (Sanskrit *gutika*) was the ancient name of a class of small spherical coins." See figs. 3, 4, 5, pl. vii., vol. iii., "Madras Journal" (1858). Whence, also, the gold A'dal *Gutkah* (Guṭká) of the "Ayín-Akbari," i. p. 32.

† Wilson, "Rig Veda Sanhitá," ii. p. 17. See also i. 312, 316, &c.

‡ Wilson, "Rig Veda Sanhitá," ii. p. 207.

§ Wilson, "Rig Veda Sanhitá," 2nd ashṭaka, 7th adhyáya. Súkta xxxiii. vol. ii. p. 291-2.

अर्हन्बिभर्षि सायकानि धन्वार्हन्निष्कं यजतं विश्वरूपं । अर्हन्निदं दयसे विश्वमभ्वं न वा ओजीयो रुद्रत्वदस्ति ॥ १० ॥

‖ Max Müller, "Rig Veda," ii. p. 579.

¶ Max Müller, "Sanskrit Literature," p. 247.

came in process of time to apply to "an ornament of the neck," the component elements supplying the designation in either case. From the passage in question we may reasonably infer that the *Nishka* of the Vedas had, even then, attained so much of a definite and unvarying form, and partial ornamental fashioning, as to be suitable for decorative purposes in its current shape; a deduction which would further imply that the piece itself was understood, or admitted to be of a constant and uniform make, and that, in effect, it carried its description in its name.

It is a question whether it is not also necessary to amend the translation of the adjective, *Vis'wa rúpa*, from "omniform," to the more intelligible "pervaded," or covered "with forms" or symbols,* a rendering which would singularly accord with the state in which we find the silver money of the period. Should any difficulty be felt at the supposition of the adornment of a god with so obvious a work of man's hand, it may be said that bows and arrows are scarcely divine weapons; but the inherent tendency of lightly-clad, imperfectly domiciled races to wear on their persons their more valuable and easily portable wealth, would naturally suggest the notion that the deities followed a similar practice; and the expression instructs us that the people among whom it was uttered were in the habit of hanging round their necks sections of the precious metals, even as their successors in the land for ninety generations have continued to do; having thereby,

* This rendering is in complete harmony with Burnouf's "Dínáras marqués de signes" *(lakshanáhatam dínára dvayam)*, two dínárs impressed with symbols. A difficulty has been felt about the supposed Latin origin of the word *Dínár;* but, if the passage quoted by Burnouf truly represents the fabric of the earlier mintages, it does not matter what form the original recorder or translator applied to the piece itself; he may well have used the conventional word of his age for gold coin, without damaging the authenticity or antiqnity of the legend, or losing sight of the character of the old type of money he was then describing, and which must have been still abundant in the land. But apart from this, Colebrooke, in his Algebra of the Hindus (p. cxxxiii.), has affirmed that *Dínár* "is a genuine Sanskrit word," the derivation of which Professor Goldstücker explains by *dí* (preserved in *dídi*, and kindred with *div*, *díp*), hence the participle *dína*, "shining," with the affix *ára*, implying "pre-eminence." As regards the term *Nishka*, Max Müller has thrown out a suggestion that it may be in some way associated with the name of the Indo-Scythian king *Kanishka* ("Sanskrit Literature," p. 332). Professor Goldstücker, on the other hand, thinks that the word may be satisfactorily derived from *nis*, "out," and *ka*, "splendour" (from *kan*, "to shine"). *Nishka* occurs in Pánini, v. 1, 20; v. 1, 30: v. 2, 119.

See "Introduction á l'Histoire de Buddhisme," p. 423; Max Müller, "Sanskrit Literature," p. 245; Prinsep's "Essays," i. 246, note 3; and "Jour. As Soc. Bengal," vi. 459.

in many instances, undesignedly preserved to history the choicest and most interesting numismatic memorials of olden time.

Dr. Weber has collected from the Sutras and later Vedic writings, a number of references to money weights,* the most interesting of which are the notice of the silver Satamána by Kátyáyana (xx. 2, 6), and the mention of a "yellow-gold satamána" *(hiraṇyam suvarṇam s'atamánam)* in the Satapatha Bráhmana (xii. 7, 2, &c.), showing that the term *s'atamána*, which is given by Manu exclusively as a weight of silver, had come to be used indifferently with its coincident metric denomination, the *Nishka*, which, in earlier times, specially implied a measure of gold,† The quotation of *Suvarṇa S'alákáni* from the Sruti,‡ is also of importance, the *S'aláka* identifying the gold piece directly with the parallel issue of silver, the residuary specimens of which retain the name to this day in the South of India.§

Having obtained from the Vedas themselves so much of an indication of the use of circulating monetary weights at the very early period to which those hymns are now admitted to belong, my task in proving an obvious advance upon the rudimentary phase of the science of money, under Manu, will be simple; especially as so much has already been incidentally brought forward, tending to dissipate any remaining doubt as to the existence of a *coined* copper currency, much anterior to the epoch, when the customs and usages of preceding ages had to be acknowledged as the practical basis of, and as far as might be, conciliated in, the new code which was to make Brahmanism absolute.‖ As I have already stated, there is no direct evidence to show what technic art had achieved in those days, or what form or finish was given to the current money; but, as with the copper, so with the divisional parts of gold and silver, in the table quoted from Manu (viii. 131—137); their classification represents something more than a mere theoretical

* "Zeitschrift," 1864, p. 138-9.

† See also the quotation from "Yájnavalkya," section i. sl. 364; Num. Chron., 1864, note, p. 56.

‡ Mádhava in Kálanirṇaya.

§ Walter Elliot, "Madras Journal of Lit. and Science," 1858, p. 224. *Saláku* (Telugu), "A dent or mark on a coin denoting its goodness."—Wilson, "Glossary." The leading meaning of the Sanskrit *S'aláká* is given as a dart, an arrow: one of its derivative meanings is "an oblong quadrangular piece of ivory or bone used in playing a particular game; a domino."—Wilson, "Sanskrit Dictionary."

‖ "No greater crime is known on earth than slaying a Bráhman."—Manu, viii. 381.

enunciation of weights and values, and demonstrates a practical acceptance of a pre-existing order of things; precisely as the general tenor of the text exhibits these weights of metal in full and free employment for the settlement of the ordinary dealings of men, in parallel currency with the copper pieces; whose mention, however, is necessarily more frequent, both as *the standard* and as the money of detail, amid a poor community. Their use in the higher totals would seem to refer to an earlier stage of civilisation, or to a time when the interchangeable values of the different metals were less understood and even more imperfectly determined. There is no attempt to define these relative values, and the omission may, perchance, have been intentional; though some such scale would soon settle itself by custom, and the lawgivers may wisely, in their generation, have abstained from attempting, like our own modern statesmen, to fix the price of gold for all time, to give permanency to an ephemeral balance, or otherwise to swerve from the ancient simplicity of their own copper standard. Neither need there be any distrust of the contrasted passages, as representing different stages of national advancement. The collection of a code of human laws would necessarily embrace the progress and practical adaptations of many generations of men, the older formulæ being retained in the one case, side by side with the more recent enactments and their modified adjuncts. In a compilation of this kind, the retention of such apparent anomalies would indeed be a negative sign of good faith; and as we have to admit considerable uncertainty as to the exact epochs of the origin, application, and classification of these laws, and a still greater margin of time to allow for their versification and ultimate embodyment in writing, it would be as well not to lay too much stress upon their internal evidence, when all the legitimate deductions we seek can be established from external testimony.

The next contribution to the history of coinage in India is derived from the unexpected source of the Grammar of Pániṇi, in the text of which pieces of money in a very complete form are adverted to.* That

* Professor Goldstücker has been so obliging as to examine Pániṇi for references to coins, and to furnish me with the following note on the subject:—

"That Pániṇi knew *coined* money is plainly borne out by his Sútra, v. 2, 119, rúpád áhata. . . . where he says, 'the word *rúpya* is in the sense of "struck" *(áhata)*, derived from *rúpa*, "form, shape," with the *taddhita* affix *ya*, here implying possession; when *rúpya* would literally mean "struck (money), having

nominal terms should appear in the grammar of a people would, at the very least, imply that the object designated had attained extensive local recognition. Without touching the higher ground, as to how soon in a nation's linguistic progress fixed grammatical definitions may become a religious, intellectual, or material need, it cannot but be conceded that if the name and description of a coin find a place among rules for the formation of words, this should be evidence sufficient to prove that such a product of mechanical art must long have passed into the dealings and commercial life of the nation at large ere it could have become incorporated in the conventional speech, and been sanctioned in the teachings of the schools.

Admitting these inferences, it remains to decide upon the date of the grammarian himself. Professor Goldstücker conceives that he has lately obtained most important confirmatory testimony that *Pánini* lived before *Buddha Sákya Muni* (B.C. 543).* Accepting this period for the record *in writing* of the passage in question, I am satisfied to leave the limit of the anterior currency of the coins open to free discussion.

The allusions to money in the sacred literature of Sákya Muni are so frequent, in comparison with their rare occurrence in the Vedic writings, as to have led one of our modern inquirers to infer that the Buddhists understood and employed the art of coining long before their Brâhman adversaries;† a more simple and satisfactory reason may be assigned for the apparent data, in the fact that the Vedas and their supplemental rituals refer to an ideal polytheism, while the Buddhist scriptures are based on the personal biography of a man living in the flesh among the people of India, whose manners and customs are thus

a form."' Kátyáyana and Patanjali make no observation on these words, but the Kásiká-vritti says that 'form' here means 'the form or shape of a *man* which was struck on it;' and considering that *rúpa*, 'form,' is in this Sútra used without any addition—or emphatically, the ellipsis of *purusha*, 'man'—is perfectly natural and justified. As to the date of the Kásikávritti, nothing positive is as yet known of it; it is certain, however, that it is much later than the Mahábháshya; but even without its interpretation, I hold that no other sense than that put by it on this Sútra could rationally be attributed to it."

* While on the subject of dates, I may mention that since the publication of the earlier portion of this article, a paper has been presented to the Royal Asiatic Society, by Dr. Whitney, "On the Jyotisha Observation" (adverted to in Note 14, page 255, "Journal As. Soc. Bengal," 1864) questioning the accuracy of the results of previous calculations. The utmost possible limit of error, however, is admitted to lie between 1120 and 1187 B.C., instead of within the 1181 and 1186 B.C., already quoted.

† Spence Hardy, "Eastern Monachism," Lond., 1850, p. 66.

incidentally portrayed. So that the Vedas proper, as might be anticipated, furnish but few references to money, and Manu confines his notices to the formal letter of the law, though that brings within its circle even the definition of the lowest rate of wages, which is fixed at one *paṇa* a day, with an allowance of grain, &c. (vii. 126). The Buddhist legends, on the contrary, abound in illustrations of every-day life, including ordinary commercial dealings, frequent mention of charitable donations and distributions; and in one instance they have preserved a record of the quaint item, that the Anonyma of her day, in the ancient city of Mathurá, estimated her favours at 500 puráṇas (about £16). Burnouf, who cites this anecdote, has further collected in his "Introduction à l'Histoire de Buddhisme," numerous passages mentioning *suvarṇas*, *puráṇas*, *kakini* (ratis), and *kárshápaṇas*,* and among other things he reproduces a tale which exemplifies the curious custom of the women of the period indulging in the habit of ornamenting the skirts of their garments with kárshápaṇas. The notice of *Dínárs*† has already been referred to, but the most important passage under the numismatic aspect, in the Buddhist literature, is to be found in the text of the "Maháwanso," where it is stated that the Bráhman Chánakya, the adviser of Chandra Gupta, "with the view of raising resources, converted (by recoining) each *kaha paṇa* into eight, and amassed eighty *koṭis* of *kahápaṇas*."‡

If the Buddhist legends are to be taken as in any way correct exponents of the state of civilisation existing at the period to which they professedly refer, it is clear that the act of recoining, and by conversion and depreciation making each *kárshápaṇa* into eight, would imply unconditionally, not only that the art of coining had reached its most advanced stage, but that the ideas and customs of the country had been already trained by long usage, to identify the regal stamp with the supposed assurance of fixed intrinsic value—a fallacy that was very early

* Pp. 91, 102, 103, 145-7, 236, 238, 243, 245, 258, note 329, note 597.

† Ibid, 423.

‡ Turnour's "Maháwanso," Ceylon, 1837, p. xl.: and M. Müller, "Sanskrit Lit." 289. The Ceylon writers wrote according to their own lights, as unlike the people of India Proper, who seem to have reserved the term Kárshapaṇa for the copper coinage. The inhabitants of Ceylon and the Western coasts appear to have coined both gold and silver into *Kárshápaṇas*, *Máshas*, and other established *weights*; though the generic term *Kárshápaṇa* in books and inscriptions usually indicates *copper* coin in the absence of any specification to the contrary.

taken advantage of by the ruling powers. For, while the primitive currencies which bear no royal impress, were endued with, and retain to the present, a remarkable uniformity of weight and fineness of metal, as in the very nature of things it was necessary for them to be full measure, that they might exchange against full measure in return; on the other hand, from the moment true coins, in our modern sense, make their appearance, irregularity accompanies them, so that in the Indian series, in one of the first completely fashioned mintages, that of the silver Behat type, bearing the name of *Kuṇanda*,* the weights of fully-stamped well-preserved specimens vary from 29 to 38·2 grains.

The Ceylon annals casually illustrate the subdivisions of the *kárshápaṇa*, as they may be inferred to have existed under Manu (viii. 404), in the descending scale as 1, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$. The *Bhikkhus* of "Wesáli" (*Bassahr*, north of Patna) asking alms, in 443 B.C., say, "Beloved! bestow on the priesthood either a *káhápaṇ*, or half, or a quarter of one, or even the value of a *másа*."† Without insisting upon this last, which would constitute $\frac{1}{16}$ of the *kárshápaṇa*, I may notice once again the permanency of Indian institutions, in the fact that Akbar's *copper*‡ coins were retained under the original and simple division of 1, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, in the presence of, and associated with, the most curious complications of the weights and values of the currency of the precious metals.

There is little else that will immediately serve our purpose in the notices of Ceylon coins.§ Nor do the more promising inscriptions of the Western Caves throw any particular light on the primitive coinages of Northern India. They contain numerous records of donations of *káhápaṇas*, and in one place notice a *Káhápaṇ Sála*, or Hall for the distribution of *kárshápaṇas*.‖ *Húṇs*¶ and *Paḍikas* are often cited

* Prinsep's "Essays," i. p. 203, pl. xi., fig. 16; vol. ii., pl. xliv., figs. 2, 3, 4; "Ariana Antiqua," p. 415, pl. xv., fig. 23.

† Maháwanso, J. A. S., Bengal, vi. 729.

‡ "Ayín-Akbari," i. 36.

§ Other references to money are to be found, "Maháwanso," pp. xli., 10; Spence Hardy, "Manual of Buddhism," pp. 119, 218, 219.

‖ "Bombay Jour. Royal Asiatic Soc.," 1853; Dr. Stevenson's "Kanheri Caves, Inscrip." No. x. p. 9, and the revision by Mr. E. W. West in 1862, p. 1, et seq. See also "Násik Cave Inscriptions," 1853, p. 3; and "Sahyádri Inscriptions," 1854, p. 1.

¶ The mention of Húns thus early is of some value in this inquiry, as showing the age of the name, associated with the near coincidence of its authorised weight with that of the old Puráṇa. Mr. Elliot derives the word from *pon*, "gold;" Canarese *honna*. The Varáha, or modern Pagoda, being merely a double *honna* of 32 gunjas.

and special respect seems to have been shown to a currency called by the local name of *Nándigera*.

In attempting to ascertain the relation of the weights of ancient and modern days, and to follow the changes that time and local custom may have introduced into the static laws of India, the capital point to be determined is the true weight of the *rati*, as it was understood and accepted when the initiatory metric system was in course of formation. Two different elements have hitherto obstructed any satisfactory settlement of the intrinsic measure of this primary unit—the one, the irregularity of the weight of the *gunja* seeds themselves, which vary with localities and other incidental circumstances of growth;* the other, the importance of which has been rather overlooked, that the modifications in the higher standards, introduced from time to time by despotic authority, were never accompanied by any rise or fall in the nominal total of *ratis* which went to form the altered integer. From these and other causes the rate of the *rati* has been variously estimated as† 1·3125 grains, 1·875 grains, 1·953 grains, and even as high as 2·25 grains.

We have Manu's authority for the fact that 32 *ratis* went to the old silver *dharaṇa* or *puráṇa*, and we are instructed by his commentator, in a needlessly complicated sum, that the *kársha* was composed of 80 *ratis* of copper. We have likewise seen that this *kársha* constituted a commercial static measure, its double character as a coin and as a weight being well calculated to ensure its fixity and uniformity in either capacity within the range of its circulation. I shall be able to show that this exact weight retained so distinct a place in the fiscal history of the metropolis of Hindustán, that in the revision and readjustment of the coinage which took place under Muhammad bin

* Colebrooke, As. Res. v. 93.

† Sir W. Jones, "As. Res.," ii. 154, "*Rati*=1$\frac{5}{16}$ of a grain." Prinsep, U. T. (180÷96); Jervis, "Weights of Konkan," p. 40; Wilson, "Glossary." sub voce *Rati*. Col. Anderson, working from Akbar's coins, which were avowedly increased upon the old ratios, made the *rati* 1·94 (Prinsep's "Essays," ii., U. T., p. 22). We need have no further difficulty about Shír Sháh's or Akbar's coin weights now that we know the bases upon which they were founded. Indeed, the determination of the true value of the *kársha* enables us to explain many enigmas in the numismatic history of India; why and whence Muhammed bin Tughlak adopted his new 140 grain standard; why the unequally-alloyed billon coins of Fíroz and others were all kept at one determinate weight, &c, &c.; N. C., xv. 136, and notes, pp. 153, 163.

Tughlak, in A.D. 1325,* this integer was revived in the form of silver coin, and was further retained as a mint standard by his successors, till Shír Sháh remodelled the currency about the middle of the sixteenth century. In the same way I have already demonstrated elsewhere,† in illustration of an independent question, that a coin retaining with singular fidelity the ponderable ratio of the ancient *puráṇa*, was concurrent with the restored *kársha* under Féroz Sháh (A.D. 1351—1388) and other kings. And to complete the intermediate link, I may cite the fact that when the effects of Greek and Scythian interference had passed away, the 32-*rati Puráṇa* reappeared in the Punjáb and Northern India, as the silver currency of the local dynasty of SYA'LA and SAMANTA DEVA,‡ and furnished in its style and devices the prototype of the Dehli CHOHA'N series of "Bull and Horseman" coins, *the Dilliwálas*, which were retained, unaltered in wieght, by the Muhammedans, in joint circulation with the silver double *Dirhams* of 174 grains, of their own system.§

Extant specimens of Syála's coins in the British Museum weigh 54·4 grains and upwards.

If this double series of weights, extending over an interval of time represented by 24 or 25 centuries, and narrowed to an almost identical locality, are found not only to accord with exactitude in themselves, but to approach the only rational solution of the given quantities, the case may be taken as proved.

The ancient *puráṇa* hall-marked silver pieces range as high as 55 grains; copper coins of *Rámadata*‖ are extant of 137.5 grains; and other early coins of about 70 grains; while, in parallel exemplification, the later standard weights, under the Muhammedans at Dehli, are found to be 56 and 140 grains. Hence—

$$140 \div 80 \text{ ratis} = 1{\cdot}75 \text{ grains.}$$
$$56 \div 32 \text{ ,, } = 1{\cdot}75 \text{ ,,}$$

* "Coins of the Patán Sultáns of Hindustán," Num. Chron., 1847, coin No 87, and vol. xv., No. 24, page 130.

† Num. Chron., xv., notes, pp. 138, 153, &c. In the minor subdivisions, the 34·5 and 17·4 of coins Nos. lix. and lx., p. 155, singularly accord with the weight required for the ¼ and ⅛ *kársha*.

‡ J. A. S. Bengal, iv. 674; J. R. A. S., ix. 177; Ariana Antiqua, p. 428; Prinsep's Essays, i. 313.

§ N. C., xv. 136; Prinsep's Essays, U. T., p. 70.

‖ Prinsep's "Essays," i. p. 216, pl. xx., figs. 47, 48.

and this is the weight I propose to assign to the original *rati;* there may be some doubt about the second decimal, as we are not bound to demand an exact sum of *even* grains, but the 1·7 may be accepted with full confidence, leaving the hundredth at discretion, though from preference, as well as for simplicity of conversion of figures, I adhere to the $1\frac{3}{4}$. Under this system, then, the definition of each ancient weight by modern grains will stand as follows:—

Silver . .	1 Másha	=	2	Ratis or	3·5	grains.
	1 Dharaṇa, or Puráṇa	=	32	,, ,,	56·0	,,
	1 Satamána	=	320	,, ,,	560·	,,
Gold . .	1 Másha	=	5	,, ,,	8·75	,,
	1 Suvarṇa	=	80	,, ,,	140·	,,
	1 Pala, or Nishka	=	320	,, ,,	560·	,,
	1 Dharaṇa	=	3200	,, ,,	5600·	,,
Copper .	1 Kárṣha	=	80	,, ,,	140·	,,
Subdivisions of *Kárṣha* . .	$\frac{1}{4}$	=	40	,, ,,	70·	,,
	$\frac{1}{8}$	=	20	,, ,,	35·	,,
	$\frac{1}{2}$	=	10	,, ,,	17·5	,,

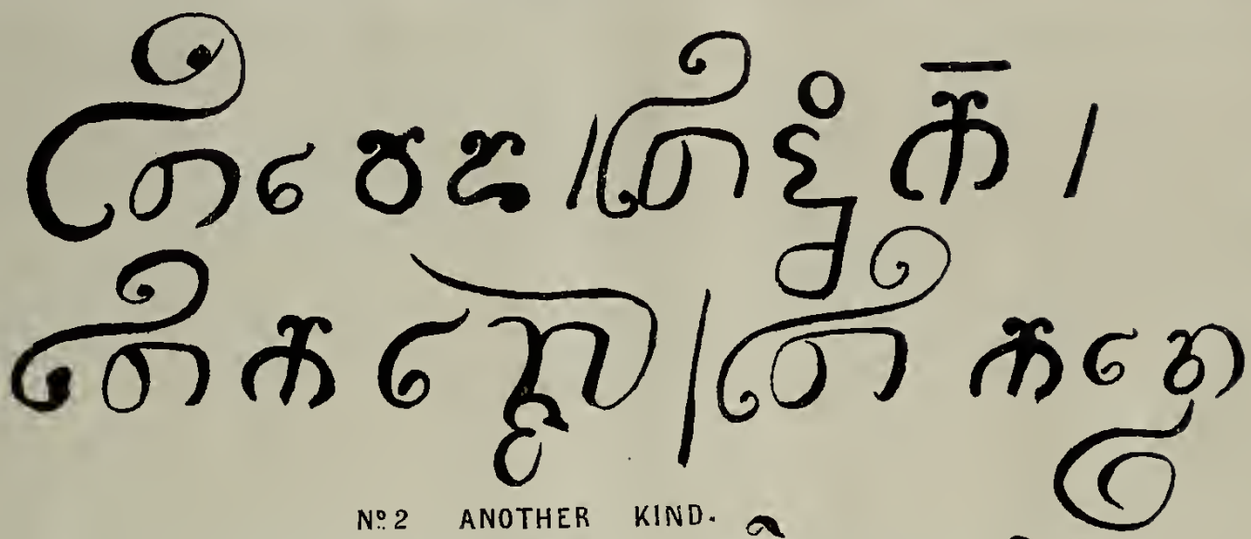
On some Siamese Inscriptions.—By Dr. A. Bastian.

[Received 12th May, 1864.—Read 1st June, 1864.]

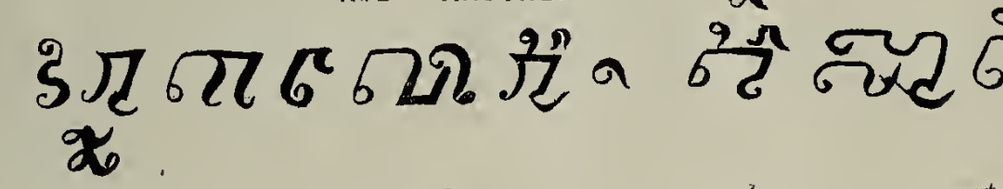
Of the Indo-Chinese alphabets, the most interesting one is that of the Siamese. The others, as those of the Cambodian, the Lao, the Shan, the Talein, &c., are all derived, more or less directly, from the Pali characters, which connect them with the circular alphabets of South India and the vernacular Singhalese. The Siamese flows more immediately from the Sanscrit and has, for instance, preserved the three sibilants, whereas there is only one in the Pali and its cognate languages. For a great many of those terms, which all the Buddhistic literatures of eastern India have purloined from the Pali, the Siamese possesses two forms, one taken from the original Sanscrit, and the other modified by its passage through the medium of the Pali. In writing the sacred books of the Trai-Pidak, the Siamese do not employ their vernacular letters, but have borrowed the Pali ones from the Cambodians, and call them therefore *Akson (Akkara) Khom* or *Khamen* letters. The Birmese use only one alphabet, (with the single exception of the square characters), whereas the Laos and Cambodians have varied a little the

forms of their Pali alphabet for profane uses, but have never employed two distinct alphabets, as has been the case in Siam. The introduction of the Pali alphabet in Ultra-India, is connected everywhere with the arrival of Buddhaghosa, the Brahmin of Maghada, who visited Ceylon to translate the Atthakatha, but the invention of their vernacular alphabet is ascribed by the Siamese to their favourite king Phra-Ruang, whose exact date is a great point of controversy amongst them. In the Phongsavadan Múang núa, or the history of the northern towns, it is said, that Phaya Ruang, (who was carried by his kite to foreign lands, like the Raja of Dewaju), invented for the nations, subjected to his rule, the Xieng thai (Siamese strokes or letters), the Xieng mon (Peguan letters), the Xieng khom (Cambodian letters), and the now unusual employment of the word *Xieng* (inclined or oblique) seems to have reference to the straight and angular shape of the Siamese letters, (recalling the ancient alphabets of the Bugis and Battas in the Eastern Archipelago), in contradistinction to the circular one of the Pali. But without going farther into the claims of Phaya Ruang to the invention of the alphabet, a subject which would require a dissertation by itself, I shall lay before you the translation of an old stone-inscription, found at Sukhothai, (the ancient capital of Siam during the reign of Phaya Ruang and before him,) and placed at present in the palace of Bangkok, by the order of the reigning king. You will see that the king mentioned in it under the name of Ramkhamheng, assigns to himself the honour of having invented the written character, which he, (a very interesting circumstance,) calls *Lai-sú*. The present word for books in the Siamese language is Nangsú, pronounced by a fanciful whim and against all rules of Siamese grammar, as *Nong-sú*. Nang-sú means verbally the writing on skins (nang), and thus illustrates in a striking way, the old traditions of the Lawa, Karen, &c., regarding the former existence of parchment books, and it appears that the Siamese, a people of quite recent growth, as they could not understand the reason for the appellation, gave intentionally a different pronunciation, although they retained the original spelling, a manner of proceeding, which could be illustrated by many similar examples in the Siamese language. The other term *Lai-sú* "would, according to the same analogy, mean writing in (various) colours, or writing in stripes." A Chinese officer who visited Cambodia in the year 1295, says of the

№ 1. STONE INSCRIPTION FROM CAMBODIA.

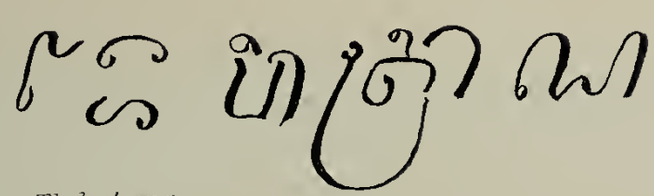


№ 2 ANOTHER KIND.



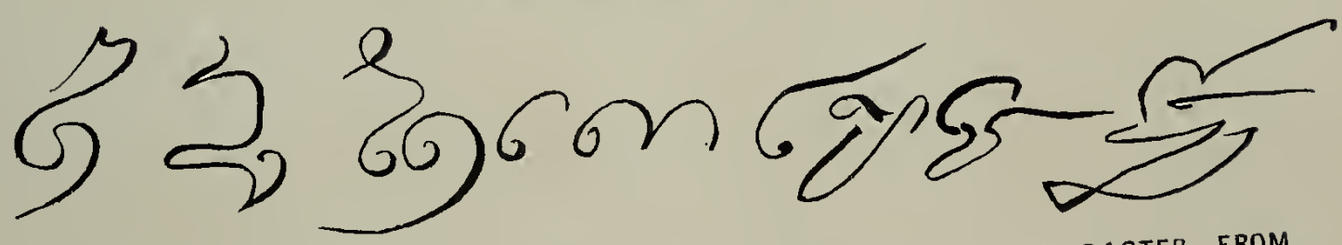
Nak *loph* *lam* *sat*

№ 3 ANOTHER KIND.



Thehatrena

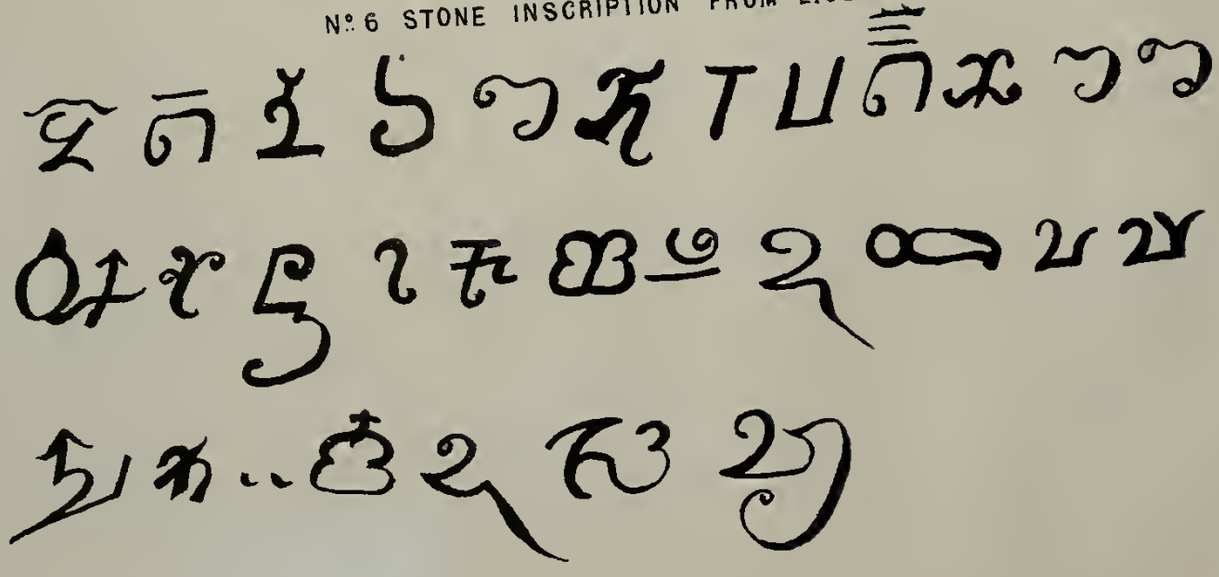
№ 4 ANOTHER KIND.



№ 5 STONE INSCRIPTION, IN AN ANTIQUATED PALI CHARACTER FROM THE PAGODA PATHOMMA-CHEDI IN SIAM CONTAINING THE BUDDHISTICAL CREED.

Ye dhamma hetuppa bhava
Yesamhetum tathakhato áha
Te sonja yo nirodho evam
athv maha samanoti

№ 6 STONE INSCRIPTION FROM LIGOR



literary sect, which, according to his accounts, then existed in the country, "Their books and public records are written on buck-skin dyed black, and cut into the required dimensions. They work down a paste, resembling the China white lime. Of this they form little sticks, and taking one into the hand, like a pencil, form characters, which can never be effaced." He must mean the black books, still in use, amongst the Birmese, Siamese and Cambodians, on which they write with a soft chalk-stone. In the convents they employ wooden tablets, covered with a black varnish, on which the writing of the boys, who trace the letters for exercise, can be easily blotted out, and the same material is used afresh. For documents and memorials, these black books are at present made of vegetable substances like the white paper books, and afterwards covered over with a black varnish. The writing is, however, far from being indelible, and can be effaced without difficulty. If the book is written full and not required to be kept, the leaves (folded up in zigzag,) are rubbed over with a preparation of burnt peas and charcoal, and then used again, as if new. In especially valuable books, the letters, for appearance' sake, are traced with a yellow dye, a preparation from gamboge, on a smoothly varnished surface, but gradually crumble off and become illegible, because the fluid does not enter into chemical composition with the material of the substratum. The white books are written on with Chinese ink. On the leaves of the Talipoin-palm the letters are traced with an iron style. The change from parchment to paper took place very likely in the rigorous times of Buddhism, when the pious priests would not allow the killing of animals to carry on its fabrication.

The inscription, translated here, is written in an ancient kind of character, differing from the present one. The vowels are still written in one line with the consonants, and the diacritical points of the modern alphabet are mostly dispensed with. The complicated system of accentuation in the Siamese of to-day, has developed itself only gradually, and can be traced back in old books to that simplicity, which still reigns in the ruder dialects of the Laos, and makes them unintelligible to the polished ear of the low-landers. I was enabled by the help of some learned friends in Bangkok to extract the antiquated alphabet of the inscription, but have not brought it yet to the state of perfection, which would be desirable for publication. The first lines

in the commencement of the inscription, are to be found in the book about Siam by Sir John Bowring, to whom the king had sent it, and as the form of the letters can be looked for there (Vol. I. p. 278), I abstain from giving specimens.

Two other stone-inscriptions from the neighbourhood of Xiengmai, which were obtained by me in Bangkok, are written likewise in an ancient character, related to that of the inscription of Sukhothai, although differing in many particulars. Both speak of royal offerings and the deposition of relics to establish the sacred period of 5000 years, in terms similar to those employed by the Birmese king Mentara, but I have not yet advanced far enough in the explanation of the characters to translate the whole of them. Even the present translation, which I offer here, is still a very imperfect one, but whenever I was at a fault to make out a satisfactory explanation, I was sure to find the best informed Siamese in the same predicament. The inscription of Sukhothai covers the four sides of a conical stone, and in the same court of Vat Keoh in the royal palace at Bangkok, is placed at its side, another stone, which was brought from Kampheng-phet and bears a Pali inscription. Besides these, stone inscriptions are found in the Siamese province of Ligor, and at the old pagoda of Pathomma-chedi at Nakhon-Xaisi, where also brick medallions are disinterred, resembling those of Tagoung and other localities, and containing the confessional formula of the Buddhists.

I have added for comparison, a few specimens of several inscriptions, which I copied at length from the stone monuments in Cambodia. The ancient characters, called *Akson Mihng*, abound chiefly at Nakhon Tom, but are found also at Nakhon Vat, intermixed with inscriptions of modern date. They are believed by the natives to be wholly unintelligible, but seemingly without real foundation, as I have already succeeded, by consulting the more intelligent members of the priesthood, in decyphering the names of gods, kings and towns, mentioned in them.

Some characters in ancient Devanagari, (resembling the Bengal inscriptions of the 12th century,) I found at the side of Cochin Chinese letters on a sepulchre in the plain of tombs at Saigon, a town which belonged for some time to the kingdom of Chiampa. The sepulchre was that of a priest and the Cochin Chinese Buddhists on such occasions, sometimes mix their writings with fanciful letters of their own invention, and intersperse them with Chinese characters.

Translation of the Sukhothai Inscription.

"My father was called Sinitharatthija, my mother, lady (nang) Súang, my elder brother, Ban-Múang. I had of the same mother (womb), five brothers and sisters, three being brothers and two sisters. Of my elder brothers, the eldest died and departed at a time, when I was still young. When I became large and grown up to about nineteen, the chieftain (Khun) Samxon of the "myang" (town or country) Xot came up to the place of "myang" Tak. My father went to attack Khun Samxon and fight him on the outworks of his camp. Khun Samxon does not delay, he comes forth from the camp. Khun Samxon spread out his troops, covering the open plains of the fields and chased my father, who fled hastily, being defeated. I do not fly. I (ku) mount the elephant, rushing on upon the army. I push on before my father; I close with Khun Samxon; I myself throw down the elephant of Khun Samxon, mounted on which he had come up to the town. Khun Samxon is defeated; he is beaten and takes to flight, jumping on a horse. My father then raised my title, I was called Phra Ram Kamheng (the courageous Lord Rama), because I had thrown down the elephant of the chieftain Samxon. All the time of my father's life, I gave support to my father; I gave support to my mother; I procured the flesh of stags and fishes; I brought them up to my father. I procured fresh areca, sweet areca, which I had tasted myself to be savoury, tasted myself to be good; I bring this up to my father. I set out against the savages, the tribes provided with elephants, to obtain slaves for my father. I fall on their villages, on their towns. I get elephants, get tusks; I get males and females; I get silver; I get gold; I bring it all up with me and deliver it over to my father. Then my father dies. There is still an elder brother. I give support to my elder brother, in the way, as I had supported my father. My elder brother dies. Now the towns come to me, all the four towns. Of all these towns of mine, of me, the father-benefactor (Pho-Khun) Ramkhamheng, this town here, the town of Sukhotay excels. The waters are full of fish, in the field grows rice. The Lord of the town does not exact any duties, he does not tax the people. Undisturbed they go along the roads, leading oxen to trade in them, mounting horses to trade in them. If they wish and desire to trade in elephants, let them do so. They may trade in them in the same way, as they are used to

trade in horses or in cattle. If they should like to trade in silver, trade in gold, trade in slaves, they are free to do so. Let them fearlessly transact their business before the face of the lords, before the host of princes and young nobles. If death occurs, the property of the father goes to his sons, of whatever it may consist. His children, his wives, his servants, his slaves, the fruit-gardens of betel and areca, all and every thing, what the father possessed, is inherited by his son. Whenever disputes arise between the common people and members of the nobility, they will be examined into and decided with justice, both parties being equally regarded as subjects. The judge must not side with the person who clandestinely steals and defrauds. He must not harm the property of the litigants and take from it by his greediness. Whenever traders to buy or sell come in companies to visit the town, let them come. Such as wait for me at the northern frontier, requiring my assistance, shall have it. If they are in want of elephants, or of horses, or of slaves, or of money, it will be given to them. After the goods have been stapled* up in the town and stored, there will be made an election of slaves and a rejection of slaves. Such as are clever in spearing, clever in fighting, shall not be killed, neither shall they be beaten. There is under the portico a bell hung up for the use of the people, the royal subjects, in the centre of each village, in the centre of each town. If in quarrels or injuries of any kind, they wish to speak their mind before the lord or complain to the nobleman, it is not difficult. They go and ring the bell, which has been hung up there for them. The father-benefactor Ramkhamheng, the father (sovereign) of the country, takes it up, he has the matter enquired into and the names of the parties searched out.

"Furthermore in this city of Sukhotay there are planted orchards of areca-palms and betel-vines, all over the town. On every place there are groves of cocoanut trees in great abundance. In this town are parks of the resin tree and plenty of them. In this town are mangoes and plenty of them. In this town are tamarinds and plenty of them. In this town there is liberty to build and plant for whosoever wishes. In the middle of this town of Sukhotay there is a stone basin with a bubbling fountain, the water is clean and clear and good to drink without being distilled, clear like the water of the Ganges (khongka).

* *Sic* in MSS. *Query* [secured] ?—Eds.

There is a river, which surrounds this town of Sukhotay in three windings, even at the dry season, two thousand four hundred fathoms in extent. The people in this town of Sukhotay are addicted to alms-givings, are addicted to observe the precepts, are addicted to make offerings. The father-benefactor Ramkhamheng, the sovereign of this town of Sukhotay, he with all his ladies, with the host of lords, all men and women, the whole of the princely race, the sons of nobles, all males and females, as many as there are, the whole multitude, all of them, persevere piously in the religion of Phra-Phuth (Buddha). They keep the precepts during the time of Lent, every one of them. When the rainy season is concluded, they celebrate the processions to throw presents to the priests during one month, and then it is finished. To solemnize this festival, they contribute artificial fruits; they collect the fruits of areca; they bring flowers; they bring cushions; they will reap the fruits of meritorious rewards. Those who present cushions, will sleep on costly canopy couches. The variety of the presents in multifarious patterns, heaped up by royal command and by the common folks, are innumerable, glittering in such quantities that they cannot be counted; they block up all places, filling every spot. The lines of presents extend in piles beyond the precincts of the town till to the outskirts of the jungle. If they have to be transported inside the palace, there is one uninterrupted mass of goods stretching around, before and behind, from the jungle outside. Then in praying and ejaculating pious words, the air resounds with the clashing of voices, with the echo of voices, in the passing and repassing of voices, with singing voices. According to every one's liking, he who feels inclined and wishes to gamble, may gamble; who feels inclined to play, may play; who feels inclined to promenade, may walk about. In this town of Sukhotay there are excellent singers with melodious voices. At the height of the festival the people use to come in in crowds, jostling each other and eager to look on, how they light up the fire-works and let them off. This town of Sukhotay contains a gong, split in halves. This town of Sukhotay possesses a temple; possesses a statue of Buddha, 18 cubits high; possesses a large image of Buddha; possesses a holy convent; possesses aged teachers; possesses a high priest. To the west of the town of Sukhotay there is a jungle-monastery (of hermits). The father-benefactor Ramkhamheng bestows alms on the high priest

(Maha-thero or the great Thero). Amongst the aged teachers there is a learned one, who has read through the Pidok in all its three parts. He is the head of the tribe of savans, excelling above all others in this town of Sukhotay, and there is none like him, from the town of Srithammarat to here. In the midst of the jungle there is a monastery. It is very large and roomy and exceedingly beautiful. At the eastern side of this town of Sukhotay there is a monastery with venerable professors; there is a royal lake; there is a forest of areca-palms and betel-vines; there are fields and cultivated tracts; there are homesteads with gardens; there are houses, large and small; there is a forest of mangoe trees; a forest of tamarinds handsome to look at and carefully kept. At the south of the town of Sukhotay there is a market and a school-room; there is the palace; there is a forest of cocoa-palms, a forest of thorny areca; there are fields and cultivated tracts; there are homesteads and gardens; there are houses, large and small. To the north of the town of Sukhotay, there is a convent with the cells of venerable teachers, who live by alms; there is a pretty lake with plenty of fish; there are plantations of cocoa-palms, plantations of resin trees, plantations of mangoes and tamarinds; there is water in a cistern. There is also the lord Khaphung, the demon-angel, who is the mightiest in that mountain and above every other demon. In this country every one of the nobles reverences the town of Sukhotay, and observes the rules of adoration in his worship, paying homage. This town is an upright one. This town stands well with the demons. If mistakes are committed in the worship, if the sacrifice is not correct, the demons in yonder mountain do not guard and protect the town; they disappear.

When the era was dated 1214, in the year of the dragon, the father-benefactor Ramkhamheng, the sovereign of this country (town) of Sisatxanalai-Sukhotay planted a palm tree, and after nineteen rice crops had gone by, he ordered the workmen to prepare the smooth surface of a stone, which was fastened and secured on the middle of the trunk of the palm tree. In the days of the dark moon, at the beginning and at the end, for eight days, and on the days of the full moon and the quarters, the assembly of the aged teachers and the priests ascend the surface of the stone to rest; and the whole circle of pious laymen accomplish the holy law in remembering and observing

the victorious precepts. The father-benefactor Ramkhamheng, the sovereign of the country of Sitxanalai-Sukhotay, ascending to the surface of the stone, sat down; and the host of the lords and the sons of the nobles, the whole multitude, paid homage to him for their villages, paid homage for their towns. On the first and the last day of the dark moon, on the extinguished moon, and at the full moon, the white elephant was adorned in its trappings of costly gold, as it has always been the custom to do. Its name is Ruchasi. The father-benefactor Ramkhamheng, having mounted on its back, proceeds to worship the image of Phra-Phuth in the jungle. He has brought forth the engravings from the town of Xolajong, to place them in the foundation, together with the glorious relics, the jewels holy and splendid from the cave on the source of the waters, the cave on the river's bank, from the precious fountain in the middle of the palm forest. Of the two halls, the one is called the golden, the other the strength of the protecting Buddha. The flat stone, called Manang-sila, in the form of an alms-bowl, is placed (as Dagob) above the relics, to close the foundation formed by the stone. Then all men saw and acknowledged, that the father-benefactor Ramkhamheng, son of the father-benefactor Sinitharathiya, had become king in the country Sri Satxanalai-Sukhotay and over the Ma-kao, the Lao and the Thay; over all towns, below and above, under the vault of heaven.

All the inhabitants of the mountain U, the dwellers on the banks of the river, were called out in the year of the pig, when the era dated 1209. They were ordered to dig and take out the holy relics. Having come upon them and seen them, they made offerings and worshipped the holy relics. At a favourable day of the sixth month, they took them out and brought them, to be buried in the centre of the town of Sisatxanalai. A pagoda was placed upon them and stone-towers were erected in a circle around the holy relics.

Then three years went by. In former times there was no written character of the Thai. When the era dated 1205, in the year of the horse, the father-benefactor Ramkhamheng, having consulted with the learned teachers, established the letters of the alphabet for the Thai, which exist since that time, when the king arranged them for use. Then it was, that the father-benefactor Ramkhamheng became verily the king and royal lord to all the Thai, because then verily he became

their teacher and instructor, enlightening the Thai, that they might know truly the merits and understand the law. But amongst the people, living in this country of the Thai, there is nobody equal in regard to firmness and boldness, in regard to courage, pre-eminence and strength, equally powerful to overcome the host of enemies.

The country stretches far and wide, being enlarged by conquests. On the side of sunrise, it extends to the royal lake, stretching in two lines through the low grounds along the banks of the river Khong (Mekhong), up to Viengchan and Viengkham, which two forts have been placed there to form the boundary posts. On the south side it comprises the people who inhabit the district Phrek in Suphannaphumiratburi, the boundary line being marked by Petchaburi and Srithammarat on the shores, which are washed by the waters of the sea. On the side of sunset, it extends to the countries of Xot and Bangkapadi, and there are no frontiers along the waters of the ocean. In a northerly direction it comprises the town of Phleh (Pre), the town of Nahn, the town Phlua, stretching to the banks of the large river, where the country of the Xava (Xao) constitutes the boundary. There are eatables cultivated in this territory, that the multitude of villagers and citizens may be provided with food, as it is right and just, according to the laws of line men."

The discussion of the many important points, alluded to in this interesting inscription, I must leave for another occasion. It has been remarked above, that this truly enlightened king, under whom, the people might with more propriety than now, have been styled "the free" (Thai), appears to be identical with the famous Phra Ruang, (at least with one of the different representatives of this name). The Siamese chronicles place his reign generally in the seventh century, but the Peguan history confirms his having reigned at about the epoch here mentioned, which has to be reckoned most probably in the Mahasakkharat: if not, as the era appears to be counted backwards, it begins with the holy period of 5000 years. The first king of Siam makes the date of the inscription 1193 of the Christian era. The town of Sukhothay is one of the oldest capitals of Siam and continually celebrated in the Phongsavadan muang nua, where one of the Brahminical ancestors is called by the name of Satxanalai. The town of Tak

lies now in ruins, in the neighbourhood of the present Rahein, and belonged to the kingdom founded in Kampengpet. The mentioning of the ocean, in defining the frontiers there, recalls the traditions of the Talcins; and Sukhothai itself is said to have been formerly a seaport. According to the Siamese legends, Phra-Ruang sailed from it to conquer China (Krung Chin), in the same year in which the Chinese historians (616 P. D.) speak of a tribute brought from Siam. The mythic traditions of the Damdukban place the residence of Phaya Ruang in Nophburi or Lophburi, the ancient capital of the aboriginal occupants of the soil, before the emigration of the Thai. The demon-worship, mentioned in the inscription, continues still in various forms in all Buddhistic countries, and the processions to make presents to the priesthood may still be seen repeated every year at Bangkok, in the way here described. The presents are called Kathin, on account of their variegated components, in remembrance of the checkered garments of the monks, which, according to the founder's institution, had to be sown together in incongruous patchwork. The royal custom of hanging up a bell, which might be rung by complainants seeking access, occurs also in the history of Hongsavadi and is known all over the orient. From the remark, that the stone placed over the relics had the form of an alms-bowl (batr), one would have to conclude, that the shape of the Dagoba is only indirectly connected with the lotus it is supposed to represent. In Cambodia, one often sees pots with bones and ashes of priests, placed under the Pho-tree, the peepul. The town of Xalang is perhaps Jonk-Ceylon (the shipping of Ceylon), a place formerly in intimate connection with the island of Ceylon, where relics were cheap as mushrooms. The places mentioned to define the boundaries of the kingdom, are all still in existence, and can be easily traced by the directions given. The kidnapping of the mountaineers to carry on the slave-trade is still continued at the present day by the Laos. The northern trade, the inscription speaks of, may have been in the hands of Chinese merchants, and the king promises them, (as protection for their valuable cargoes), a safe conduct through the territory occupied by hostile and predatory tribes. The years are counted by crops of rice, as it is often done by the present Siamese, who at other times employ the enumeration of the yearly inundations in their reckonings. The names given to the years are those of the Dodecade.

avowed object of correcting the errors of such a scholar as Prinsep, it is naturally expected that he should take some precaution to ensure accuracy, and not blunder even in those places where the unfortunate subject of his criticism happens to be correct."* This is directed at me ; and I reply to it.

Where have I come "forward with the avowed object of correcting the errors of such a scholar as Prinsep"? Are the words of such an avowal producible? Or can it be inferred, from anything I have put on paper, that my purpose was that here alleged? Adverting to the Eran inscriptions, I have expressed myself as follows, concerning their original decipherer : "Had Mr. Prinsep inspected the documents in discussion, with the advantage of the facilities I have been able to command, it is beyond question that his conclusions respecting them would have differed, as on matters of moment, so as to points of unimportance, from those he has recorded. Writing under obligation of the reserve impressed by this consideration, I shall stay to expatiate on but a few of the discrepancies, touching secondary details, which, on collation of our results, the attentive reader will discover. At the same time, I have weighed these cases, one and all, with my best diligence."† My chief aim, as to the Eran inscriptions, was to read and to translate them anew. That, all along, I studiously aimed, wherever it was practicable, not to provoke comparison of my own work with that of my predecessor, will, I believe, strike most of my readers.

The Bábú, on the other hand, has thus delivered himself with respect to "such a scholar as Prinsep," "the unfortunate subject of" my "criticism :" "Prinsep, notwithstanding his untiring diligence and splendid critical acumen, was obliged, owing to his own want of familiarity with the Sanskrita, to depend upon his interpreters ; and they, blind to the importance of the work upon which he was so ardently engaged, neglected their duty, and trifled with him in all matters in which he could not readily detect the imposition they practised upon him. Hence it is, that his translation of the Eran re-

* *Journal As. Soc. Beng.*, 1862, p. 394.

† *Journal As. Soc. Beng.*, 1861, p. 16.

Mr. Prinsep was guided solely by Captain Burt's facsimiles ; and I had pored for two whole days on the incised originals.

cords * * is sadly defective in many respects."* To this I need not add one word of comment.

Before passing to other things, I take occasion to say, that, contrary to what has been intimated, not in a single instance that has been pointed out, have I "blundered" where Mr. Prinsep "happens to be correct." And was "such a scholar" correct only by hap?

At the end of my "Note on Budhagupta" are these words: "My paper on the land-grants of Hastin, and that on the Eran inscriptions, as I did not see the proof-sheets, abound in errors of the press, to say nothing of other faults. The more important will here be rectified, and a few comments interspersed."† Referring to me, the Bábú says: "I must, even at the risk of being tedious, adduce my premises for the errors [*sic*] in his reading of the Iran inscriptions, to which I take exception. Dr. Hall has attributed most of them to the printers; but it is difficult to conceive how those scape-goats are to be responsible for the word *sansurata*, which Dr. Hall altered into *sansurabhu* without any authority. * * Regarding the elegant simile of *a king electing his wife like a maiden her husband, the Doctor says*,"‡ *&c. &c.*

My "bulky" list of corrigenda and addenda, as the Bábú styles it, takes up just twenty-one lines; and within that space, I set *sánka* and *Suráshṭras*, for *s'anka* and *Suráshṭra*, to the account of the printer: and this is the entire foundation for the charge that I have attempted to disown my errors.

The Bábú's clause bearing on *sansuratam* certainly stands in need of readjustment. The word was Mr. Prinsep's, not mine.

And now for the "elegant simile," which is altogether the Bábú's own property. I first printed: "Who, by the will of the Ordainer, acquired, like as a maiden *sometimes* elects her husband, the splendour of royalty." This I corrected to: "Providentially preferred by Royal Prosperity, as it had been a maiden who elects her husband." Nowhere have I spoken of "a king electing his wife like a maiden her husband:" and whence does it appear that I took "the splendour of royalty" for anything but an unfleshly personification?

* *Journal As. Soc. Beng.*, 1861, p. 268.
† *Journal As. Soc. Beng.*, 1861, p. 149.
‡ *Journal As. Soc. Beng.*, 1862, p. 394.

The Bábú, animadverting on my rendering of the Eran inscriptions, says: "He translates स्वंभ्रष्टद्विहेतोः into the unmeaning* 'derived prosperity to his race;' when he should have followed Prinsep and given 'for the prosperity of his race.'" On turning to the version of Mr. Prinsep, I am not at all startled to discover that he has not so translated स्वंभ्रष्टद्विहेतोः, an epithet of Harivishṇu. He has not translated the expression at all. It is lower down, in the column inscription, that the words occur to which his "for the prosperity of his race" are meant to correspond.† Differing, there, from Mr. Prinsep, in deciphering the original, I have given "with purpose to advance the merit of his father and mother."

When I called पितरमनुजातस्य "a hoary solecism," I should not have done so,—as I wrote near two years ago,—‡ if I had had access, at the time I so characterized it, to a respectable Sanskrit Dictionary. The Bábú, with all the air of a discoverer, magnanimously taunts me with this mistake, notwithstanding my voluntary and explicit admission that I had erred. Who shall say that, but for his ploughing with my heifer, I might not here have eluded the Bábú's penetration? However, my translation of the aforesaid expression, "the counterpart of his sire," is quite correct. The Bábú, with intent to make me out wrong, refers to Dr. Goldstücker's *Sanskrit Dictionary*. Dr. Goldstücker authorizes me to say that my explanation is quite as good as his own.

* More literal than my "who derived prosperity to his race" would have been "cause of the prosperity of his race." Only I wished to make prominent the devolution which is implied by the Sanskrit.

The verb "derive," as employed by me, has been in the English language for several hundred years; and it is not yet obsolete. Within a short time I have met with it, in the acceptation which the Bábú pronounces to be "unmeaning," in three living writers.

"The term, indeed, is derived to us from the Schoolmen; and so far they are chargeable with having perplexed theology with the disquisitions arising out of it." Bishop Hampden's *Bampton Lectures*, third edition, p. 181. Also see pp. 153, 184, 331.

"The king's power of assent is a power derived to him from the whole body of the realm." Gladstone; *The State in its Relations with the Church*, second edition, p. 9. Also see the same author's *Church Principles, &c.* p. 5.

"It is proper to state that I forego any advantage which could be derived to my argument from the idea of abstract right, as a thing independent of utility." J. S. Mill: *on Liberty*, pp. 23, 24. Also see the same author's *Considerations on Representative Government.*

† *Journal As. Soc. Beng.*, 1838, p. 634.

‡ *Journal As. Soc. Beng.*, 1861, p. 139.

Commenting on the Bábú's decipherment of an inscription, I said: "The third line shows an *upadhmániya* before a प. In the teeth of all grammar, this, as lately edited, had been turned into a *repha*."* To this the Bábú rejoins: "The *upadhmániya* is a printer's blunder." The Sanskrit scholar cannot fail to discern that there is, in this reply, a blunder incomparably worse than a printer's.

Again, I objected to the Bábú's मातापितुस्तथा. The reply is: "My *mátápitustathá* is quite as correct as the suggested *mátápitrostathá*; the one being an *itaretarasamása*, and the other a *samáhára*."

In passing, *mátápitustathá* would involve, not, as is here implied, an *itaretarayoga* compound, but a *samáhára*. A compound of the *samáhára* description must be a neuter singular; and that "mother" and "father" can be thus combined, the veriest tyro in Sanskrit should know to be impossible.

These specimens of the Bábú's want of accuracy and scholarship might be greatly extended. But I shall have said as much as I care to say, after mentioning that he has credited Mr. Prinsep,† instead of myself, with extracting a full date from the inscription of Budhagupta. This is a trifle; but it is characteristic.

I had written thus far in April last, but laid my letter aside, with the intention of withholding it. Owing, however, to Bábú Rájendralál Mitra's paper on Bhoja, in the second number of this year's Journal, I have resolved to forbear no longer. It would make a long list, if I were to resume the facts of my own finding out which the Bábú there appropriates as though he himself had first brought them to light. Where, too, he assails me, in connexion with the name of Colebrooke,‡ he knows full well that I was not professing to correct that great scholar as to the meaning of the word *dala*. When re-translating a passage translated by another, it is no just conclusion that I regard as wrong, whatever I do not think fit to copy from his renderings. It was a matter of misreading and metre, in the instance in question, where I showed that Colebrooke had slipped.§ For the

* *Journal As. Soc. Beng.*, 1862, p. 128.
† *Journal As. Soc. Beng.*, 1862, p. 396.
‡ *Journal As. Soc. Beng*, 1863, pp. 106 & 107.
§ *Journal of the American Oriental Society*, Vol. VII., pp. 31 and 45; and *Journal As. Soc. Beng.*, 1861, p. 210.

rest, the word *dala* signifies "petal" as well as "leaf." I am told that "it is only on the leaf of the lotus that water is tremulous, and not on its petals." Indeed!

In preceding volumes of this Journal,* I have stated that Bábú Rájendralál Mitra has interpolated an inscription, and thereby created a new king; and this myth, Mahendrapála II., has been adopted as a reality, in Professor Lassen's *Indian Antiquities.*†

Your obedient servant,

F. E. Hall.

King's College, London, Nov. 9, 1863.

P. S. Colonel Cunningham, in his *Archæological Survey Report*, published in your Journal for this year, writing of the year in which the inscription naming Skandagupta is dated, says: "Professor Hall, on the authority of Bápú Deva Sástrí, the learned astronomer of the Benares College, prefers the era of Vikramáditya." I have never expressed any such preference; and I have never appealed, on the subject, to Pandit Bápú Deva. Colonel Cunningham was thinking of the inscription of Budhagupta. I have explicitly said: "Not to my knowledge, is there one particle of proof that Kumáragupta preceded Budhagupta, or that Skandagupta did, whether immediately, or after an interval."‡ The year 141 in the inscription that speaks of Skandagupta I have not suggested to place either before or after Budhagupta's year 165.

By the by, the Udayagiri inscription is not dated in S'rávaṇa, as according to Colonel Cunningham's decipherment, but in A'shádha, and very distinctly. I read the word on the spot in the spring of last year.

* 1861, p. 199; 1862, pp. 5 and 15.
† *Indische Alterthumskunde*, Vol. III., pp. 827 and 1169.
‡ *Journal As. Soc. Beng.*, 1861, p. 388.

Literary Intelligence.

The large bronze statue of Buddha which was exhumed at Sooltan-gunge by Mr. Harris and which has been figured in this Journal, has reached England and been presented by Mr. T. Thornton to the town of Birmingham.

Capt. Lees was under a misimpression when he announced at the last August meeting that the Elliot MSS., now under publication in England by Mr. E. B. Cowell and Dr. Reinhold Rost, were being published by our Society. The offer of assistance, which, on the recommendation of our Philological Committee, our Council sent to Lady Elliot in June 1863, through our Honorary Agent in London, Mr. E. Thomas, was not at once accepted, and in the mean time, Mr. Cowell's return to England enabled her ladyship to make other and to her more acceptable arrangements. The historical materials left by Sir H. Elliot, are to be published in 3 volumes, edited by Mr. Cowell, under the title of 'The History of India as told by its own historians,' while M. Rost is to bring out a complete edition of the Glossary under that of 'Memoirs on the history, philology and ethnic distribution of the races of the N. W. Provinces of India.' The History is not to contain any oriental text.

M. Jules Mohl in announcing its projected publication in the Journ. Asiatique, makes the following remarks.

"Je ne suis pas, en général, grand partisan des ouvrages posthumes; mais je suis heureux de voir que l'on sauve de l'oubli tout ce qui peut se publier des matériaux préparés et élaborés par un homme aussi distingué par le cœur, l'esprit et le savoir, que Sir H. Elliot, qui était certainement un des hommes les plus remarquables parmi le grand nombre des savants que le service de la Compagnie des Indes a formés. On ne leur a jamais rendu en Angleterre la même justice que sur le continent, et je crois qu'il en sera de même des ouvrages posthumes dont je parle ici."

Mr. Cowell, we hear, has also undertaken the continuation of Wilson's translation of the Rig Veda.

Brockhaus has undertaken to publish M. Haug's 'Religion of the Zoroastrians,' which is to be in two volumes, the first to contain the

history of Zend and Pehlevee literature, accompanied by translations and grammars of these languages, the second to explain the Zoroastrian dogmas, and to give an account of the origin and development of this religion and of its relations with Vedism.

The Royal Asiatic Society have commenced a new series of their Journal, the first part of which contains a paper by Dr. J. Muir on the Vedic Theogony and Mythology. This is to be followed by others, the Author's object being to examine the religious ideas of the Rig Veda and 'to compare them occasionally with the corresponding conceptions of the early Greeks.'

The Oriental Translation Fund Committee are, we regret to see, unable to proceed with any new publications for want of funds. They propose, therefore, to complete, as soon as practicable, De Slane's translation of Ibn Khallikan and to close their labours.

The following is from General Cunningham, dated October last.

"The coins of *Sophytes* to which Captain Stubbs refers, have only been found in the N. W. of India, as far as I am aware: and I am therefore inclined to assign them to Sophites, or Sopeithes, or Cuphites, the king of the Kathæi, who was contemporary with Alexander. The coins themselves appear to be of the same age as those of Alexander and Seleukos.

"Thomas's article on Indian Weights promises to be interesting.—I have been collecting materials for the same subject for nearly 20 years, and I have made many curious discoveries—I see that he quotes Sir William Jones as fixing the weight of the *Krishnala*, or *Rati* seed, at $1\frac{5}{16}$ grain: but I am satisfied that this is a simple misprint of Jones's manuscript, for $1\frac{5}{6}$ or 1.833 grain, which is as nearly as possible the average weight of thousands of seeds which I have tested. The great unit of mediæval and modern times is the *tâka* of not less than 145 grains, of which 6 make the *chha-tâka*, or *chhatak*, equal to 870 grains, or nearly 2 ounces—and 100 make the *setaka* or *ser*, the derivation being *sat-táka* or 100 *takas*—For convenience I have taken, in all my calculations, the *rati* seed at 1.8229 grain—Then 80 *ratis*, or 145.832 was the weight of the *tangka* of copper, and also of the golden *suvarna*, which multiplied by 6 gives 874.99 grains, or *exactly* 2 ounces for the *chhatáka* or chhatak. One

of the most curious facts connected with ancient oriental Numismatics is that *sîm* in Persian means both "*thirteen*" and "*silver*," which confirms the statement of Herodotus that in the time of Darius gold was 13 times the value of silver."

Extract from Capt. Stubbs' letter to Mr. Grote:—

"I shewed the gold stater of Diodotus, which you may recollect my having, to Messrs. Vaux and Poole at the British Museum, and they held a Committee on it, the result being a clear verdict in its favour: so Mr. Thomas writes me word. They were much pleased with a Sophytus which I gave them,* and Mr. Vaux agrees with me in thinking that General Cunningham's attribution of the name Σωφυτος to the Latin suffes and the Aramean—שׂוֹפֵט is objectionable."

Professor Holmboe of Christiania, in a letter to Bábu Rájendralála Mitra, gives the following summary of certain memoirs lately published by him on the relation which formerly existed between Asia and Scandinavia.

"'A présent je prends la liberté de vous envoyer trois petits mémoires archéologíques: 1. Om Eeds-Ringe c. à. d. sur des anneaux à serment. J'y aí prouvé, que les anneaux, dont se servaient nos ancêtres payens, pour y poser la main en prêtant serment, ont eu la même forme que les anneaux, qu'on voit entre les mains de quelques personnes dans la processíon sacrifícale sculptée aux murs à côté des escaliers du temple de Pesepolis. J'aí tâché de prouver, que l'usage de prêter serment sur an anneau aít été en usage chez les anciens Perses; particulièrement sous la dynastie der Sassanides, dont les sculptures à Nakhchi Roustam et à Nakhchi Bostan ne repreesentent pas, comme on a cru, la remise solennelle du symbole de la royauté au nouveau roi, mais le prêtement de serment du nouveau roi sur un anneau, qu'au nom de Dieu lui présente le grand mobed (mobedi mobedân), ce qui démontre assez clairement la tenure de la main du roi. Sur la pl. I, j'ai donné les dessins de deux anciennes monnaies celtiques, dont l'obvers represente la jurisdiction par un homme tenant l'anneau à serment, et le revers de l'une represente le sacrifice par [d' ?] un quadrupéde, sur le dos duquel on

* It is considered a better one than Major Hay's.

voit le manteau sacrificial. Le résultat, que je tire de mes raisonnements, c'est que le rite de prêter serment sur un anneau, comme tant d' autres rites, a dû passer de l' Orient dans le Nord de l' Europe.

2. Kong Svegders Reise c. à d. le voyage du roi Svegder. On lit dans l'histoire de Norvége par Snorro Sturlason, chap. 15 de l'histoire des Ynglings, qu' un roi de Suède, nommé Svegder, lequel, vu la sèrie des rois qui ont regnés jusqu'au temps où nous avons une chronologie certaine, a dû vivre au 4me siècle de l'ère chrétienne, fit deux voyages pour aller à Godheim ou Asaland, où il espérait trouver Odin (Bouddha?) Le récit rapporte, que dans son premier voyage il visita le pays des Turcs, le grand Svithjod c, à d, la Russie actuelle, et Panaheim c, à d. le Ta Ouan ou grand Ouan sur les bord de Jaxartes (Lir devger,) dont parle le Chinois Lee'mutsien dans le Laéki. Le voyage dura cinq ans. Après avoir resté quelque temps à la maison il fit un second voyage dans le même but. Il traversa de nouveau Svithjod, et ayant passé sa limite [?] de l'Est il arriva à un lieu, nommé Stein, où il y avait une pierre *(stein* en Norv. signifie *pierre,)* grande comme une grande maison. Là, sortant le soir d' une maison, où lui et sa suite s'étaient endormis, [?] il observa sous la pierre, un dverg (petit être mysterreux de la Mythologie des anciens, demeurant sous terre, mais en sortant le soir et la nuit,) assis sous la pierre. Alors le roi et sa suite se mirent à courir vers la pierre, mais avant d'y arriver, il vit le dverg debout dans la porte, l'appellant et l'invitant à entrer s'il desirait voir Odin. Il entra, la porte se ferma, et on ne le vit plus.

Voilà le contenu du récit. Je suppose que la pierre ait été un Stoupa au Tope, dont l'exterieur bien plâtré lui ait donné l'aspect d'une pierre, d'une masse solide. Le dverg assis a dû être une statuette de Bouddha assis, telle qu'on les voit quelquefois dans les niches de la base des monuments bouddhiques; et la porte a pu être la porte d'une chapelle réunie au tope, telle qu'on voit par exemple au dagobah de Pollanarua á Ceylon (p. 11, du mém.) Un des gardiens du monument a dû l'appeler ainsi, pour s'emparer d'un homme, dont il craignait violence contre le sanctuaire, et sachant qu'il cherchait Odin (Bouddha,) il lui dit, qu'il était lá-dedans, où, peut-être, quelques reliques de Bouddha

étaient déposées. Le récit doit donc sortir de la classe des fables, et être reputé historique dans son fond.

3. Thorolf Bægifots Begravelse c. à d. l'enterrement de Thorolf Bægifot. Dans une histoire d'une province de l'Islande nommée Eyrar, concernant les derniers temps du paganisme, on lit d'un homme, nommé Thorolf Bægifot, lequel, revenant un soir d'un voyage, s'assit sur son siège d'honneur et y resta jusqu'au matin, lorsqu'on l'y trouva mort. Son fils étant appelé, enfonça le parois derrière le dos du défunt, et emporta le corps par l'ouverture. C'est, à ce que je sais, le seul exemple en Scandinavie, d'une manière si singulière de faire sortir un corps mort. Mais en Asie on en trouve plusieurs exemples. Marco Paolo raconte, qu'en Tartarie, les astrologues conseillaient vers quel point de l'univers les morts devaient être retirés et s'il n'y avait pas de porte dans la direction indiquée on faisait une ouverture dans le parois, et retiraient par là le mort. Le Rev. Pallagoix raconte, qu'à Siam, au lieu de faire passer le cercueil par la porte, on le descend dans la rue par une ouverture pratiquée au murail. Et M. Pallas raconte, qu'un lama des Kalmuks étant trouvé mort sur son siège d'honneur, on renversa sa demeure par *derrière* [sic.] Ce exemples éveillent la supposition, que la manière, dont on retirait le corps de Th. B. était une trace de Bouddhisme.

Ayant été enterré dans une vallée, le même Th. B. causait comme revenant tant de malheurs, qu'on se crut forcé de transporter son corps dans le désert, mais arrivé à la sortie de la valleé, le corps devint si *lourd*, que 14 hommes ne pouvaient pas l'emporter plus loin. J'ai comparé ce récit avec celui que rapporte Mr. Schmidt dans ses notes au Seanavy Lectren, à propos de l'enterrement du conquérant célèbre, Dchingis-Khaghan. Etant mort au Tohet, son corps fut transporté à sa demeure. Arrivé la, le corps fut si *lourd*, qu'on s'efforça en vain de descendre le cercueil de la voiture. On se vit obligé de'élever le tertre sépulcrale au dessus de la voiture. Voilà un nouvel exemple de l'influence de croyances orientales sur celles des Scandinaves.

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Ancient Indian Weights, No. III.—By E. THOMAS, *Esq.*

[Received 15th March, 1865.]

THE EARLIEST INDIAN COINAGE.

So many questions connected with the earliest form of Indian money have been incidentally adverted to in the examination of the weights upon which it was based, and from whose very elements as divisional sections of metal, all Indian coinages took their origin, that but little remains to be said in regard to the introductory phase of local numismatic art, beyond a reference to the technic details, and a casual review of the symbols impressed upon these normal measures of value. The contrast, however, between the mechanical adaptations of the east and west may properly claim a momentary notice, with the view of testing the validity of the assumption I have previously hazarded respecting the complete independence of the invention of a metallic circulating medium by the people of Hindustán.*

Many years ago the late Mr. Burgon† correctly traced, from the then comparatively limited data, the germ and initial development of the art of coining money in Western Asia, describing the process as ema-

* Num. Chron., N. S., vol. iii *note*, p. 226; and more in detail in my edition of Prinsep's "Essays" (Murray, London, 1858), vol. i. p. 217.

† Numismatic Journal, 1837, vol. i. p. 118.

nating from the Eastern custom of attaching seals, as the pledge of the owner's faith in any given object. This theory satisfactorily predicated the exact order of the derivative fabrication of coins, which may now, with more confidence, be deduced from the largely-increased knowledge of the artisan's craft and mechanical aptitude of the ancient inhabitants of Mesopotamia, the relics of which the researches of Layard, Loftus, and Botta have recovered in so near an approach to their primal integrity. The universal employment of clay for almost every purpose of life, including official and private writings, with the connecting seals that secured even leather or parchment documents, extending down to the very coffins* in which men were buried, naturally led up to marked improvements in the processes of stamping and impressing the soft substance nature so readily hardened into durability, and to which fire secured so much of indestructibility. If moist clay was so amenable to treatment, and so suitable for the purpose of receiving the signets of the people at large, we need scarcely be unprepared to find yielding metals speedily subjected to a similar process —for the transition from the superficially-cut stone seal to the sunk die of highly-tempered metal which produced the Darics, would occupy but a single step in the development of mechanical appliances. In effect, the first mint stamps were nothing more than authoritative seals, the attestation-mark being confined to one side of the lump of silver or gold, the lower surface bearing traces only of the simple contrivance necessary to fix the crude coin. In opposition to this almost natural course of invention, India, on the other hand, though possessed of, and employing clay for obvious needs,† had little cause to use it as a vehicle of record or as the medium of seal attestations; if the later practice may be held to furnish any evidence of the past, her people must be supposed to have written upon birch bark,‡ or other equally suitable substances so common in the south from very remote ages,§

* Mr. J. E. Taylor, "Jour. Roy. As. Soc.," xv. 414. Loftus, "Chaldæa," p. 204.

† Wilson, "Rig Veda." vol. iii. p. xiv. "Arrian," lib. v. cap. xxiv., and lib. viii. cap. x. Hiouen-Thsang, "Mémoires," vol. i. p. 333, &c.

‡ The primitive Persians of the north-east also wrote upon birch bark. Hamza Isfahání, under the events of A. H. 350 (A. D. 961), adverts to the discovery at Jaí (Isfahán), of the rituals of the Magi, all of which were written, in the most ancient Persian language, on birch bark. See also Q. Curtius, viii. 9, § 15; Reinaud, "Mém. sur l'Inde," 305; "Ariana Antiqua," pp. 60, 84; Prinsep's "Essays," ii. 46.

§ "Arrian," viii. 7. "La Vie de Hiouen-Thsang," 158.

while the practical advance from ever-recurring weighings towards fixed metallic currencies was probably due to the introductory adoption of lengths of uniformly-shaped bars of silver (Plate XI. Figs. 1, 2), which, when weight and value gradually came to require more formal certificates, were adapted designedly to the new purpose by change of form and a flattening and expansion of surface, in order to receive and retain visibly the authoritative countermarks. One part of the system was so far, by hazard, in accord with the custom of the west, that the upper face alone was impressed with the authenticating stamps, though the guiding motive was probably different, and the object sought may well have been the desirable facility of reference to the serial order of the obverse markings—each successive repetition of which constituted a testimony to the equity of past ages.

The lower face of these domino-like pieces is ordinarily indented with a single minor punch, occupying as a rule nearly the middle of the reverse. The dies, though of lesser size, follow the usual symbolical representations in vogue upon the superior face. There are scarcely sufficient indications to show if the dies in question constituted a projected portion of the anvil; but I should infer to the contrary: nor does the isolation of these symbols, in the first instance, prevent repetitions of small punch-marks over or around their central position; in some cases—though these form the exceptions—the clear field of the reverse is ultimately devoted to the reception of the obverse or larger devices: which anomaly recurs, of necessity, to a greater extent with those pieces which have continued long in circulation, and more especially is this found to be the case among the residue of this description of currency in Central India and the Peninsula, where ancient customs so firmly resisted the encroachments of foreign or extra-provincial civilisation.

As far as the typical designs in themselves, when compared with later Indian symbolical adaptations, are concerned, they would seem to refer to no particular religious or secular division, but, embodying primitive ideas, with but little advanced artistic power of representation, to have been produced or adopted, from time to time, as regal or possibly metropolitan authorities demanded distinctive devices. It would be useless, at this stage of the inquiry, to attempt to decide whether these discriminating re-attestations appertain primarily to

succeeding dynasties, progressive generations of men, or whether they were merely the equitable revisions of contemporary jurisdictions. Though more probably, as a general rule, the simple fixed weights of metal circulated from one end of the country to the other, in virtue of previous marks, only arrested in their course when seeming wear or dubious colour called for fresh attestation: or incidentally, when new conquerors came on the scene and gratuitously added their hereditary symbols. The devices, in the open sense, are all domestic or emblematic within the mundane range of simple people—the highest flight heavenwards is the figure of the sun, but its orb is associated with no other symptom of planetary influences, and no single purely Vedic conception. So also, amid the numerous symbols or esoteric monograms that have been claimed as specially Buddhist,* there is not one that is absolutely and conclusively an origination of, or emanation from, that creed. The *Chaitya* other Scythians had before them; the *Bodhi-Tree* is no more essentially Buddhist than the Assyrian Sacred Tree,† the Hebrew Grove,‡ or the popularly venerated trees of India at large.§

Equally on the other part Vedic advocates will now scarcely claim the figure of the objectionable Dog,‖ or seek to appropriate to Aryan Brahmanism ploughs, harrows, or serpents. In brief, these primitive punch-dies seem to have been the produce of purely home fancies and local thought, until we reach incomprehensible devices, composed of lines, angles, and circles, which clearly depart from Nature's forms; and while we put these aside as exceptional composite designs, we may accept unhesitatingly as of foreign origin the panther and the vine, engraved in a style of good Greek art, which overlays the mixed impressions of earlier date and provincial imagery, and appears only towards the end of the career of the punch-marked coins, in their north-western spread, before they were finally absorbed in that quarter by

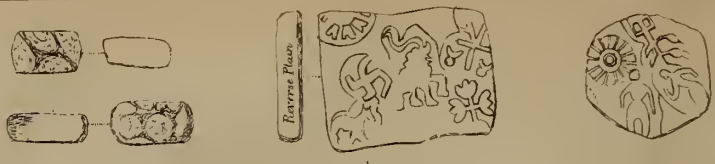
* Sykes, "Jour. R. A. S.," v. 451; Cunningham, "Bhilsa Topes," p. 351, plates xxxi., xxxii. B. H. Hodgson, "Jour. R. A. S.," xviii. 393.

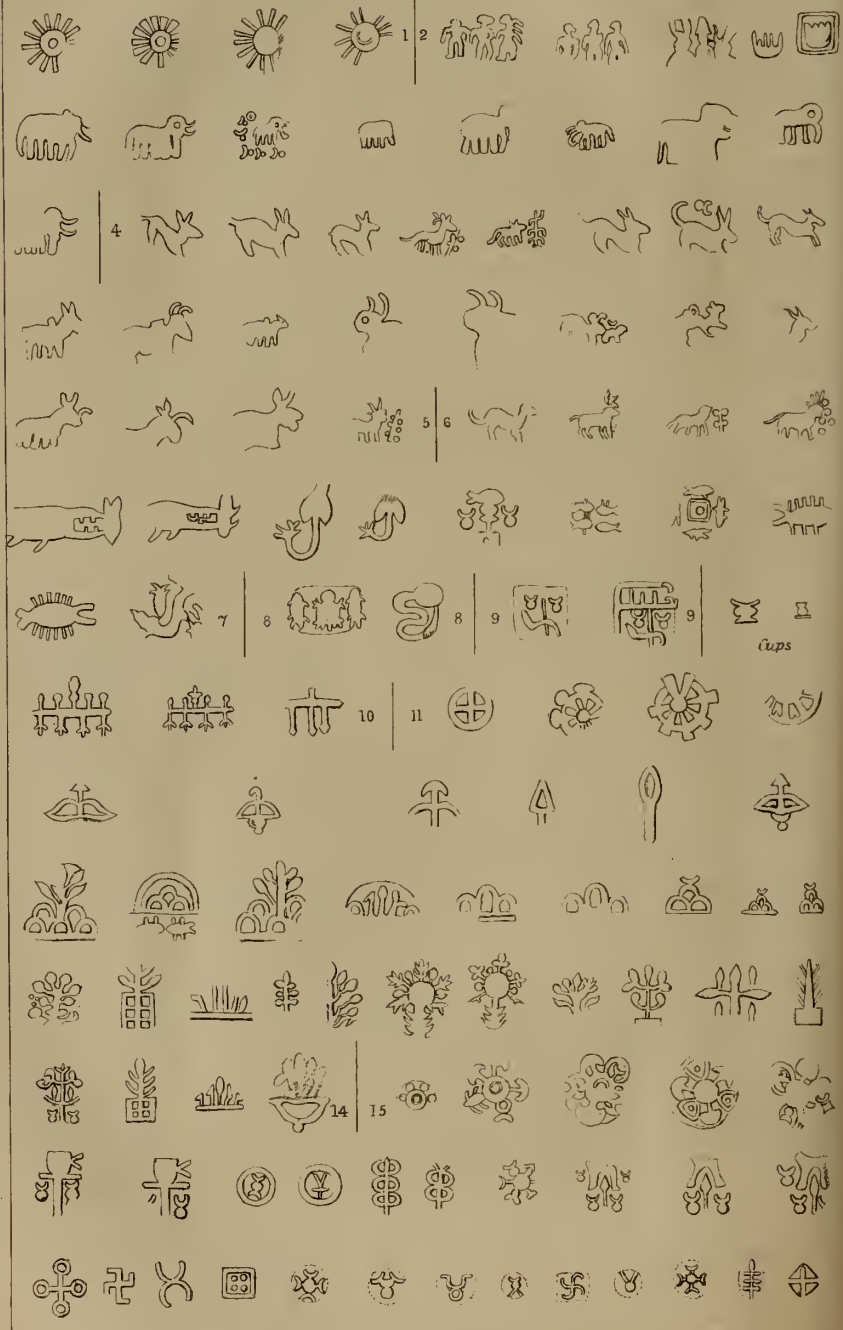
† Gosse's "Assyria," p. 94; Rawlinson's "Ancient Monarchies," ii. 235.

‡ Smith's "Dictionary of the Bible," article "Grove,"—doubts are raised regarding the correctness of the translation of the word *Ashérah* as a grove. See also note in Gesenius, *sub voce Ashérah*.

§ Wilson, "Megha Dúta," ver. 157. Ward's Hindus, iii. 204. So also *Tulasí*,—"*Ocymum sanctum*," or "Sacred Basil."

‖ Manu, iii. 92, iv. 208, x. 51, 91, 106, etc. Max Müller, "Science of Language," ii. 481.





SYMBOLS ON EARLY INDIAN COINS.

On Stone by Dinonath Nauth.

LITH. BY H. M. SMITH, SURVEY GENL'S OFFICE, CALCUTTA, JUNE 1865.

the nearly full-surface die-struck money with devices of an elephant and a panther ;* which class in turn merge naturally into the similar though advanced fabrics of the mints of Agathocles and Pantaleon, of square or oblong form,† a shape the Greeks had not previously made use of, but which when once adopted they retained without scruple, whatever their early prejudices might have been—possibly out of respect for local associations, a motive which weighed sufficiently with their successors and other Bactrian Hellenes to induce them to perpetuate the square indifferently with the circular coins. The exceptional, or in this case indigenous form, found favour in later generations with the Muhammadan conquerors, who sanctioned unreservedly square pieces in common with the circular forms, up to the time of Sháh Jehán (A.D. 1628–58). But though these unshapely bits of metal ran on in free circulation up to the advent of the Greeks, this by no means implies that there were not other and more perfect currencies matured in India. The use of the time-honoured punch survived in the Peninsula till very lately, but no one would infer from this fact that there were not more advanced methods of coining known in the land. In fact, like other nations of the East, the Hindus have uniformly evinced more regard for intrinsic value than criticism of the shape in which money presented itself.

Many of these ancient symbols, more especially the four-fold Sun (17, No 1, Plate XI.) are found established in permanence on the fully-struck coinage of Ujain,‡ of a date not far removed from the reign of Asoka, who once ruled as sub-king of that city; the probable period of issue is assumed from the forms of the Indian-Páli letters embodying the name of U'JENINI, the local rendering of the later classical Sanskrit *Ujjayiní*. Associated in the same group as regards

* These coins are still mere compromises, being formed from an obverse punch, with a full surface reverse. "Ariana Antiqua," pl. xv. figs. 26, 27; Prinsep's "Essays," i. pl. xx. figs. 50, 51, page 220; Cunningham's pl. i., &c.

While upon this subject, I may notice the discovery of the name of Agathocles in Bactrian characters on a coin of similar fabric. His name, it will be remembered, has hitherto only been found in the Indian-Pali transcript of the Greek (Num. Chron. N.S iv. 196). The piece in question has, on the obverse, a Chaitya, with a seven-pointed star, and the name *Akathakayasa* (possibly Aṇkathakṛayasa). The reverse bears the conventional sacred tree, with the title *Maharaja* strangely distorted into *Hi,rajasa,me* or *He,ragasa,me*.

† A. A., pl. vi. figs. 7, 8, 9, 11; Prinsep's "Essays," pl. xxviii. 8, 9; vol. ii. pp. 179, 180; "Jour. des Sav.," 1835, pl. i. fig. i.

‡ "Jour. As. Soc. Bengal," vol. vii., pl. lxi., p. 1054.

general devices, and identified with the apparently cognate mintages of similar time and locality, there appear other symbolical figures which no predilection or prejudice can claim as exclusively Buddhist; indeed, whatever hostility and eventual persecution may ultimately have arisen between the leading creeds of India, it is clear that at this period, and for long after, the indigenous populations lived harmoniously together;* like all things Indian, old notions and pre-existing customs retained too strong a hold upon the masses to be easily revolutionised; and if at times a proselyting Buddhist or able and ambitious Brahman came to the front, and achieved even more than provincial renown, the Indian community at large was but little affected by the momentary influence; and it is only towards the eighth or ninth centuries A. D. that, without knowing the causes which led to the result or the means by which it was accomplished, we find Brahmanism dominant and active in persecution.

I have now to advert to the symbols embodied in the Plate. (No. XI.) I shall notice only those of more moment in the text of this paper, leaving the engraving to explain itself under the subjoined synopsis.

A. Heavenly bodies	1	Suns.
B. Man and his members... ...	2	
Animals	3	Elephants.
,, ...	4	Dogs
,, ...	5	Deer, Cows, &c.
,, ...	6	Leopards.
Fish	7	
Reptiles	8	
C. Home life	9	Ploughs.
,, ...	9*	Cups, vases, &c.
,, ...	10	Harrows.
,, ...	11	Wheels.
,, ...	12	Bows and arrows.
D. Imaginary devices	13	Chaityas.
,, ...	14	Trees.
,, ...	15	Ornamental circles.
,, ...	16	Magic formulæ.
E. Reverse dies	17	

* Stevenson, "Journal Bombay Br. R. A. Soc." Hiouen-Thsang, *passim*.

Under class A appears the single representation of the Sun : no other planet or denizen of an Eastern sky is reflected in early Indian mint-symbolisation. In examining the general bearing of these designs, the first point to determine is,—does the sun here, as the opening and deepest-sunk emblem, stand for an object of worship? *Savitṛi* or *Súrya*, undoubtedly held a high position in the primitive Vedic theogony,* and it is a coincidence singularly in accord with its typical isolation on these pieces, that the Indo-Aryans, unlike their Persian brethren, dissociated the *Sun* from all other planetary bodies. But with all this, there is an under-current of evidence that the Scythians had already introduced the leading idea of sun-worship into India, prior to any Aryan immigration; for even the Vedic devotion to the great luminary is mixed up with the obviously Scythic *aswamedha*, or sacrifice of the horse.† Then, again, arises the question as to whether this Sun-type, which appears the earliest among all the mint dies, and is so frequently repeated in slightly modified outlines, does not refer to the more directly Indian traditionary family of the Surya Vans'as,‡ who eventually are made to come into such poetic hostility with the Chandra Vans'as, or Lunar branch. Neither one race nor the other is recognised or alluded to in the text of the Vedas; but abundance of reasons may be given for this abstinence, without implying a necessary non-existence of children of the Sun before the date of the collection of those ancient hymns. However, looking to the decidedly secular nature of the large majority of the figures in subsequent use upon this class of money, I am content for the present to adopt the popular rather than the devotional solution; or, if the latter alternative find favour, it must be conceded that the Buddhists incorporated the symbolism of the early worship of the Sun into their own system, which in itself may fortuitously have carried them through many sacerdotal difficulties, even as, if we are to credit resemblances, the Hindus successfully appropriated the Buddhist adaptation of an older form in the outrageous idol of Jagannáth, or secured as a Brahmanic institution the ancient Temple of the Sun at Multán.§ Whatever may have been

* Wilson, "Rig Veda Sanhitá," vol. i., pp. xxvii. xxxii.; vol. ii. p. vii.; vol. iii. p. x.

† Wilson, "Rig Veda Sanhitá," vol. ii. p. xiv.

‡ Prinsep's "Essays," vol. ii. U. T., pp. 232, 236.

§ Reinaud, "Mémoire sur l'Inde" (Paris, 1849), p. 97.

the course in other lands, it is clear that, in India, it was primarily needful for the success of any new creed, to humour the prejudices, and consult the eye-training of the multitude, as identified and associated with past superstitious observances.

Among other figures of very frequent occurrence and very varying outlines, a leading place must be given in this series to the so-called *Chaityas*. There is little doubt but that the normal tumulus originally suggested the device, for even to the last, amid all the changes its pictorial delineation was subjected to, there remains the clear ideal trace of the central crypt, for the inhumation of ashes, or the deposit of sacred objects, to which it was devoted in later times.

Much emphasis has been laid upon the peculiarly Buddhistic character of this symbol. It is quite true that its form ultimately entered largely into the exoteric elements of that creed, but it is doubtful if Buddhism, as expounded by *Sákya Sinha*, was even thought of when these fanciful tumuli were first impressed upon the public money; and to show how little of an exclusive title the Buddhists had to the *chaitya* as an object of religious import,* it may be sufficient to cite the fact that, so far as India is concerned, its figured outline appears in conjunction with unquestionable planetary devices on the coins of the Sáh kings of Surashtra,† who clearly were not followers of *Dharma*. But, as the Buddhist religion avowedly developed itself in the land, and was no foreign importation, nothing would be more reasonable than that its votaries should retain and incorporate into their own ritualism many of the devices that had already acquired a quasi-reverence among the vulgar, even as the Sun reasserted its pristine prominence so certainly and unobtrusively, that its traditional worshippers, at the last, scarcely sought to know through what sectional division of composite creeds their votive offerings were consigned to the divinity whose "cultus" patriarchal sages, here and elsewhere, had intuitively inaugurated.

Many of the singular linear combinations classed in the Plate under D, as Nos. 15, 16, which it would be difficult otherwise to interpret,

* Prinsep, "Jour. A. S. B.," iv. p. 687.

† "Jour. Royal Asiatic Society," xii. p. 1. Prinsep's "Essays," i., p. 425; ii. pl. xxxvii. p. 84. "Jour. As. Soc. Bengal," vi. 377; vii. 347. Prinsep's reading of his coin (No. 11, p. 354, "Jour. A. S. B.") as *Jinadámá*, "votary of Buddha," was an error; the name is *Jiwa Dámá*.

may reasonably be referred to the independent conceptions of primitive magic; as, whatever may have been the religion of the various grades of men in its higher sense, it is manifest that even the leading and more intellectual rulers of the people retained a vague faith in the efficacy of charms; almost all the tales in Persian or Arabic authors bearing upon Alexander's intercourse with the unconquered nations of India, turn upon their proficiency in the black art;—traditions sufficiently warranted by the probability that he, a Greek, would readily seek revelations of this kind, even as he sought the knowledge of the art of the Chaldees.

So also with their own home legends—one half of the revolution wrought by Chandra Gupta's advisers is placed to the credit of magic, and the Nandas, whom he superseded, appear to have been special proficients in sorcery. If this was the state of things in India in those semi-historical times, may not we adopt the parallel of other nations, and assume that, as so many crude hierarchies grew out of archaic divinings, these Indian symbols, in their degree, may well have been emanations from a similar source, and have run an equal race into the higher dignity of representing things held more sacred? —as such, their later reception into a series of the typical adjuncts of a faith formed *in situ*, need excite no surprise.

In concluding these papers on Indian Weights, and completing somewhat hastily the illustration of the introductory system of Indian coinages, I am anxious, as the inquiry may end here, to furnish a final and, I trust, a convincing argument against those who affirm that Alexander taught India how to coin money—by meeting them on their own ground, and producing a very perfect piece of an Indian king, a manifest emanation from the gradational advances of indigenous treatment, minted contemporaneously in a part of the country Alexander did not reach. Additional interest will be felt in these coins, when it is known that there are strong grounds for believing that they bear the name and superscription of Xandrames, the king of the Gangetic provinces, who was prepared to meet Alexander should he have ventured to advance towards the Jumna.

The first suggestion for this identification only occurred to me a few days ago, on reading the newly-published French translation of the

second volume of the Arabic text of Masaudi,* where mention is made of Alexander's having, after the conquest of Porus, entered into correspondence with one of the most powerful kings of India, who is incidentally stated to have been addicted to magic, named Kand (كند). Masaudi is not very lucid as to the exact position of this potentate's dominions; but the Arabs of his day (330 A.H.) had but limited knowledge of the geography of India beyond their new home on the Indus. This king, however, I believe to be no other than the *Kananda* (properly, it will be seen, *Krananda*), monarch of the sacred centre of Brahmanism and the valley of the Ganges, whom I have already had occasion to refer to, under the numismatic aspect, as having been unscrupulous in the measure of the value of his coins† (a reproach I shall perhaps now be in a position to relieve him of). The same name of *Kananda*, obscured under the three letters of Semitic alphabets, reappears in the Shâh Námah as كيد, *Kaid*, "the Indian;" and long stories are told of him and his mystic powers in connection with similar traditions of Alexander.‡ The triliteral designation is preserved in other original authors as كند, with the necessarily imperfect transcription§ incident to the Semitic conversion of Indian words, and the systematic ignoring of short vowels; but the name occurs, as a nearer approach to the apparent original, in a work entitled "The Mujmal-al-Tawáríkh," compiled about 520 A.H., at the court of Sanjar, wherein the letters appear as قفند,‖ a mistake probably for قنند, *Kananda*, where the ear perhaps designed to do more in the first instance to restore the true pronunciation, than the hands of succeeding copyists knew how to follow.

Before proceeding to examine what the Indians say of themselves on this subject, I will revert casually to the incidental references in the Greek authors. The leading passage, which contributes the name of

* Maçoudi, "Les Prairies d'Or," par C. Barbier de Meynard et Pavet de Courteille. Paris, 1863. "Après avoir tué Porus, l'un des rois de l'Inde, . . . Alexandre . . . aprit alors que dans les extrèmités les plus reculées de l'Inde il y avait un roi, plein de sagesse, très-bon administrateur, practiquant la piété, équitable envers ses sujets. Il avait vécu plusieurs siècles, et il était supérieur à tous les philosophes et à tous les sages de l'Inde. Son nom était Kend." Vol. ii. p. 260.

† Num. Chron. N.S., iv. 128. See also Num. Chron., iii. p. 230, note 8.

‡ Macan's "Shâh Námah," iii. p. 1290—1296, &c.

§ Ibn Badrún, quoted in Masaudi, French Edit., iii. 452.

‖ Reinaud, "Fragments Arabes," p. 44, and "Mémoire sur l'Inde," p. 63.

the king of the Gangetic provinces, occurs in Diodorus Siculus, to the effect that *Xandrames* was prepared, with an overwhelming force, to oppose Alexander in his progress beyond the Hyphasis.* Quintus Curtius has preserved the designation in sufficient integrity as *Aggrames*, and attests similarly the reputed power of the monarch in question.† Arrian does not mention the names either of king or people; but after alluding to the autonomous cities‡ to the west of the Hyphasis, goes on to remark, that the country beyond that river was reported to be highly productive and well cultivated, and to be governed equitably by the *Nobility*.§ The earlier classical critics were inclined to think that this testimony of Arrian's conflicted with the assertions of Diodorus, &c.;‖ but if I rightly interpret the evidence of the native authors I am about to notice, and its special bearing upon the coins, these seemingly opposing statements are not only reconcilable in themselves, but mutually aid and assist in the single solution that it would be possible to draw from the independent data they are here cited to illustrate.

The materials available from indigenous sources for the illustration of this section of Indian history, though promising, in virtue of the importance attached to the dynastic changes involved, are proportionately meagre in detail and distorted in substance. So that, in preference to relying upon purely local chronicles, we draw our most consistent testimony from the Ceylon annals, which, though they had, in the first instance, to embody foreign events, and possibly to arrive at much of the necessary knowledge through oral channels, have eventually remained intact, unassailed by hostile revision or reconversion for sectarian purposes into simulated Paurânic prophecies, or equally unscrupulous scriptural fabrications. Not to encumber the text of this paper with quotations, it may be sufficient to state the general purport

* Diod. Sic. lib. xvii. 93. Πραισίων καὶ Γανδαριδῶν ἔθνος, τουτων δὲ βασιλεύειν Ξανδράμην

† Quintus Curtius, ix., c. 2 :—"§ 2. Percontatus igitur Phegelam quæ noscenda erant, 'xi. dierum ultra flumen per vastas solitudines iter esse' cognoscit: 'excipere deinde Gangen,' maximum totius India fluminum. § 3. Ulteriorem ripam colere gentes Gangaridas et Pharrasios; eorumque regem esse Aggrammem, xx. millibus equitum ducentisque peditum obsidentem vias." See also Plutarch (Langhorne), iv. 405.

‡ Arrian, Hist. v. cap. xxii. See also Diod. Sic. ii. cap. xxxix.

§ Arrian, v. c. 25. Πρὸς γὰρ τῶν ἀρίστων ἄρχεσθαι τοὺς πολλοὺς, τοὺς δὲ οὐδὲν ἔξω τοῦ ἐπιεικοῦς ἐξηγεῖσθαι

‖ Roorkes's "Arrian" (London, 1729), ii. p. 54.

of the information obtained from the Mahâwanso and its subordinate commentaries. It would seem that there were *nine* NANDAS, the predecessors of Chandra Gupta, who ruled conjointly,* forming a co-equal brotherhood similar to those of lower degree, so common amid the still existing village communities of India; designated in the vernacular dialect, *Bhaiyáchárá*, proprietary fraternities.† The Brahmanical chronicles, though they do not directly confirm this statement of the contemporaneous sovereignty of the NANDAS, incidentally support such a conclusion, as in the expressions, "the Brahman *Kauṭilya* will root out the *nine* Nandas;"‡ and in the southern legend, quoted in the introduction to the Play of the *Mudrá Rákshasa*, the king is represented as consigning the kingdom to his *nine* sons.§ I advert to this point the more prominently, as one of the great difficulties has hitherto been to explain or reconcile the apparent anomaly of Krananda's designating himself in the coin legends as "*the King, the great King, Krananda, the brother of Amogha;*" and the question naturally arose, if Amogha had no title, and no apparent position in the government, what was the object of his brother's claiming relationship in so formal a manner upon the state coinage? The coincidence may now be satisfactorily accounted for, by supposing *Amogha* to have been the eldest living brother in the family oligarchy, a position recognised to this day, while Krananda had already justified, by his talents and administrative ability, the choice of the brotherhood, who had apparently elected him

* Mahâwanso, p. 21. "Kálásoko had ten sons; these brothers (conjointly) ruled the empire, righteously, for twenty-two years. Subsequently there were nine; they also, according to their seniority, reigned for twenty-two years."

Mahâwanso, p. xxxviii. [from the commentary, the *Tika*]. "Kálásoko's own sons were ten brothers. Their names are specified in the Atthakathá. The appellation of 'the nine Nandos' originates in nine of them bearing that patronymic title. . . . in aforetime, during the conjoint administration of the (nine) sons of Kalásoko. . . . His brothers next succeeded to the empire in the order of their seniority. They altogether reigned 22 years. It was on this account that (in the Mahâwanso) it is stated that there were nine Nandos." See also J. A. S. B. vi. 714, 726 (Buddhaghoso's Aṭṭhakathá) "the ten sons of Kálásoko reigned 22 years. Subsequently to them, Nawanando reigned 22 years."

† Wilson derives the *chara* from the Sanskrit *áchára*, "institute." I should prefer the local *chára*, "pasturage," especially as the associate *Bhaiya* is in the Indian form of the classic Aryan *Bhráta*.

‡ Wilson's "Vishnu Puráṇa," p. 467. See also note, p. 468, for various readings from Bhágavata, Váyu and Matsya Puráṇas.

§ The Mudrá Rákshasa, in Wilson's "Hindu Theatre," vol. ii. p. 144. For other notices of the Nandas, see "Asiatic Researches," xx. 167; Rev. W. H. Mill, J. A. S. B. iii. p. 343. Wilson's "Essays on Sanskrit Literature," i. 174, 178; Burnouf, "I. 359 and Lotus de la bonne loi," p. 452; Max Müller, "Sanskrit Literature," 275.

"Primus inter pares;"* but necessarily with much larger powers and functions in dealing with kingdoms than the ordinary title would carry with it in the mere management of village communities.

I now have to refer to the coins themselves, but as introductory to further details, it is necessary to indicate the leading locality of their discovery, and the epoch to which they should, on independent grounds, be attributed. I have so lately, and so entirely without reference to any present theory, reviewed the chief sites of the discovery of this class of money, under comparatively careful systems of geographical record, that I had better confine myself to a recapitulation of those results, pure and simple. The conclusion I arrived at was, that the kingdom for the supply of whose currency these coins were designed, had "its boundaries extending down the Doáb of the Ganges and Jumna below Hastinápura, and westwards beyond the latter river to some extent along the foot of the Himálayas into the Punjáb"†—*the* division of the entire country probably the most advanced, at that

* General Cunningham, many years ago, guessed, in virtue of a portion of the name, that *Kunanda* was one of the nine Nandas, but as he has not ventured to support his conjecture, I conclude that he has abandoned the identification. ("Bhilsa Topes," p. 355.) Max Müller rightly divined that Xandrames might be "the same as the last Nanda" ("Sanskrit Literature," p. 279); though, Wilford, in 1807, had already enunciated, to all intents and purposes, a similar theory. ("As. Res.," ix. p. 94.) Notwithstanding that he had previously so far compromised himself, as to advocate the interpretation of the Greek *Xandrames* as a synonym of the Sanskrit *Chandra Gupta* (As. Res. V. 286).

[Referring to priorities of publication, I see that General Cunningham has another grievance against me (J. A. S. B. 1864, p. 229). It seems that in examining General Abbott's coins, in November, 1859, I noted a square piece of Epander, as that of a "new king." The Memoir in which this statement ultimately appeared, had avowedly been laid aside, and after two years' delay was inserted in the Journal of the R. A. S. (vol xx. p. 99, July, 1862). In the mean time, as I now learn, General Cunningham had announced to the world that he was the owner of a bad coin of the same king (J. A. S. B. 1860, p. 396). But if I offended the General's susceptibility in this very open date of discovery, I must have afflicted his sensitive and exclusive ideas of patent rights still more acutely, when I again published Col. Abbott's coin as "*unique*" in the Numismatic Chronicle of September, 1864 (p. 207, vol. iii. N. S.)

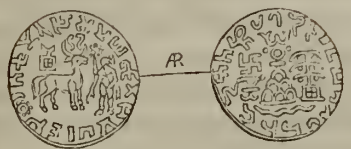
Though, in truth, I was, in either case, altogether innocent of intent, and to bring this home to the General's own peculiar feelings, I may state that had I seen the notice he refers me to, I should *not* have given him credit, in the same article, for a discovery he confesses to be due to Mr. Forrest. And, on the other hand, I should have been most anxious to have been able to cite the conjunction of the names of Antiochus Nikator and Agathocles on the same piece, which so specially bore upon the subject matter of my paper.]

† Prinsep's "Essays," i. 204. General Cunningham says, "found chiefly between the Indus and Jumna." Mr. Bayley's experience coincides with my own in placing their centre more to the eastward. These coins were first brought to notice in 1834, on the occasion of Sir P. Cautley's discovery and excavation of the ancient city of Behat, on the Jumna, 17 feet below the present general level of the surrounding country. See J. A. S. B. iii. 43, 221. Prinsep's "Essays," i p. 76.

period, in material wealth, as it was in intellectual development, claims that it has upheld with singular tenacity, under many adverse influences, through more than twenty centuries, until European Calcutta, at last, superseded the Imperialism of Moghul Delhi.

I have a more onerous duty to perform in satisfying my readers in regard to the date internal evidence would assign to these issues. I have previously confessed a difficulty, and admitted that the data for testing the age of this coinage by the style of the letters on its surface were somewhat uncertain, and in a very elaborate examination of every single literal symbol employed on the varying representatives of the class, I came to the conclusion that if certain more archaic forms of letters might take the whole series up in point of time, modifications, approaching to modernisations, might equally reduce individual instances to a comparatively late date.* I was prepared to disavow any adhesion to the old theory that the fixed lapidary type of Asoka's inscriptions was to constitute the one test of all local time and progress, and the sole referee of all gradations in Palæography, though I was not in a condition to cite what I now advance with more confidence—both the exceptional and stiff form of a lapidary alphabet, *per se*, as opposed to the writing of everyday life, which last the numismatic letters would more readily follow; but I subordinated the fact that Asoka's alphabet was designed for all India, and although it condescended to admit modified dialectic changes, all the inscriptions are supposed to have emanated from one official copy, which, however perfect at Palibothra or imposing at Ganjam, may well have been behind the age in that focus of learning to the eastward of the Saraswati, where not only must Indian-Páli have been brought to unusual caligraphic perfection, but from its contact and association with the Semitic alphabet on the same ground and in the same public documents, may be supposed to have achieved suggestive progress of its own, and to have risen far above the limitations of the writing of ordinary uninstructed communities in other parts of India; so that, whatever doubts or hesitation I may have felt in the once discouraged notion that any approach to perfection existed in India prior to Alexander's advent, I have been forced into, and now willingly acknowledge, diametrically opposite convictions, and concur in the surprise expressed by the Greeks themselves that the Indians were already so far and so independently advanced in civilisation.

* Prinsep's "Essays," i. p. 207.



Silver. Weight 29·0 grains. B. M., J. A. S. B. vii. pl. xxxii. figs. 2, 3, 4, 8.

Obv.—A female figure, holding on high a large flower,* and apparently in attendance on a fanciful representation of a sacred deer.† The animal has curiously curved horns, and a bushy tail like a Himalayan Yák. Monogram ꝺ.‡

Legend, in Indian-Páli [a similar flower to that in the field is repeated at the commencement of the legend]:—

Rájnah Kraṇandasa Amogha-bhratasa Mahárajasa. (Coin) of the great King, the King Krananda, the brother of Amogha.

Rev.—A Chaitya surmounted by a small umbrella, above which appears a curious symbol§—a serpent is seen at the foot of the Chaitya.

* This is probably intended to represent a lotus, a favourite object of reverence with the Buddhists. One of the Nandas was named *Mahá Padma*, "great Lotus." (Vishṇu Puráṇa, 467. The *Padma-chenpo* of Tibetan writers. J. A. S. B. i 2.) "The distinctive mark" of one of the four principal classes of Buddhists (the *Ráhula*) was also "an *utpala-padma* (water-lily) jewel, and tree-leaf, put together in the form of a nosegay." I may as well take the opportunity of noting that the symbols of the remaining three classes of Buddhists were the "shell, or conch" for the *Káshyapa*: a "*sortsika* flower" for the *Upáli*: and "the figure of a wheel" for the *Kátáyana*. (Csoma Körösi, "Jour. As. Soc. Bengal," vii. (1838), pp. 143—4.)

† The deer was typical of the *Pratyeka* Buddhas. Deer were the authorised devices for the signets of the priests ("Jour. A. S. Bengal," 1835, p. 625, As. Res. xx. 86). and deer were from the first cherished and sacred animals among the Buddhists—"The Deer Park of the Immortal," at Sarnáth, near Benáres, was an important feature in connection with the celebrated Stúpa and religious establishments at that place. ("Foe Koue Ki," chapter xxxiv. "Mémoires," Hiouen-Thsang, i. p. 354.)

‡ I am unable to offer any solution of the meaning of this sign. It may possibly be an older form of the Tree.

§ *Chaityas*, or more properly *Stúpas* (Sanskrit "a pile of earth"), are also called *Dágobas* in the Maháwanso, a name stated to be derived from *Dhátu* and *gabbhan*, "Womb of a relic." (Mah. p. 5.; see also Prinsep's "Essays," i. 165.) The monogram which surmounts the *Stúpa* on the coins eventually came to be recognised as a symbol of *Dharma*; its outline has much in common with the representations of the idol at Jagganáth. (Stevenson, J. R. A. S. viii. 331. Cunningham, "Bhilsa Topes," pl. xxxii.) The device in question recurs frequently on the later Bactrian and Indo-Scythic coins. (Num. Chron. xix. pl. p. 12, No. 166. "Ariana Antiqua," pl. xxii. 156. Burnouf, ii. 627).

In the field are the Bódhi tree,* the Swastika cross,† and a later form of one of the devices under No. 16 of the old series of emblems. Legend, in Bactrian-Páli :—

Rajah Kraṇandasa Amogha-bhratisa Mahárajasa. The concluding title of *Mahárája* is separated from the rest of the legend, and placed independently at the foot of the reverse.‡

* This tree is another chosen emblem of later Buddhism; but, as I have before remarked, it did not appertain *exclusively* to the Buddhists in early times, as it is to be seen on a very ancient coin implying a directly opposing faith, in the fact of its bearing the name of *Vishṇu-deva* in old Indian-Páli characters. (J. A. S. B. iii. pl. xxv. fig. 1, and Prinsep's "Essays," ii. 2, vol. i. pl. vii. fig. 1.) So also Q. Curtius, in his notice "Deos putant, quicquid colere cœperunt; arbores maxime, quas violare capitale est" (viii. 9, § 34), refers to Indians in general, and not to Buddhists in particular). Another suggestive question is raised by the accompanying devices on the surface of this piece, one of which represents a half-moon—a totally exceptional sign, which in conjunction with the name of *Vishṇu*, may be taken to stand for a symbol of Brahmanism as opposed to Buddhism, a coincidence which may be further extended to import the pre-existence of Chandravansas, in designed contrast to Surya Vansas; and an eventual typical acceptation of the name in combination as *Chandra-Gupta Vishṇu-Gupta* (Chanáky a)—all evidencing an intentional hostility to the "Children of the Sun" of Ayodhya, with whom Sákya was so immediately identified. I may as well take the opportunity of adding that the remaining objects on the obverse of this coin consist of the triple Caduceus-like symbol, under D 16 in the Plate, together with a deer above the half-moon, and a *reverse* device of a horse.

† Let the primary ideal which suggested the cross of the *Swástika* be what it may, the resulting emblem seems to have been appropriated by the Buddhists as one of their special devices in the initial stage of the belief of Sákya-Muni. The *Tao szu*, or "Sectaries of the mystical cross," are prominently noticed by Fa Hian. (cap. xxii., xxiii.), and their doctrine is stated to have formed "the ancient religion of Tibet, which prevailed until the general introduction of Buddhism in the ixth century." Mr. Caldwell has instituted an interesting inquiry into the ancient religion of the Drávidians, which bears so appositely on the general question of the rise of subsequent sects in India, that I transcribe the final conclusion he arives at:—"On comparing their Dravidian system of demonolatry and sorcery with 'Shamanism'—the superstition which prevails amongst the Ugrian races of Siberia and the hill tribes on the south-western frontier of China, which is still mixed up with the Buddhism of the Mongols, and which was the old religion of the whole Tartar race before Buddhism and Muhammadanism were disseminated amongst them—we cannot avoid the conclusion that those two superstitions, though practised by races so widely separated, are not only similar but identical."—Dravidian Grammar, p. 519 See also Maháwanso, p. xlv.

‡ Panini enumerates the Swastika among the ordinary marks for sheep in use in his day (Goldstücker, p 59). It eventually became a symbol common to Buddhists, Jainas and Brahmans. The symbols of the 24 Jainas are enumerated by Colebrooke, (As. Rs. ix. 301) as follows, No. 1, A Bull; 2, an Elephant; 3 a Horse; 4, an ape; 5, a Curlew; 6, a Lotus; 7, a Swastika; 8, the moon; 9, Makara; 10, a [four-petalled] Sriratsa; 11, a Rhinoceros; 12, a Buffaloe; 13, a Boar; 14, a Falcon; 15, a thunderbolt, 16, an Antelope; 17, a Goat; 18, Nauda varta [an arabesque figure, seemingly designed to repeat the *Swastika* as often as possible in its component lines]; 19, a jar; 20, a Tortoise; 21, a blue water-lily; 22, a conch; 23, a Serpent; 24, a Lion.

Kuvera's treasures or nine Gems, also illustrate the history of Indian symbols,

It has been usual to read the name of this king as *Kuṇanda*, and tested by the limitations of the Indian Páli alphabet proper, the initial compound should stand for KU and nothing else; but as some of th lately-acquired specimens have furnished, for the first time, an approximate reading of the name in the counterpart Bactrian character on the reverse, giving the indubitable foot-stroke to the right, which constitutes the subjunct *r*, appended to the K, there can be no reasonable doubt but that *Kraṇanda* is the correct transliteration. The apparent anomaly of supposing that the Indian Páli borrowed this form of suffixed *r* from its fellow alphabet is disposed of by its use a second time in this legend, in the Páli *Bhrata*. With similar licence, the Bactrian writing, to supply its own deficiencies, appropriated the Páli *jh* in *Rajha*, corresponding with the *Rajnah* of the obverse.

The copper coins of this class follow the typical devices of the silver money, varying, however, in shape and weight to such an extent as to indicate a very general and comprehensive original currency. A peculiarity in which they depart from the parallel issues of silver, is the total omission of the counterpart reverse legend in Bactrian Páli, occasionally so imperfectly rendered even in the best designed mintages, and the superscription is confined to what we must suppose to have been the *local* Indian Páli character, in which mint artisans and the public at large were probably much better versed.

The ninth, or one of the nine Nandas, seems to have been popularly designated *Dhana Nanda*, or the rich Nanda,* and certainly, if the extant specimens of the money bearing the impress of the name of

Wilson (Megha Dúta, verse 534) has the following note on the subject. "The Padma, "Mahápadma, Sankha, Makara, Kachhapa, Mukunda, Nanda, Níla, and Kharva, are the nine Nidhis."

"Some of the words bear the meanings of precious or holy things: thus Padma is the Lotus; Sankha the shell or conch. Again some of them imply large numbers; thus Padma is 10,000 millions, and Mahápadma is 100,000 millions, &c. but all of them are not received in either the one or the other acceptation. We may translate almost all into things: thus, a lotus, a large lotus, a shell, a certain fish, a tortoise, a crest, a mathematical figure used by the Jainás [No. 18, above?] Níla refers only to colour; [No' 21 supra?] but Kharva, the ninth, means a dwarf." See also As. Res. xx. p. 544.

There is a very full list of Buddhist symbols in Captain Low's paper on "Buddha and the Phrabat," in the Transactions of the R. A. S., vol. iii. p. 57, which has been commented on, in detail, by M. E. Burnouf, in his "Lotus de la bonne loi" (Paris, 1852), p. 626.

* Maháwanso (Tika), xxxix. "Vishṇu Puráṇa," *note*, p. 468. Max Müller, "Sanskrit Literature," p. 281.

Kraṇanda are any test of the activity of his mints and the amplitude of his treasure, he must have truly deserved the title.

Whatever mythical conceptions may have first determined the outlines of these various coin devices, or whenever they were incorporated into that religious system, it is clear that they one and all eventually came to be regarded as typical emblems of the Buddhist creed.* As such, there can be no hesitation in accepting their combined evidence as conclusive, that the kings who set them forth in such prominence two centuries after the *Nirváṇa* of Sákya-Muni, must have been votaries of the faith he originated or reformed.

If the faintly preserved similarity of the names of Xandrames and Kand fortuitously led to their association in the person of *Kraṇanda*, and an almost obvious sequence connected him with one of the *nine* Nandas, and alike the issuer of the coins bearing this designation, it was reserved for the coins themselves to contribute the most important item in the entire combination to the effect that these Nandas were Buddhists, and in this fact to explain much that the whole written history of India, foreign or domestic, had hitherto failed to convey—the exact record of the State religion at the period, thus obscuring the right interpretation of the then impending dynastic revolution, commenced and accomplished, as it would now seem, for the triumph of the Brahmanical hierarchy over the representatives of the more purely indigenous belief.

These considerations, however, open out a larger area of Oriental national progress than the legitimate limits of the scope of the Numismatic Society may justify my entering upon, though history must once again, in this case, admit a debt it owes to the archæology of money. And as antiquaries, we ourselves may frankly recognise the aid conferred by the determination of the correct epoch of these coins, in justifying

* The association of these symbols with a somewhat advanced phase of Buddhism is shown in the retention of the deer, the Bodhi-tree, the Chaitya and the serpent (which is placed perpendicularly on some specimens) on the reverse of a coin, the obverse of which displays the standing figure of Buddha himself, having the lotus and the word *Bhagavata*, his special designation, in the marginal legend. (J. A. S. B. iii. pl. xxv. fig. 4., Prinsep's "Essays," i. pl. vii. fig. 4.)

There seems to have been a current tradition in the land, regarding the real faith of the Nandas, signs of which are apparent in Hiouen-Thsang's notice, "Les hommes do peu de foi raisonnaient entre eux à ce sujet: Jadis, disaient ils, le roi *Nan-tho* (Nanda) a construit ces cinq dépôts pour y amasser les sept matières précieuses" (vol. ii. p. 427).

the arrangement of so many prior and subsequent series of the subordinate mintages of a country whose early annals were so largely perverted or sacrificed to sectarian hostility.

I have still two purely numismatic questions to advert to before concluding this paper. Reference has already been made to the adoption by the Greeks of the Indian or square form of money, but if the period and personal identity of the *Kraṇanda* of these coins are rightly determined, the Greek Bactrians must have condescended to appropriate further oriental mint developments. Alexander the Great, Seleucus, and all those invaders who might have influenced Indian art, had their nominal legends arranged in parallel lines, or at the utmost on three sides of a square, on the inner field of the reverse.

Diodotus, Agathocles, Euthydemus, Demetrius, and other Bactrian Hellenes, who came into closer contact with India to the westward, retained the same practical arrangement of legends. So far as the existing numismatic data authorise a conclusion, Eucratides was the first to commence any marked modification of the practice, and to lean towards the filling up the complete outer margin of the coin with royal names and titles. Of course, if Kraṇanda came after all these Bactrian Greeks, he may have imitated their customs; but if, as it would appear, he was a contemporary of Alexander, ruling in a distant and unassailed part of the country, it is clear that local art was thus far independent and in advance of that of Greece, and that the Bactrian and Scythian interlopers* borrowed circular legends from India.

In contrasting the equitable adjustment and full value of the early punch-impressed pieces, with the irregularity in these respects, to be detected in the mechanically improved and more advanced specimens of Indian mintages, I was lately led to instance the identical coins of Kraṇanda as proofs of what unscrupulous kings might do, even in the very introductory application of ideas of seigniorage, towards depreciating their own currency. The results in question were cited to exemplify the statement in the Mahâwanso, where the Brahman *Chánakya* is accused of so operating on the coin of the realm as to

* The mention of these later Scythians recalls the curious coincidence of many of the subordinate members of the ruling families designating themselves, somewhat after the manner of Kraṇanda, "Brothers" and even "Nephews of the King," &c. See Num. Chron. vol xix. Nos. xxvii. class B, and xxxiv.

convert every *one* into *eight*.* When I quoted the tradition and the numismatic fact in juxtaposition, I little surmised how much more closely the two might be connected, or that instead of the latter affording a mere illustration of the former, that the surviving metallic witnesses would suffice, with the slight introductory testimony, to put a man's memory on trial for forgery twenty centuries and more after date. But so it would seem: the *Brahman* Chánakya† confesses, through his own advocates, that in his desire to subvert the rule of the Nandas, he seduced sons from their father's palaces, and "with the view of raising resources," to have had recourse to the more than questionable expedient of *depreciating*, or properly speaking *forging*, coins of the ruling monarch, which, however, under the ultimate test of the old money changers, would soon have found their level. The copper coinage of the day was probably beyond any very ready power of transmutation, but if the silver currency is to afford a modern "pix," the Brahman must have worked to advantage, as there may be seen in the cabinets of the British Museum, at this present writing, a piece purporting to be of *Kraṇanda*, with fair legends and full spread of surface, though of tenuity itself, which should in ordinary equity have weighed somewhere over 40 grains, but which on trial barely balances 17·7 grains Troy.‡

* Num. Chron. N.S., iv. pp. 127, 128.

† Maháwanso, p. xl. "Opening the door [of Nanda's palace at Palibothra] with the utmost secrecy, and escaping with the prince out of that passage, they fled into the wilderness of *Winjjhá*. While dwelling there, with the view of raising resources, he converted (by recoining) each *kahâpanan* into eight, and amassed eighty *kótis* of *kahápaná*. Having buried this treasure, he commenced to search for a second individual entitled (by birth) to be raised to sovereign power, and met with the aforesaid prince of the Móriyan dynasty called Chandagutto."

‡ This of course is an extreme instance, but it is not a strained example; and although the piece, which I refrained from quoting previously, is damaged, and has lost its oxydised film, it is by no means worn, or anything like a coin which we might legally refuse for want of the king's emblems. The best coin of the class still weighs 38·2 grains. (Num. Chron. N.S., iv. p. 128.)

Description of a Mystic Play, as performed in Ladak, Zaskar, &c.— By Captain H. H. Godwin-Austen, *Surveyor, Topographical Survey, F. R. G. S.*

[Received 21st October, 1864]. [Read 2nd November, 1864].

These Mystic Plays of which I am about to give an account, are performed on certain feast days in all the principal monasteries of Ladak, about twice in the year, in spring and autumn. They are also, I have been informed, enacted at Lhassa and Bhootan, but I did not see one when in the latter country. I can give no information as to their origin, and must here state that not being a Tibetan scholar, I cannot vouch for the true orthography of proper names written down at the time *vivâ voce*, and which are very difficult to catch. The Play hereafter described, I saw performed in the fine old Goupa or Monastery of Himis, which is situated in a lateral ravine that joins the river Indus a day's journey above Leh on the left bank of that river. From its secluded position, this was one of the few religious houses that escaped destruction on the invasion of the country by the Dogra army under Wazier Jerawur. At that time much curious and interesting property and valuable religious writings were ruthlessly destroyed. The theatrical property, consisting of silk dresses, masks, &c., are therefore seen in greater perfection at Himis than at any other monastery in the country. On entering the court-yard on the day of performance, we found the head Lhama with all the gylongs (monks) of the establishment were assembled, the musical instruments were arranged ready under the little verandah to the proper right of the large Prayer Cylinder which stands under the centre of it, and every thing betokened the coming scene.

Before commencing an account of the strange performance, it will be as well to roughly describe that portion of the building where it is enacted. The principal entrance to the monastery is through a massive door, from which runs a gently sloping and paved covered way leading into a court-yard about 30 × 40 yards square, having on the left hand a narrow verandah, in the centre of which stands the large Prayer Cylinder above mentioned. The larger picturesque doorway

the entrance of one of the principal idol rooms, is in the extreme right hand corner, massive brass rings affixed to large *bosses* of brass are affixed on either door, the posts of which are of carved and coloured wood work. The walls of the main building with its bay windows of lattice work, enclose the court-yard along the right hand side, the roof is adorned with curious cylindrical pendant devices made of cloth called "Thook;" each surmounted with the Trisool or trident, painted black and red. On the side facing the main entrance, the court-yard is open, leading away to the doorways of other idol rooms. In the centre space stand two high poles "Turpochè," from which hang yaks' tails and white cotton streamers printed in the Thibetan character. Innumerable small prayer wheels are fitted into a hitch that runs round the sides of the court-yard. A few large trees throw their shade on the building, and above them tower the rugged cliffs of the little valley, topped here and there by *Lhatos*, small square built altars, surmounted by bundles of brushwood and wild sheep horns, the thin sticks of the brushwood being covered with offerings of coloured flags printed with some *muntra* or other. All preliminaries over and the actors ready inside the building, the musicians,* wearing curious head-dresses and robes, red being the predominant color, took up their position in the verandah facing the monastery. Their instruments consisted of enormous long trumpets, that draw out like a telescope to 8 or 9 feet; these issue a low, mellow, bass sound, the mouth-piece is of peculiar form being a large flat disc against which the lips are pressed; a narrower trumpet globe-shaped at lower end; flageolets, drums and cymbals completed the set. The drums are peculiar, being fixed to a long handle, the end resting on the ground, they are struck with a bent piece of thin iron, the point of which is covered with a leather button. The musicians commenced a wailing sort of air accompanied by a low chant, to which the drums and cymbals beat a regular tune, but very subdued. Then came, trooping out of the idol room, a set of maskers in the most extraordinary dress it is possible to conceive; they were called Tsam-

* See Captain Melville's photographs, No. 10. This same costume is worn by the musicians of the Deb and Dhurm Raja at Punakha in Bhootan, and it is as well to mention here that the monks of Himis, as well as a few other monasteries in Ladakh, are of the same sect as the Buddhists of Bhootan, viz. the "Dukpah" of whom the spiritual head is the Dhurm Raja.

Chut,* and in single file led round the flag-poles in the centre of the yard, with a sort of quiet and most laughable dance, slowly turning round and round themselves, and coming to a sudden halt at the end of each bar of the music, which the drummers notified by a louder stroke. Thus the circle moved round the poles while they tossed their arms about and waved the coloured flags they held in their hands. The dresses were all of China silk and Kimkab, the apron embroidered with the face of a hideous demon, the head-dress was a large conical hat with a very broad brim, edged with black wool; from the hat several wide ribbons of different gay coloured silks hung down the back, extending nearly to the heels, but the most extraordinary and striking part of their costume, was the device of a death's head, the eye-sockets, teeth, &c. worked in silk on a white ground. This was suspended from the neck and hung down to just below the breast.

In the left hand they held a sort of spoon having for the bowl a piece of human skull, cut out of the forehead portion, and round the edge of which were attached narrow streamers of silk and some plaited ends of hair. This ghostly ladle is called "Bundah." In these spoons, the portions into which the enemy is cut up, are carried away and thrown up into the air as an offering to the gods: of this enemy I shall speak further on. These maskers hold in the right hand a short little stick with red and blue streamers of silk; these and the spoons majestically waived about as they go round in their solemn dance, had the most curious effect I ever saw. Pantomimes and extravaganzas floated round one during the whole performance, yet this was a real mystical religious pageant having some curious and bygone origin, which none of the party knew or could get explained. This dance came to an end at last, and as the troop ascended the steps to the large doorway, the same number, but in a different disguise, came out. The tune was now changed and seemed to be the repeating of a number of stanzas of the same length, the maskers held in the right hand little drums and in the left, bells. To the first, the drums were attached a short string with a small ball at the end, so that when moved quickly backwards and forwards it may strike both ends of the drum. At the end of each stanza they gave a rattle and a ring at the same time, moving round in the same way as did the first set, only stopping to make an obeisance to the

* See Photographs, No. 1.

centre when they used their drums at the end of the intonation. These were also dressed in gaudy China silks, both wore gilt masks with apertures for eyes and mouth, the top of the hat was conical with silk streamers on the sides and a large loose scarf behind. These masks were named "CHIN-BEP" or from their copper coloured masks, "ZANG-BUKH, lit. copper mask.* These had no death-like insignia as the first maskers wore. After these had retired, a short delay, and another more imposing group marched with great dignity out of the monastery. These all wore very large masks of different forms and colours, still all of the same type as the heads of deities, their great peculiarity being the third eye in the centre of the forehead. The principal of these deities was "THLOGAN PUDMA JUNGNAS" or "he born of the lotus" over whom was carried a large umbrella. Among the other attendant maskers of consequence was† SINGE' DRANDROK, DORJE' TROLONG, SANGSPA KURPO (Brahma), ZHIN-SKIONG or Eswara. These are, I believe, intended to represent emblematically the six classes of beings subject to transmigration, viz. 1, gods; 2, demi-gods; 3, men; 4, animals; 5, ghosts; 6, the inhabitants of hell; for although we did not then see the mask of the bull's head, it should have been among the maskers,—perhaps the monks did not take the trouble, and thought us none the wiser,—now this would well represent No. 4 of the above classes; and in another monastery I afterwards saw masks made to represent stags. Attending on this principal group were another set of maskers, who carried the long handled drums and the bent striker. Their dresses were of the same type, long petticoats of rich China silk, but the head-dress a kind of crown with six points, gilt, rising to a high point in the centre, while streamers of silk hung down from the ears to the waist.‡ On each of the six points were the following syllables in the Lantsa character, viz. $\overset{1}{\text{OM}}$, $\overset{2}{\text{AH}}$, $\overset{3}{\text{SHI}}$, $\overset{4}{\text{HUNG}}$, $\overset{5}{\text{TRANG}}$.§

* See fig. 2.

† See Photographs, Nos. 4, 5 and 8.

‡ See No 6 of Captain M.'s photographs.

§ Each of these syllables have some mystical connection with the centre and cardinal points of the compass, thus—

1

2

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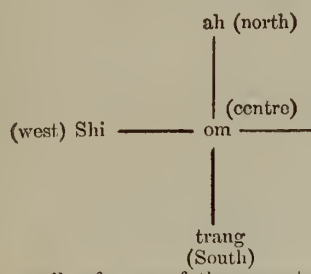
The whole of these last named Maskers marched round the Flag Poles in solemn procession, the band still playing; they then sat down in a line on the ground; THLOGAN PUDMA JUNGNAS in the centre. Then with shrill whistling, made by putting the fingers in the mouth, several boys came rushing out of the monastery, and running up made obeisance to the chief in the centre, and danced wildly about round the Poles. They were called "SPAO," warriors, and wore short skirts, and streamers of silk hung from the waist, round which was a belt carrying small round bells (Gungaroo, Hind.); the same were also attached to the ancles. Their masks were green with a broad face on them, and from the centre of the crown rose a stick with a triangular red flag; they held a bell in the left hand, and a large handled drum in the right. With these also careered about two jesters, one of whom had two small kettle-drums tied on his back, on which the other would occasionally thump, and play other practical jokes for the amusement of the crowd, salaming also in mock respect to Pudma Jungnas and his attendants. There were also another set who made up this court of Indra, of which it may be a representation; these were called KATINCHUN,* wearing a red mitre-shaped hat, silk capes



and each of these points is again supposed to be the dwelling of a god. This curious system is seen drawn out on the walls of some of the monasteries, in a complicated sort of labyrinth, called MISKYODPA DKYILKHAR, the circle of AKSHOBHYA in Sanscrit. I once saw one in process of construction on a square with sides quite four feet in length. The deities assigned to the different parts are numberless, but of the principal I may name,—North, Tonyút thúbba, West, Nam-'wa-ta-yas, East, Dorjè Sempspa, South, R. Zingsten Jungldau, Centre, Nang-por-nang-Tsat.

See Hodgson, on the Literature and Religion of the Bhuddists, note, foot of page 117. "In niches at the base of the hemisphere are frequently enshrined four of the five Dhiani Buddhas, one opposite to each cardinal point. AKSHOBHYA occupies the Eastern nitch; RATNA SAMBHAVA, the Southern; AMITA'BHA, the Western and AMOGHASIDDHA the Northern. VAIROCHANA, the 1st Dhyani Buddha, is supposed to occupy the centre invisibly. Sometimes, however, he appears visibly, being placed at the right hand of AKSHOBHYA.

* See No. 3 of Capt. M.'s Photographs.

and petticoats, and carried bells and small hand drums; they sat in a solemn row opposite the gods, and may have been intended to represent dewans of the court. After the jesters had danced about and played various antics, both with the actors and the lookers-on, they rose and marched back into the monastery. To these succeeded a set of NUMKINGS with red masks and TSAKINGS* with brown, who both carried the long handled drum, and from their head dress rose a tall stick with a triangular flag, with a narrow brown silk border and a device of three eyes painted on the centre. The two sides named above, faced each other and with a kind of hop dance, advanced towards each other and then retired, striking occasionally in time to the music, not of their own drums, but of those of their *vis a vis;* altogether it was the oddest and most curious spectacle possible to imagine. What this strange masque was intended to represent is more than I can say, and the priests of the monastery seemed to know as little of the matter, or perhaps could not explain it, mixed as the subject must be with theological Buddhist mysteries, the ridiculous grafted upon it for the amusement of the populace.

I will wind up my account by a description of the masque which last appeared upon the scene and ended the performance. The reader must now bear in mind that these last characters hold a place in another and different day's festival, so that we were merely shown the costume. I saw afterwards, on my return to Leh from the Chang Chenmo, this play acted throughout at the monastery of GAWUN, an account of which I will hereafter give. But to return to the actors, those that we last saw, were got up in the most wonderful way to represent skeletons, their clothes being tight fitting and white, the fingers and toes, loose and long, the mask being a really artistic model of the human skull, the lower jaw being moveable. These men danced a slow weird *pas*, grinning at each other, and knocking together their short staves, which at the top were carved into death's heads. The band played a subdued solemn chant while this ghostly dance went on. These men take a part in the festival, when the supposed enemy, an effigy of whom is modelled in dough, is cut up and carried away by these ghostly bearers who are intended to represent the dwellers of the burial-grounds.

* See Photograph, No. 9.

Translation of a MS. obtained in Ladak regarding the Dancing on the 10th day of the 5th month, a great holiday.—By the Rev. H. A. Jaeschke, *of the Moravian Mission, Kyelang, Lahoul.*

"Dance Book of the 10th."

(After some preambulatry lines which I do not thoroughly understand, it continues as follows):—

The time for the first meeting on the 10th having arrived, the performers put on their attire and a nether garment* folded in many beautiful plaits. The leader in front, they enter running quicker and quicker, according to the measure, and form a circle for the dancing called.....† Mustard seed is distributed among the dancers. Then making the sign of the Trident‡ the following steps are gone through ..... at the words§ .....the right hand, and at the words..... ... the left is stretched out. (This motion I cannot clearly understand.)

Then the leaders turning to the right, and the last in the line to the left, both advancing towards each other, the circle is again closed or formed. (Steps and dancing). Again making the sign of the Trident they retire.

Now enter the Libators of Chang.|| With bells and fans in their hands, and slowly advancing form a circle (dancing .....) at the words .....they take the offering of Libation to all the beings of the six classes¶ in the whole world. Each one* prays for whatever wish he desires to be fulfilled. Now, after a signal from the cymbals, the large trumpets, (about 8 or 9 feet long), thin trumpets, globe trumpets, kettle-drums, pipes, &c., and the whistling with the mouth (that extremely shrill kind, which is produced by putting two fingers in the

* Part of the clerical dress, very like a petticoat.

† Here occurs a considerable number of names of different motions, paces, and gestures, often repeated in this little paper, which cannot be translated nor can I properly describe them, as I am not acquainted with the terms used in dancing in the English language.

‡ Viz., with the hands.

§ These refer to the words of the song which accompanies the dance.

|| This word seems to comprehend all sorts of fermented liquors; thus in Lahoul and Kulloo rice-chang is most common; in Ladak barley-chang, a kind of malt liquor without hops; in Koonawur they make a grape-chang or wine.

¶ The six classes of beings subject to transmigration are cha deo (gods); Chamyin (asura demigods); mi (manusha men): dudro (animals): yidags (peeta .....) nyal wapa (or daitya the inhabitants of hell).

* Viz. of the Lhamas present.

mouth), all these instruments concurring to make one loud noise, the performers one after the other sounding his bell, hand-drum, or other instrument, and blowing the air thrice with his face, mentally* summons the noxious enemy† as nobody can do so in reality (dancing).

The time having arrived to put down the venomous (enemy), with dancing, a circle is formed and each performer must successively hit him with his instrument;‡ then follow different steps and words of incantation and exorcism.

Three signals with the cymbals having been made two ATSARAS,§ coming out of the large door of the monastery, post themselves on either side of it, with one arm a kimbo, and blow their *hautbois* twice gently, twice vehemently, and then two Gylongs‖ and one terrible person, holding a skull, having performed a series of steps, finally make the sign of the Trident and retire again. After them appear the persons of the burial-ground (ghouls), and after performing many gestures with their arms, retire.

This concludes the 10th day's act.

On the 11th day of the same month, in the first act,—here follows what I am unable to explain; in the second act, adoration is paid to the king;¶ in the third act, mustard seed is thrown on the enemy after some singing and dancing, and the ceremony of fixing the nail is performed,** and hitting the arms, legs and heart of the figure. Now

* Performing things *mentally* when circumstances will not allow of it in reality, is permitted to a great extent in the Buddhist religion, *e. g.* when a person dies without riches, the family may *imagine* themselves to offer gold, precious stones, &c., to any extent to Buddha, who will condescend to take it, as if it were really given. Living Lhamas do not let their flocks off quite so easily.

† Any being, man or demon, adversary to the religion or to the conntry, &c.

‡ A small figure moulded in dough, representing that enemy, or venomous or noxious person, lies on the ground in a triangular enclosnre, and each of the dancers has to hit it, with the sword dagger, or other arms or emblem he may carry.

§ ATSARA is derived from tho Sanscrit áchárya teacher, spiritual guide; but according to what I was told, it is now rather used like Yogi or holy mendicant, a Hindoo faqir. Besides this, it must also denote a sort of demon or spirit, as I have met with the word in this signification in books; I am not quite sure which it is here.

‖ Gylong, a degree of the Lhama priesthood.

¶ No name is given in the text, it was said to be some deity. (THLOGAN PUDMA JUNGNAS?)

** A nail or peg, in shape of a dagger and often beantifully ornamented, is a magic instrument, occurring very frequently in books, as an emblem of deities, as well as used in exorcisms, &c. often by a gesture of the hand symbolizing its use. By its use, demons are supposed to be bound and enemies killed.

the rulers of the burial-ground* proceeding with dancing, take up the corpse,† making the gesture of the trident. Heruka, a god holding in his right hand a lance with a flag, and in the left a man's heart and a snare,‡ enters attended by the Lady mother (Heruka's wife) having in her right hand a club (Khatomka, Sanscrit Khatwánga) and in her left hand, a skull.

Four incantations with bells and faces; four women, who carry a snare, a little child's corpse,§ a heart, and a cymitar; their dress a wide human skin, a potka, and leopard skin petticoat. Dancing and music continue, while the last that enter are four Tiger coats, (warriors with bows and arrows).

In the 4th act, the dancers are four Libators of Chang, and eight other performers ..... (some unintelligible words here follow.) A mask named "Large mouth" with a censer, another with a drum and Hashang with his children‖ now come on the scene and the MS. concludes with a number of cyphers indicating the number of the steps in each dance.

* Viz. two male and two female demons.

† Lying on the triangle-shaped framework.

‡ A magic rope for catching noxious beings.

§ Such things as the little child's corpse and the human skin are not real, the former is a small figure, the latter a loose counterfeit made of silk or other stuff.

‖ Hashang was originally a Chinese priest whom I find mentioned in Tibetan historical books as a preacher of heretical doctrines. Here in this play, Hashang seems represented as a sort of school-master masked as a very old man and attended by a lot of masked children.

Some Account of Ancient Remains at Saidpúr and Bhitári.—By the Rev. M. A. Sherring, *LL. B., and* C. Horne, *Esq., C. S.*

[Received 4th January, 1865.—Read 1st February, 1865.]

Some account of the remains found at Bhitári has been already inserted at various times in the Journal of the Asiatic Society of Bengal. This refers for the most part to the stone pillar standing there, and to the inscription upon it, dating from the epoch of Sri Kumára Gupta. General Cunningham, in his interesting and valuable Report, printed in a Supplementary Number of the Society's Journal for the year 1863, supplies important information respecting other objects at Bhitári. Yet there are several very remarkable relics of the past which, so far as we have ascertained, neither this indefatigable investigator nor any other archæologist has hitherto described. It is our purpose to give a succinct description of these relics.

It is necessary to draw attention to the circumstance that Bhitári is usually spoken of in the Society's Journal as Saidpúr-Bhitári, whereas Bhitári and Saidpúr are distinct places, the one being about $4\frac{1}{2}$ miles distant from the other. The high road from Benares to Ghazeepore passes close to the large town of Saidpúr, while the village of Bhitári lies several miles away from this road. Its proximity, however, to Saidpúr, is no doubt the reason why the two have been associated together; besides which, there is good ground for believing that in ancient times both contained large Buddhist structures.

SAIDPUR.

This is a flourishing town of ten thousand inhabitants, chiefly Hindu traders, many of whom, judging from the multitude of well-made houses adorning the streets, are living in comfort, if not in affluence. Two large Hindu temples have been recently erected in the town, which, together with the Government Tahsili school, are situated on the left bank of the Ganges. Passing down the main street to its extremity and thence diverging to the right, you come immediately upon the outer wall of an enclosure, on entering which you observe three separate buildings appropriated by the Mahomedans for sacred purposes. One of these is a modern structure; the remain-

ing two are of undoubted antiquity. These latter we shall proceed to describe.

The first is a small domed building sustained by four stone pillars, the bases of which rest on a platform twelve feet square, raised a few inches above the ground. The shafts of the pillars are square, and the capitals are cruciform, each limb being one foot ten inches in length, and having the usual Buddhist bell-ornamentation. The pillars on the north and east quarters exhibit a groove about 15 inches in height, which evidently once contained a pierced stone railing. The eaves stones above are apparently original, and have a projection of 15 inches. These eaves are strikingly characteristic of the architecture of the early period to which this building must be assigned, and are often of great size and solidity. In ancient Buddhist structures both in Benares and in Jaunpore, as well as in this instance, they are cut on the upper surface to resemble woodwork. Some persons will be reminded by this circumstance of Akber's stone roof at Futtehpore Sikri, cut in imitation of tiles, and of the carved beams in the caves at Elephanta.

The second building is 26½ feet long by 23 broad, and is upheld by at least 34 columns disposed in the following remarkable order, namely, 6 at each of the north-east and south-east corners, 9 couples at intervals in the circumference, and 4 single pillars in the centre, forming a square. The two clusters of six pillars have been united by stone slabs into two thick ones, each 2½ feet square. This curious amalgamation is, in all probability, the work of the Mahomedans, though from what motive, it is hard to conjecture. The building was already strongly supported, and the alteration considerably detracts from its native simplicity. The space between the side pillars is 5 feet 9 inches, between the side and centre pillars 6 feet 4 inches, and between the centre pillars themselves 5 feet 1 inch. The height of each column is 6 feet 11 inches, of which the base is 9 inches, the shaft 4 feet 8 inches, the stone upon it 10 inches, and the capital 1 foot 8 inches. The innermost line of columns is built into a wall of solid masonry composed of ancient stones, and is of more recent date than other parts of the edifice. The roof is of long stone slabs, but in its centre there is a primitive Buddhist ceiling consisting of four stones placed diagonally upon the architraves and crowned by a flat

stone ornamented with a lotus blossom. Each corner stone also exhibits this flower in relief. The existence of the original eaves stone on portions of three sides of this structure, is sufficient proof that it could not have been any larger than it is at present; but the great strength of the supports above alluded to, would appear to indicate that it once possessed a second or even a third story. Upon the roof is a diminutive chamber of comparatively modern construction, sustained by four ancient pillars. The shafts are octagonal, and the capitals and rounded bases are richly carved with the bell and leaf pattern. These pillars have been doubtless taken from old buildings which were formerly situated in this neighbourhood.

We are of opinion that these two edifices were separate chaityas attached to a vihar or monastery, traces of which, owing to the short time at our disposal, we did not attempt to discover. The preservation of these interesting remains is to be attributed to the circumstance of a Mahomedan faqir named Sheikh Samman having taken up his abode in one of them, and having been buried in it at his death. The second chaitya contains the tomb of Makhdum Sáh. It would be worth the while for any one having time at his disposal to explore thoroughly this locality, which abounds with Mahomedan tombs, some of which, it may reasonably be supposed, have been constructed with stone taken from the usual Mussalman quarries of Hindu and Buddhist remains.

BHITÁRI.

This village is situated on the Gángi river, an affluent of the Ganges, and is called Saidpur-Bhitári, from which Rajah Deo Narain Singh, late member of the Legislative Council of India, derives his title. Its appearance in the distance is that of a long low mound, which, on nearer approach, displays a reddish hue on account of the large quantity of brick rubbish entering into its composition. In form it is nearly rectangular, the measurement of its four sides being as follows:—

East Face, ...	500 yards.
South ditto, ...	525 ditto.
West ditto, ...	685 ditto.
North ditto, ...	700 ditto.

A mound rises at each corner, and another half way along each face, and many more are within the enclosure itself. There is also a spur running from the south-west angle. The general aspect of the site is that of a fort with projecting towers at the corners, connected together by a low embankment or wall; whilst the debris scattered about in every direction and the numerous mounds, would seem to indicate that formerly extensive buildings existed upon it.

On the spur is a recently erected Imambara, under the foundations of which a hole has been made into the mound on which it stands, revealing the original foundations of a very ancient edifice lying in sitû. The bricks are of exceedingly large dimensions, some being 19 inches long, about 1 foot in width, and 3 inches in thickness. It would be interesting to lay bare the whole of these remains, and to trace as far as practicable, without injury to the Imambara, the extent and nature of the earlier structure.

In the year 1863, Mr. Horne was requested by the Government of the North-Western Provinces, at the suggestion of Major-General Cunningham, to make excavations into some of the mounds at Bhitâri. Strange to say, although trenches were made into several mounds, yet nothing of importance was discovered. It by no means follows, however, that because no ancient relics were brought to light in those tumuli which were then laid open, that a further and more complete investigation would be fruitless. It is only natural that the changes which have taken place through many generations among the buildings which the successive inhabitants of Bhitari have erected, having recourse to the ancient structures for their materials from century to century, rather than to materials of their own manufacture, should have occasioned the formation of some, perhaps of many, of the existing mounds; and therefore it is no matter for astonishment that Mr. Horne should have found only vast masses of earth, pottery, brick, and other rubbish, especially as his excavations were mostly carried on in the immediate neighbourhood of the inhabited portion of Bhitari. His decided conviction is, that if excavations were conducted on a more extensive scale, and embraced not only the larger tumuli in the interior of the enclosure, but likewise those lying at various distances in the outskirts, it is highly probable that discoveries of great interest to the archæologist, shedding light on the antiquity of

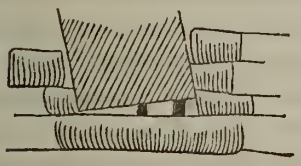
this entire region, might be made. It is the opinion of General Cunningham that the Bhitari ruins date from the Gupta period, or from A. D. 100 to A. D. 300, and that they are amongst the oldest Brahmanical remains known to us. He is wrong, however, in the implied supposition that they are altogether of Brahmanical origin, as we shall presently show.

Judging from the relics of tombs and religious houses dispersed over the village and its suburbs, Bhitari must have been a place of some importance during the Mahomedan rule in India. The few inhabitants still residing in it are, for the most part, followers of the prophet. The bridge over the Gángi below the village, was erected by the Mahomedans. It dates from at least two æras, and the original structure, General Cunningham considers, 'consisted of only two small arches,' to which two others have been subsequently added. The bridge has been altogether built with cut stones taken from other buildings, and in one place the figure of an animal, such as supports the brackets in the Atálí Masjid in Jáunpur, is inserted into the wall. A mason-mark found on one of the stones, is indisputably of the age of the Guptas. Although in a dilapidated condition, the bridge nevertheless possesses considerable strength; and its thorough repair, which is very desirable, might be effected at a comparatively small cost.

In the enclosure itself, the most noticeable object is undoubtedly the famous column with the Gupta inscription upon it. The column rests upon a roughly hewn stone, and is $28\frac{1}{2}$ feet in height. This includes the base which is 10 feet 2 inches high, of which, between five and six are below the level of the adjacent soil. It is out of the perpendicular, and the cause of this, as well as of the injury to the capital, is attributed by the inhabitants to lightning with which, they say, the pillar was struck many years ago; but it is just as probable, perhaps more so, that both results may have been effected by the Mahomedans, who, failing in their attempt to throw down the column, may have mutilated the capital, as is commonly reported they did, with cannon-shot, and destroyed the figure of a lion, which, it is with good reason conjectured, formerly crouched upon it.

In his Report to Government, Mr. Horne says:—"I laid bare the east face of the foundation, as the column slopes to the north, and

found that the base was 3 inches off the foundation-stone on the south side, (Vide woodcut in the margin); that there were two iron wedges driven under as indicated; and that at some remote period, stone-work of a massive character had been placed around to prevent further declension. I then cleared the mound away which abutted on the column, hoping to find some traces of foundations at least, of the building to which the monolith may have formed an adjunct. This mound rose from 10 to 12 feet, and extended some distance, and, as far as I could ascertain by cutting a trench and levelling, consists entirely of broken bricks and earth."



There is no doubt that during the Buddhist period in India, several temples and one or two monasteries flourished in Bhitari. In a mosque in the village, of modern erection, are thirty stone pillars, seven of them being elaborately carved. These must have been taken from buildings situated here in ancient times, for they present similar characteristics to the columns of Buddhist shrines and monasteries, of which remains are still found in Benares and elsewhere. In a small uncovered brick enclosure we discovered several old sculptures, among them a rude statue of Buddha in excellent preservation. The entire stone is 5 feet in height, but the figure measures only 2 feet 4 inches. Buddha is seated in contemplation, and is devoid of ornament; and on the palm of his hand the *chakra* symbol is engraved. He is attended by two chauri-bearers and two *kinnaras* or cherubs, and is seated on a semi-circle, below which are four diminutive figures, two representing animals, and two Buddha. The statue has the sacred corona encompassing the head, embellished on the upper part with Indian-corn and leaves, and must have been a prominent object in one of the temples formerly standing here.

Of the other sculptured stones found at this spot, we will only describe two. One of them exhibits the figure of a man seated on a prancing ram, which may possibly be intended to illustrate one of the signs of the Zodiac. The other is a small octagonal pillar in a niche, and on either side of it is an erect human figure. In the middle of the village is a well, by the mouth of which is a collection of old

stones picked up in the neighbourhood at various times. Some of these are of Buddhist, while others may be of Hindu type. Amongst them are two heads alluded to in the note, and also two very curious stones, one representing the front portion of the human skull, and the other a human hand clasping a shell. There is likewise rather a large statue of the god Ganesh, referred to by General Cunningham in his Bhitari Report. It is plainly of modern date, and is not worth even an allusion. Portions of cloister pillars, square below and octagonal above, may be here and there seen. These were manifestly first cut down and rounded by the Hindus, to serve as *lingams*, and when the Mahomedans became dominant, were then used by them as head-stones for their graves, the *chirágh* or lamp being placed on the top instead of in a small niche which it is customary to make for the same. Some of the massive stones of the mosque now used as architraves and pillars were evidently taken from ancient edifices; and it is not difficult to trace roofing stones of old cloisters in some of the stones in the pavement and in the covering stones of the graves.

General Cunningham also partially describes a remarkable stone found not far from the column, respecting which we would make a few remarks in addition to his own. His account is as follows. "There is also a large slab," he says, "with a half-size two-armed female figure, attended by another female figure holding an umbrella over her, both in very high relief. The figures in this sculpture are in the same style and in the same attitudes as those of the similar group of the Raja and his umbrella attendant on the gold coins of the Gupta Princes. This sculpture, I believe, represents a queen on her way to worship at the temple. The group is a favourite one with Hindu artists, and, as far as my observation goes, it is never used singly, but always in pairs, one on each side of the door-way of a temple. The age of this sculpture I am inclined to fix as early as the time of the Gupta kings, partly on account of the similarity of style to that of their gold coins, partly also because the pillar belongs to one of that family, but chiefly because some of the bricks found in various parts of the ruins are stamped with the name of Sri Kumâra Gupta." To this interesting information concerning this curious stone, we would add, that seven human figures are sculptured upon it in bas-relief. Of these the chief female figure or queen stands upon a

lotus blossom, and another is remarkable for being seated on the head of a non-descript animal, partly of human form and closely resembling the figure carved upon a stone of the Gángi bridge before described. The figure is decorated with a double necklace, from the centre of which hangs a large pendant, and on its back and beneath its feet runs a band of elaborate scroll-work forming the lowermost division of the sculpture and springing originally from a cherub who has a wonderful head of hair, and whose feet are like the talons of a bird. This peculiar ornamentation is perhaps the most singular feature of the entire sculpture, inasmuch as it fixes the æra of the slab, and also the religious sect from which it proceeded. On the face of the large Buddhist tower at Sarnath is a similar scroll-work connected with a similarly carved cherub. As this tower was most probably erected in the Gupta period, the conjecture of General Cunningham becomes almost a demonstrated fact, that the slab must date from the same epoch, but it is of Buddhist, and not, as he imagines, of Hindu origin, unless it be that the Hindus and Buddhists of about the same period adopted the same style of ornamentation, a supposition which although possible, it would, in the absence of proof, be very hazardous to follow.

It seems evident therefore that the ancient remains at Bhitari are both of Buddhist and of Hindu origin, though it is hard to say precisely which preceded the other. The pillar was erected by Skanda Gupta, of whom, the inscription says, "in the spirit of his own dreadful deeds," he "danced in the fierce dance," and was possessed of a clear insight into the profound wisdom of the Tantras." He was consequently a worshipper of Shiva, and was an enthusiastic admirer of the Tantric mysteries and abominations. But Kumára Gupta, (whose name General Cunningham found stamped on bricks lying about at Bhitari,) who preceded him, and was most probably his father, was certainly not a Shaiva, for in the inscription reference is made both to him and to his father, Chandra Gupta, the second, as worshippers of the "Supreme Bhagavat." It is just possible that this term may mean Vishnu; if so, they were both Vaishnavas. But it is exceedingly probable that the allusion is to Buddha, inasmuch as, one of the titles most usually ascribed to him is that of "Bhagavat." Moreover, the inscription of Chundra Gupta on one of the railings of the Great Tope at Sanchi, sets forth that a sum of money

was given by this monarch "to the followers of Dharma in the great monastery." It is difficult to believe that he would have extended his patronage to this Buddhist monastery, had he not cherished the Buddhist faith. We are strongly inclined therefore with General Cunningham to the opinion that Chandra Gupta and Kumára Gupta, father and son, were Buddhists. The ninth king of this dynasty, Buddha Gupta, corrected the rabid Hindu tendencies of his predecessor Skanda Gupta, and in his turn became a zealous disciple of Buddha. Respecting the remaining kings of this dynasty, it is not known of what creed they were; but it is not a little remarkable that Siladitiya, the great king of Malwa, who vanquished the Guptas and took possession of their vast empire, was attached to the Buddhist religion.

The conclusion, therefore, at which we arrive, is, that ancient Bhitari was alternately in the hands of Buddhist and Hindu monarchs during the Gupta period, who severally embellished it, according to their distinctive religious views. The twofold character of the discovered remains tends to the corroboration of this opinion, and we have no doubt that further research would only more fully confirm it. It is remarkable that the sculptured fragments of a shell grasped by a hand, and also of a skull, the former a symbol of Vaishnavism, and the latter of the Tantric form of Shaivism, should both have been found among the same ruins, showing that both these rival sects of Hinduism were once prevailing there. We hope that excavations on a more extended scale than has yet been attempted, may one day be carried on both within the elevated Bhitari enclosure itself and amongst the outlying mounds.

The iconoclastic zeal of the Mahomedans is too well known to need remark; and as the value of the monolith at Bhitari on account of the historical information it affords regarding the Gupta dynasty is indisputable, it is of considerable importance that the Government remove it to another place, say the Queen's College, Benares, for greater security, to which it would be an interesting architectural ornament; the more so as we have laid out an archæological garden in the grounds of that institution.

Note.—We subjoin a Lithograph, (Plate XVII.) of a very curious group found at Bhitári and supposed by us, in consequence of other similar groups at the Vishnupad at Gaya and there described as such, to be a portion of the "Nau-

graha" or nine planets. This may perhaps be the stone alluded to by General Cunningham in his Report.

We also found other very curious remains viz. 2 heads (alluded to before), a bust with head, and a sitting figure. The nationality of the parties represented we cannot determine. They are all females and the hair is drest in a very singular style, being drawn up from the face and bound with a fillet, from which depend elegant ornaments, and then gathered in a mob on the top of the head. The hair over the centre of the forehead is carefully parted, and there is a fine jewel in the centre; over the forehead and in the ears are very large heavy earrings.

Might not these be representations of noble foreign ladies, who having visited this noted spot, had vowed and erected temples, in or near to which in niches were placed their statues in memory of the founders?—Amongst the articles found by Major Kittoe at Sarnath and described by Dr. Butler, is a similar representation made in burnt clay. This head-dressing must not be confounded with that as shewn in the Bhilsa figures of ascetics, who like many of the fuqeers of the present day did not cut their hair, but gathererd it in large bunches at the sides of their heads or plaited it.

(Received 20th January, 1865.)

Since the above paper was written, I have paid another visit to Saidpur. On this occasion I examined the country to the west of the town, which I had not done previously. About three quarters of a mile from Saidpur, on the high road, is the small village of Zuhar-ganj, between which and the river is a mound regarded by the people as the remains of an old fort. Bricks are cropping out of its sides, and for some distance along the banks of the river round to the main road beyond the village, the soil is strewn with broken brick, showing that formerly buildings of this material were standing here. To the north of the road, but almost close to it, is a mound called Rám Tawakku, rising abruptly from the plain on which are also numerous fragments of broken brick. To the north, about a mile from the public road, is an immense terrace raised from 30 to 40 feet high above the surrounding country. Its length is 420 paces, and its breadth 190. The terrace is thickly covered with broken brick, and at one corner there are likewise fragments of stone. This enormous

mound is of an irregular shape. There is little doubt that extensive buildings lie buried here, which, judging from the quantity of brick rubbish found above, are for the most part probably of this material. The people say, that the habitations formerly situated on this spot, fell in; hence, in their estimation, the origin of the mound. Close by, are two other tumuli, and further off are apparently others. Were these mounds, especially the largest, to be excavated, I feel satisfied that the result would amply repay the labour and expense bestowed on the undertaking.

About half a mile beyond Zuharganj, a few steps from the road, is a stone *chabutra* or platform, on which are two figures, one representing the Boar Incarnation, and the other Krishna with his milk-maids. Both are old and in excellent preservation. The ornamentation of the stone representing the former figure, is curious. The carving exhibits a pilaster in bas-relief exceedingly similar in detail to the shrine pillars of Bakariya Kund, Benares, which, strange to say, are undoubtedly of Buddhist origin, while this pilaster belonging to an incarnation of Vishnu is of Hindu origin. Around the base of a tree standing a few steps off, is an assemblage of mutilated sculptures of ancient date. They are not worshipped by the Hindus. I brought away several heads, and a fragment of a seated figure with a short inscription in front. M. A. S.

On stone from a Photograph by H. H. Fraze[illegible]

[illegible] H. M[illegible]s [illegible]utta Aug[t] 1865.

FROM BHILSARE[illegible]

Supposed to be a [illegible] Pāṇḍavs and the [illegible]

Note on the Pronunciation of the Tibetan Language.—*By the Rev.* H. A. Jaeschke *of Kyèlang.*

[Received 1st February 1865. Read 1st February, 1865.]

The Tibetan language is known to possess a very rich literature, though the smaller part of it is original, most of the Tibetan works being translations from the Buddhistic part of the Sanscrit literature. The whole is not of an older date than the 7th century, as that king of Tibet who despatched one of his ministers to India, in order to learn Sanscrit and create an alphabet for the Tibetan language, was a contemporary of Mohammad. It is incredible, of course, that he should have loaded his writings with a great many superfluous signs, especially when his only pattern was the Sanscrit, with its perfect accommodation of the sign to the sound. On the contrary, he is likely to have expressed in writing, with a few exceptions perhaps, every sound of the language, as it was pronounced at his time. At present, however, the Tibetan mode of spelling differs nearly as much from the actual pronunciation in the greater part of the country as in the English, or rather in the French language, for the discrepancy mostly rests in the consonants, many of which have changed in certain cases their original sounds, or are dropped in speaking, though they are, considered etymologically, essential elements of a word, and therefore appear in writing, in a proportion similar to such French words as: ils parlent; qu'est cela &c., *e. g.* bkrashis, pronounced tashí. In French, the cause and history of this discrepancy is clear, as we know the Latin mother as well as the Gallic child, and possess specimens from all ages, by which we can trace the gradual changes. In Tibetan, nothing of the kind exists, or at least very little has yet been discovered; nor is there much reason for hoping that in their own literature anything has been preserved that might throw light on the history of the language, since the grammatical as well as the historical powers of the Tibetan mind seem to be developed to a very small degree, and the ancient orthography has been, with few exceptions, scrupulously left unchanged, since its invention 1200 years ago. Csoma de Körös and other grammarians, especially Cunningham

in his work on Ladak, mention some dialectical differences in the pronunciation of various districts, which in some instances agree more accurately with the way of spelling, and the latter states that the more learned Lamas, but these only, pronounce distinctly, though rapidly, the initial letters which are usually silent. But a closer inquisition shows the interesting fact, that in the most western extremity of Tibet in the province of Purig and the northernmost part of Ladak, nearly all the consonants and the ancient pronunciation of the language, as it was at the period of the invention of the alphabet, has been preserved by *the illiterate*, not by a few learned Lamas only, in the case of whom we could not be sure whether their accommodation to the ancient spelling were not merely artificial—a capricious imitation of what they are trained to revere as the dialect of their sacred writings. Let me mention some instances. The letters here in question are more especially those compound consonants, consisting of two or three elements, which are in Tibetan, as in many cases in Sanscrit also, denoted in writing by putting the following consonant *below* the preceding one. Now *e. g.* the letter *s* as initial, with a following *k*, *t*, &c. is spoken distinctly in Ladak, as in *skad*, language; *stan*, mat; *skarma*, star; *l* in the same case is pronounced even in Lahoul, *e. g. ltawa*, to look at; *lchangma*, willow; *r* in the same case, in no instance in Lahoul, but in many in Ladak, *e. g. rdowa*, the stone, and in still more, perhaps in every word where it appears in writing, in Purig, *e. g. rgyalwa*, victorious, or more commonly, good, excellent, which is pronounced by Ladakees, and I think everywhere else in Tibet: *gyalla;* and so are words as: *rdzogs*, *rdza*, *rdzun*, &c In a similar way a villager of Purig will call a knife, *gri;* washing, *khruwa;* rice, *bras;* child, *phrugu;* whereas even in Ladak these four words are heard like *dri*, *thruwa*, *dras*, *thrugu*, in Lahoul and more to the East like *di*, *tuwa*, *dai* or *de*, *tugu*, with little or nothing of the innate *r*, and the *p* and *k* sounds changed into *t* sounds with a more or less lingual pronunciation. Again: those connected with what would be spelled *y* in English are pronounced according to their spelling only in Purig and Balti in all cases, *e. g. byang*, north; *phyag*, hand (in respectful language); *phyugpo*, rich; these are spoken like *jang*, *chhag*, *chhugpa* already in the southeastern part of Ladak, and in Lahoul; whereas in the case of the *k* sounds,

in words like *khyi*, the dog, *gyelwa*, to fall down, *Kye-lang*, the name of the village in Lahoul where the Moravian Mission is established, the correct pronunciation has been preserved even in that province, and *chhi* instead of *khyi* is only used by still more Eastern Tibetans. Upon the whole, it may be said that, if not perfectly, still to a certain degree, the different changes which the pronunciation of the language has undergone in the course of upwards of one thousand years, may be traceable even at the present day in the different districts of Tibet from Purig and Balti in the west to the capital town of Lhasa near the Chinese frontier, where the deviation, or we may justly say, the degeneration has reached its highest pitch, in introducing assimilations, dissolving certain consonants nearly into vowels, dropping others entirely, confounding two or three cognate sounds into one intermediate, and mingling the short vowels with one another. Assimilations as in the Latin *compono* instead of *con-pono*, are unheard of in the written Tibetan language, as also in the spoken dialect of the western provinces; the word *gompa* will in Purig mean nothing but a step; a different idea, that of custom, practice, which the Lahoulee will include, being connected with the spelling: *gomspa* or *sgompa*. In the pronunciation of Lhasa two more, *gonpa* to dress, to put on, and *gonpa*, monastery, are mixed up with the two former, by means of assimilation of the *n*. Again: *s* in the end of a syllable is pronounced in Purig and Ladak, but dropped in most other districts, not without a prolonging or changing influence on the preceding vowel. Thus the word *chhos*, religion, law, (*dharma* in Sanscr.) is pronounced *chhŏs* in Ladak, *chhoi* in Lahoul, *chhō* in upper Kunawur, *chhŏ* in Lhasa; *d* and *g*, in the end of a syllable, are melted into semivowels or nearly liquid consonants in a similar way as in Danish (though not exactly the same): *skad*, the language, loses its *s* even in Southern Ladak, but in Lhasa it is mutilated into *kĕ'*; *smad*, the nether part, into *mĕ'*; *Bod*, proper name of Tibet, the Bhota of Sans., into *Bŏ'*; *lchags*, iron, into *chă'*, scarcely different in pronunciation from *ja*, tea; *sringmo*, sister, is pronounced *shringmo* in west Tibet, *singmo* or nearly *simo* in Lhasa; *sa* and *za*, *shi* and *zhi* (the latter like *ji* when pronounced as in French,) which are as accurately distinguished by every Lahoulee or Ladakee, as *s* in seal and *z* in zeal, are confounded in Lhasa.

But all this would leave the linguist hopeless as to the question of the historical periods *when* these changes took place, as it only adds the *â posteriori* proof, *that* the pronunciation has once agreed with the spelling, to the *â priori* conclusion which everybody may infer from the mere fact of the present discrepancy. A step towards the solution of this question may perhaps be possible by the study of the languages of some frontier districts. An instance of peculiar interest in this respect is found in the Boo-nan language, spoken in a small district of Lahoul, and in part of Kunawur, where it is called Tibar-skad, Tibar-language. It is the familiar tongue of the Lahoul villages in the Bhaga valley, just above the junction of the Bhaga and Chundra rivers, over an extent of about 10 miles on both sides, whereas Tibetan is understood and spoken fluently enough in intercourse with genuine Tibetans by the adult men, but more or less imperfectly by women and children, and many Tibetan words, very common in books, and generally known in Ladak, are not understood by any one in this district. The fact of this language existing in two different provinces, like two islands separated from each other by the pure Tibetan population of Spiti and the pure Hindu nationality of Kooloo, renders the theory of a wider diffusion, of the Tibarskad language in former times probable, and agrees with the assertion of the Lahoul people, that even within the remembrance of the present generation, its district was greater that it is now, and has been more and more encroached upon by the Tibetan. Now in this language a great many Tibetan words are to be met with, which may have induced General Cunningham to class this Tibarskad under the head of dialects of the Tibetan; but I think the great difference of the grammatical structure of both languages (the Boo-nan being at least as elaborate as the Hindi, the Tibetan nearly devoid of inflections at all) and even a closer examina- of the lexical stock of the language, must lead to a different opinion. Nearly all the words of primary necessity (an inference against which Latham objects, I do not see exactly with how much reason), and many others are not borrowed from the Tibetan, any more than from Sanscrit, but have an original character. Here is a small list of words all of which seem to be original, or at least I know not from what other language they might be derived.

Kati, scissors.
Kirti, basket.
Kutulu, bag.
Kundrang, tub, basin.
Kumtsi, bow, for shooting.
Kurkutrig, ant.
Kyugs, ashes.
Koang gul kwang gul, neck (*gul* is Tib.)
Koar, *kwar*, jug, jar.
Khu, smoke.
Khudrub, fist.
Khug, meal of roasted barley.
Khur, knife.
Khul, bag.
Khoartum, *khwartum*, egg.
Khoa, *khwa*, raven.
Gara, donkey.
Gogs, spittle.
Gyugs, dust.
Gyum, house.
Gyen, spring (as a season).
Gram, stone.
Gring, beam, timber.
Goanu, *gwanu*, fox.
Chatram, sickle.
Chi, grass.
Nyugtsi, monkey.*
Tigs, cover, lid, cork.
Thagadrang, spark.
Thigi, leather bag, purse.
Thopo, drinking cup.
Dan, belly.
Diptsi, top.
Diskar, thirst.
Debu, snake.
Deg, leather.
Deska, lie, falsehood.
Dompa, blacksmith.
Pug, roasted grains.
Peltsi, milk.
Phos, garment, dress.
Phyutsi, hole.
Ba, wall.
Bang, foot, leg.
Bitang, door.
Bitsi, thread.
Bed, younger brother.
Betse, twin.
Botri, buttermilk.
Botsi, finger.
Byanja, can, pot.
Byenmo, wife.
Byerbu, trowsers.
Byutsi, mouse, rat.
Mashung, wife.
Mir, fat (melted).
Mu, snow.
Mutsa, mustachio.
Me, *labs*, flame.
Me, *lum*, fire-place.
(*Me*, is Tib. and means fire.)
Tsitsi, child.
Tsemed, daughter; girl.
Tsam, wool.
Tsog, thornbush.
Watsi, clue (of woolthread).
Wal, shovel.
Wampu, yellow bear (the only bear occurring in Lahoul.)

* Monkies are not in Lahoul; in the Koonawur Tibarskad, Cunningham mentions only the terms *gonas* and *brandras*: What may the origin of *nyugtsi* be?

Zad, barley.
Yushi, meal, flour.
Rangtsi, sleeve.
Rig, field.
Rindri, lead (plumbum).
Rētsi, ear.
Roang, *rwang*, hill, mountain.
La, goat; rock, cliff.
Lama, sheep.
Lala, song.
Lang, dung.
Lan, wind.
Lab, leaf.
Las, price.
Lis, ice.
Len, work, action.
Lo, carpet.
Lha, moon.
Lha Kham, month.
Lhe, tongue.
Lhegs, villager; community.
Shag, birch-tree.
Sharpa, youth, boy.
Shirti, rain.
Shirped, broom.
Shu, blood.
Shugtsi, comb.
Shel, summer.
Shosha, heart.
Shrag, shame.
Shrangs, horse, pony.
Shrig, louse (Tib. *shig*.)
Shrim, arrow.
Shoantsi, *shwantsi*, dove.
Sazha, hukka.
Sagsa, grasshopper.
Sanpa, meat, eatables.
Sibi, flute, pipe.
Sēshi, friend, acquaintance.
Soti, water.
Skyugtrong, breast.
Sta, vein; artery.
Stagorwa, neck.
Smutig, flea.
Awa, father.
Ag, mouth.
Amphang, carrot.
Antsi, road.
Kyuï, long.
Khaï, black.
Khyeï, sweet.
Khyoï, dry.
Gadgad, rough.
Golweï, blind.
Grangi, *grañi*.*
Ngaï, straight.
Chung gor, deep.
Chuïni, few.
Chheï, warm.
Chhoï, fat, well-fed.
Nyeme, nice (to the taste).
Taï, being, having, possessing, rich.
Tingi, blue.
Tunig, short.
Thi, wet, thin (in case of liquids).
Damshi, pure, clean, fine.
Dezi, great.
Nuï, new.
Noï, much, many.

* It is not *ng* in sing, but the nasalised vowel as in the Hindustani meṉ, meñ.

Pari, broad.
Punji, hot, pungent.
Pētsētsi, little, small.
Phreï, rough.
Byaï, thin (of cloth, paper &c.).
Mangi, red.
Wus, moist.
Zhili, bright (opp. dark).
Yuï, old (as clothes and other things).
Laï, thin, fine (as thread &c.).
Loï, easy.
Lheï, yellow.
Shangtre, old (as men &c.).
Shi, white.
Shiri, rough.
Shuri, sour.
Sil sil, smooth.
Soï, cold.
Ebbo, good.
Gyi, I.
Han, thou.
Dal, he, she, it.
Hingtsore, we.
Hantsore, you.
Daltsore, they.
Tsore, all.
Thazu, this.
Thĕ, that.
Gyo, which } interj.
Kha, what }
Tiki, one.
Bi, four.
Kachum, to turn.
Kunchum, to look at.
Kugchum, to arrest.
Kyichum, to wash.
Kyulchum, to rob.
Kyormen, to discharge (an arrow).
Khugchum, to find.
Khyuchum, to cover.
Galchum, to liberate.
Gyagsmen, to listen.
Gyarchum, to fear, be afraid of.
Grechum, to bite.
Goalchum gwalchum, to hang up.
Chāchum, to smear, paint.
Chūchum, to press, squeeze.
Chhingchum, to rob.
Chhilchum, to select.
Chhurchum, to squeeze out.
Chhuĭnchum, to bind, fasten.
Tigchum, to cover.
Tidmen, to irrigate.
Toamen, twamen, to mow, cut grass.
Toanchum, twanchum, to borrow (money).
Thugchum, to break.
Thĭchum, to melt.
Thirchum, to send (a man).
Thogchum, to put off (a coat).
De, is.
Dodmen, to meet.
Ni, is.
Niza, was.
Panchum, to fly.
Pinchum, to fill.
Punchum, to grow.
Phanchum, to sew.
Phochum, to put on (clothes).
Phyamen, to speak.
Bruchum, to wipe.
Tsagchum, to put in.
Tsabchum, to cleave.

Zhedmen, to sit.
Yagsmen, to arise, come into existence.
Yen, is.
Richum, to bring.
Rochum, to roast.
Ligchum, to do, make.
Lochum, to say.
Shanchum, to rise.
Smyadchum, to touch.
Hirchum, to fall.
Helchum, to carry away.
Hyugschum, to throw.
Hoangsmen, *hwangsmen*, to go out, come out, flow out, &c.
Hoanchum, *hwanchum*, to take out, bring out, draw out, &c.
Alchum, to take away.
Elmen, to go.
Tha, not (in prohibitive and narrating sentences.)
Thazung, *tharang*, there.
Thang, to-day.
Thing, *thiṉ*, (nasal) here.
Thindzug, thus.
Thong, therein, within.
Nung, there.
Hya, yesterday.
Ire, again.
Odchi, to-morrow.
Chi, from.
Mang, in (-meñ Hind. ?)

The great multitude of Tibetan words, however, which are adopted in the Boo-nan language can be divided into two classes: 1, those in which the present Boo-nan pronunciation agrees with the Tibetan *spelling*, i. e. the *ancient* Tibetan pronunciation, though this pronunciation is not preserved in the Tibetan of Lahoul itself, in many cases not even in Ladak, perhaps in some instances not anywhere else. The Boo-nan people themselves, whenever they speak Tibetan, use the modern pronunciation according to the custom of Lahoul, which often widely differs from the written letters.

2. Those words in which the Boo-nan pronunciation agrees with the *modern* Tibetan.

To No. 1 belong:

Kres, hunger, in modern Lahoulee, Tibetan unknown.
Khams, appetite, ... kham.
Khral, tax, ... ṭhal.
Khrutsi, arm (elbow,) ..... (vacat.)
Khruï, cubit, (ib.)..... ṭhu.
Khaspa, wise, skilful, ... khaipa.
Gyogspa, quick,..... gyogpa.
Grampa, cheek,..... ḍampa.
Grogpo, river,..... ḍogpo.

Ngospo, truth (in Tib. thing, reality,) ..... ngoipo.
Chespa, dear, cherished, ... chepa.
Snyingrus, industry, in Tib. courage, ... nyingru.
Snyema, ear (of corn,) ..... nyema.
Dus, time, ... dui.
Stan, carpet, ... tan.
Stong, thousand, ... tong.
Spu, hair, ... pu.
Ugs, breath, ... ug, u.
Phyagphulchum, to make reverence, adore, ... chhagpulwa.
Phyugpo, rich, ... chhugpa.
Brawobrao, buckwheat, ... ḍawo.
Brag, rock, cliff, ... ḍag.
Brangsa, dwelling-place, habitation, ... ḍangsa.
Brichum, to write, ... ḍiwa.
Myangchum, to state, ... nyangwa.
Zugs, body, ... zug.
Yas, right (not left,) ..... yai.
Ras, cotton cloth, ... rai.
Rigs, kind, sort, ... rig.
Ruspa, bone, ... ruipa.
Sman, medicine, ... man.

To No. 2.

Ṭam, cabbage, Tib. literally; kram.
Kad, language, lit. skad.
Karma, star, lit. skarma.
Ṭhim, judgment jurisdiction, lit. khrims.
Ḍu, corner; ship, lit. gru.
Ḍoi, counsel, advice, lit. gros.
Nyingzhe, compassion, benevolence, lit. snyingzhe.
Tontog, harvest, lit. stontog.
Jungwa, element, lit. byungwa.
Chodpa, behaviour, lit. spyodpa.
Digpa, sin, lit. sdigpa.
Lobma, pupil, *lobpon* teacher, lit. slobma and slobdpon.

This would seem to indicate two different influxes of Tibetan words and ideas, one at a very early period, the other much later,—so many

centuries after the invention of the alphabet, that the pronunciation was already altered to that of the present day. It is not impossible that a more complete dictionary of this language in both its dialects, that of Kunawar and that of Lahoul, and perhaps also of other unwritten Himalayan dialects and languages, situated as they are between the great Tibetan and Indian families, might afford more than one interesting result with regard to the history of the Tibetan language and the histories of the people of these countries, in their political situations as well in their civilisation. If such investigations happened to be aided by the discovery of local records of such a kind as formed the history of Sikkim, destroyed by the Nepalese soldiery (v. Hooker's Him. Journ. I. p. 331) it might be possible to clear up parts of the history of these countries hitherto very obscure.

It would seem to me as if the collection of words given above, might suggest the conjecture that the first of the two irruptions of Tibetan power and influence into these valleys, inhabited by Boonan-speaking mountaineers, was merely of a political nature, carrying with it such institutions as *taxes*, very probably the first thing which the small population of a secluded valley is likely to be taught by a foreign invader,—some new articles of manufacture (cotton cloth, carpets, &c.), words for the higher numerals, and some others; whereas the second,—perhaps going on in a more quiet and slow way,—brought with it judicial and governmental institutions of a somewhat higher order, and the religious and philosophical ideas as well as usages of Buddhism.

Notes on the Gurjat State of Patna.—*By Major* H. B. Impey, *Deputy Commissioner of Sumbulpore.*

[Received 18th October, 1864.]

The following sketch of the history of the Gurjat state of Patna is founded upon the records, genealogical trees, and traditions maintained by successive Rajáhs. Although there may be errors in the calculation of periods, and mistakes in the incidence of events, yet, considering how all natives of pretension or position strive to keep up a remembrance of their ancestors through the services of Brahmins, and how strictly they themselves cherish the links of private history (as for instance, the custom of the Hindus to religiously pronounce the names of their preceding generations, while engaged in their ablutions,) it may be assumed that such records and links, when adjusted by their circumstantial data, as in this case, will generally form a pretty correct chain of evidence in respect to main facts.

Origin of the Mahárajáhs.—The Mahárajáhs of Patna claim direct descent from a race of Rajpoot Rajahs of Gurh Sumbul, near Mynpooree, and count back the individuals of this race for 32 generations.

Foundation of one state, Patna, from a cluster of eight Gurhs.—It is narrated that these Rajahs used to be in constant attendance at the Court of Delhi till the last named Hutumber Singh having intrigued and run off with one of the king's daughters, was pursued and killed, and his family forced to fly. Amongst the wives of this Rajah was one who, escaping, arrived enciente, in Patna, and found refuge with the chief of Khobagurh, being one of eight gurhs,* which at that time, alone formed the territories of Patna, being comprised within the three rivers Ung, Mahanuddy, and Sel, and bounded on the west by Khurriar, (a possession then of Jaypoor), and Bindanawagurh and the chiefs of which took it in turns, a day at a time, to

* 1 Patna.
2 Salabhata.
3 Kongaon.
4 Jhorasinga.
5 Sindeehala.
6 Kolagurh.
7 Gooragurh.
8 Boomnagurh.

exercise full authority, as Rajah over the whole. She was placed in charge of the said Chief's Brahmin at Ramoor, and there gave birth to a boy named Raman Deo. The Chief adopted the boy, and subsequently, on his coming of age, himself being sick and weary of rule, resigned his position to him, Raman Deo soon after this succeeded in murdering the other seven Chiefs, and usurping to himself the whole and permanent authority in Patna. Finally he married a daughter of the Ruler of Orissa, through whose influence and power, he was enabled to maintain his usurped position.

Extension of territory and dominion to the right bank of the Mahanuddy.—It would appear that during the time of Raman Deo and the two succeeding Maharajahs the territories and dominion of Patna became extended beyond the Ung river to the right bank of the Mahanuddy: embracing—

1st. Patna Proper, as now, but with the addition to the west, of three gurhs, viz. Kholagurh, Goorhagurh and Koomragurh at present included in the Gurjat state of Khurriar and of 12 villages known then as "Baragam," afterwards as "Borasambeer," and subsequently detached as portion of the Gurjat State of that name, and to the east in continuation between the rivers Ung and Sel to the Mahanuddy.

2nd. As annexed to Patna Proper, all the land embraced within the Ung and Mahanuddy rivers, and bounded on the west by Phooljur and Sarumgur, which now comprises the southern portion of Sumbulpore and part of Sonepore.

As Tributary dependencies the Gond Gurjat States of Brindanawagurh,* Phooljhur† and Sarungurh.‡

The lands and estates lying contiguous to the left bank of the Mananuddy were, it is believed, at that time attached to Sirgooja, with the exception of the North Western portion of the present Sumbulpore district known as Chundurpore and Bhortia which belonged to Ruttunpoor.

Subjugation of States and acquisition of territory on left bank of the Mahanuddy.—The fourth Maharajah, Puthee Singh Deo, subjugated and made tributary to Patna, the three dependencies of Sirgooja, named Bamall, Gangpoor and Bamra, and annexed to Patna itself, by dispossession from the Rajah of Bamra, the zemindaree of Rehracole,

* 3rd. † 4th. ‡ 5th.

and so much of the lands (now) of Sumbulpore on the left bank of the Mahanuddy, as were contained between Rehraeole and Bamra to the east, Bamra and Gangpoor to the north, and to the west by the river Eebe to its sudden bend westward, and from thence by a line running south, to the spot at the extremity of the present city of Sumbulpore where now the Jail Bridge stands.

Erection of a Fort in Phooljur.—Maharajah Bikrumdit Deo, the ninth Rajah of Patna, erected a Fort in Phooljur at Seespalgurh, where its remains are said to be still traceable: a proof this of the unflinching authority then exercised over the Gurját states.

Acquisition of the "Gurh" of Chundurpoor.—It is probable that the erection of this advanced post in a Tributary State had for its aim, as much the extension of dominion, as the maintenance in security of existing dominancy: for no sooner did the next ruler, Maharajah Baijul Deo 2nd, succeed to the Guddee, than he advanced to Chundurpoor, and forcibly dispossessed the ruler of Ruttunpoor of that "Gurh" with its surrounding lands.

There still remained, to complete the circle known afterwards as the "28 Gurhs:"

1st. The three Northern Gurjat states of Raigurh, Burgurh and Suktee, (dependencies of Sirgooja); 2ndly, the central tract of land (now an integral portion of the Sumbulpore district,) falling between the Eebe and the line drawn therefrom, as before observed to the present Sumbulpore Jail Bridge, and the Gurjat State of Sarungurh, (also belonging to Sirgooja,) and lastly the two eastern Gurjat States of Boad and Atmullriek.

It never fell to the lot of Patna itself to include these remaining States and lands within the scope of its authority or possession. The completion of the circle was not effected till Patna had retired from the banks of the Mahanuddy, so far as the mouth of the Ung river near Binka, and a new state had sprung up under its auspices (on the north of the Ung,) afterwards known as Sumbulpore. It might therefore seem foreign to the object of these "Notes" as touching Patna, to speak of the rise and power of this second State. Nevertheless the advance of the latter was so intimately connected with, and so immediately the result of, the dominion of the former, and again the decline of the former so direct an issue of the rise of the

latter, that it is necessary to trace the history of the extension of power across the Mahanuddy in so far as the grouping of the once known "18 Gurhs" shall be concerned.

Relinquishment by the Rajah of Patna of territory and dominion on the left bank of the Ung River.—Nursing Deo, the 12th Maharajah of Patna, and his brother Bulram Deo quarrelling, the former made over absolutely to the latter, (probably on compulsion,) all such portions of his territories as lay north of the river Ung: the engagement between the two brothers being that each was to be perfectly independent of the other. Bulram Deo, taking possession of his allotment, erected a fort on the right bank of the Mahanuddy, exactly opposite the present city of Sumbulpore at Chowunpore, (where to this day the traces of his fort are visible,) and adopted the title of Rajah of Chowunpore. Shortly after this, he dispossessed Sirgooja of the dependencies of Suktee, Raigurh and Burgurh, and of the remaining portion, as before noticed, of Sumbulpore, and finally included Boad and Atmullick, (now Gurjat States of Cuttack,) among the number of his territory mehals. After this, he abandoned the Fort of Chowunpore, and crossing the river, erected a mud fort on the opposite bank. To this, he gave the name of Sumbulpore, from the number of Seemul trees that existed there on its site. Then changing his own title to that of Maharajah of Sumbulpore, he founded a dominion which soon took the real ascendancy over the parent State of Patna.

The two states of Patna and Sumbulpore were now distinct, and the area of the "28 gurhs" was now fully embraced. But as yet this number of Gurjat States with independent chiefs, tributary to the two paramount rulers of Patna and Sumbulpore, were not fully formed.

Enumeration of the 15 *Gurhs of the Sumbulpore and Patna group.*—The then existing tributary Gurjat States attached to Sumbulpore were Phooljur, Sarungurh, Suktee, Raigurh, Burgurh, Burmarr, Gangpoor, Bamra, Boad, Atmullick, and, by admission of the Sumbulpore Maharajah, Rehracole: to these may be added Chundurpore, retained by the Maharajah under his own immediate authority. In Patna, the only dependency was Bindanawagurh. The total therefore of the "18 gurhs" or Gurjat States, during the time of Nursing

Deo and Bulram Deo, Maharajahs respectively, of Sumbulpore and Patna, was 15, wanting to complete were Sonepore in the one case, and Khurriar and Borasamber in the other.

Formation of the 8 remaining Gurjat States.—The necessity of providing for younger sons, caused the alienation from the parent states of Sonepore and Khurriar. Thus Sonepore, as far as the left of the river Ung, (the land on the right to the Sel river, still, as before noted, belonging to Patna,) its chief town being Binka, was constituted an independent tributary Gurjat State by the 4th Rajah of Sumbulpore, who made it over with the title of Rajah to his 2nd son Muddun Gopaul. And again the 15th Maharajah of Patna giving over three "gurhs" of the original eight of Patna, viz., Kholagurh, Goorhagurh, and Boomragurh, to his younger son Gopaul Roy, and the latter obtaining Khurriar as a dowry on his marriage with a daughter of the Rajah of Jaipore, those gurhs merged into Khurriar and the whole was constituted one Gurjat state with the title of Rajah.

The last created Gurjat was Borasambur the present chief of which owes his position to the cunning and power of an ancestor. Originally Borasambur consisted of eight villages, which went by the name of "Atgoan," and formed a small zemindaree, part of the integral state of Patna. It is stated that one of the zemindars of "Atgoan" having saved the life of a Sambur deer by killing a "bora" or boa-constrictor which had attacked it, the name of the zemindaree was changed to Borasambur. Notwithstanding the smallness originally of the area of the zemindaree, the proprietor was a man of some importance, he was chief of his caste-men, Bhinjwals—and, on the occasion of a new Maharajah being raised to the Guddee, it was his especial duty to take the latter on his lap and fold over his head the turban of state. Again, the zemindar held an important position: his lands were situated alone on the north side of the range of hills called Goondmardhum, which form part of the northern boundary of Patna, and thus he could hold the approaches through those hills to Patna for or against any hostile forces. It would appear that during the first inroads of the Mahrattas, the zemindar of Borasambur was successful in guarding these approaches. For this service he was granted an extension of property on the Patna side. What

of its power, the control of its three tributary states,* and thus finally fell into a smaller circle of power and property than that which it embraced when some 600 years before (dating from the usurpation of Raman Deo) it had first sprung into powerful existence.

Such then is the history of the extension and contraction of the territories and dominion of Patna. Like as at its first sacrifice of ground, and of prospect of further advancement, was owing to family dissension, so also was the final loss of the last tract of its former acquisitions caused by family dissensions. In the one instance, however, it was left with the substance of conquest, and the opportunities from arrested ambition of employing such to the development of its own reserved dominions. But in the other, it was brought ultimately to entire ruin. A glance at the present features of the country of Patna and a brief review of the dissensions that occurred during the time of Raee Singh Deo, and of their results, will serve to explain these last assertions.

Description of the present area of Patna.—It is calculated that the present territories of Patna contain 5,000 square miles. Although they are dotted at distant intervals with a few small hills, yet it may be stated that they compose a plateau of undulating surface so peculiarly favourable for the cultivation of rice, the pulses, oil seeds and sugar-cane. There are certainly besides the few scattered hills, interruptions also of gravelly or rocky rises covered with jungle and a few forest trees. But making allowance for the deduction of these from the general area, there remains a vast expanse of culturable land, the soil of which is of a good description.

Present condition of the area and indications of past prosperity.—Tracts of scrubby jungle have usurped the sites of former fields, and wild beasts now hold dominion where once stood the habitations of men. The Gurh of Patna is now the centre of such a jungle, radiating 10 coss or say 20 miles in every direction. Close around the "Gurh," at distances varying from one or two miles, are about 100 tanks, and in the surrounding jungle beyond these, at intervals of four or six miles, are said to be the remains of other tanks, with traces of villages marked, not only by the general certain evidence of planted

* 1. Brindanawagurh.
2. Khurriar.
3. Borasambur.

trees, such as the mangoe, but also by the unmistakeable proof of old broken tiles and brick foundations of houses and temples. Nor is it alone immediately around the "gurh" of Patna, that signs of former welfare and former energetic rule are to be found. Turning to the southern position of the state in the Kondhan zemindarees of Lowa and Topa, at Jhoorwace in Lowa, at Titoola and Oodeypoor in Topa, are numerous ruins of solid buildings, of from one to three stories high, and generally through the Kondhan lands are the walls of neglected temples at distances of two or four miles apart. Moreover to prove in some measure the earnestness which formerly existed for developing the country, and the respect which is still held for the race of its once energetic rulers, it is to be remarked that the Khonds of the oldest Khond settlement at Saintula claim to have been brought to Patna from Jeypore by Raman Deo, and pride themselves in being still loyal and Khalsa subjects of his descendants. Further indications of decayed prosperity and past enterprise might be adduced and not least, this, the minute respectability and intelligence of some of the Zemindars and Gountiahs of old families; but enough perhaps has been noticed to prove that there is just ground for the boast of the Patna people that their country was once thickly populated and flourishing to such an extent, that even rich merchants were numbered in it up to the time when anarchy at first, and the depredations of the Mahrattas afterwards, compelled them to depart—till the occurrence of these events, which now remain to be noticed, it is believed, then, that the attention of the rulers of Patna, 20 in succession, was given to the welfare and prosperity of their country and subjects.

Cause of decline of power and prosperity.—Hindur Shah Deo, the 20th Maharajah of Patna, died, leaving two young sons, the eldest named Race Singh Deo under the guardianship of his younger brother, their uncle, Buckraj Singh. This uncle, in view to the usurpation of the Guddee, murdered the mother of the two boys and intended also to kill the latter. But he was frustrated in this intention. For the boys were carried off in security to Phooljur by their maternal uncle, and there brought up. Race Singh Deo, on coming to age, sought assistance from Nagpore, and, procuring a force of Mahrattas, proceeded to regain his rights. He attacked and killed his uncle, and thus obtained possession of his estate. But, however much this was beneficial to

himself, and pleasing perhaps to a portion of his subjects, still the country paid heavily at the time for his restoration. While party spirit and enmity having now been excited, it was to be expected that, an occasion offering, conflicting interests might again stir them to a blaze; and again, the plains of Patna having now been opened out to the view of the Mahrattas, it might be regarded as certain that their greed would spend itself on the first opportunity of home dissensions in depredatory incursions. And this prospect was indeed brought to issue as follows. Raee Singh retained his position for many years, but during this period the roused spirit of discontent and rebellion was spreading through the land, till ultimately it was brought to burst upon the unfortunate Maharajah, then nearly 80 years old, by the intrigues of his second wife. The story is, that he had three wives, no offspring by the first, two boys by the second, and one son, the eldest of all, by the third. The second wife was fearful that the eldest son by the third Ranee would, as being his father's favourite, succeed to the Guddee, unless during the Maharajah's life she should take steps to prevent it. The measures she took for prevention were the exciting a general rebellion which resulted as before noted, in the flight of the Maharajah Raee Singh Deo to Sonepore. The Maharajah, however, frustrated the design of his second wife; for he took her with him to Patna, along with his grandson by his eldest born; and on his death three years afterwards, appointed him his successor by putting the regular Pugree on his head. During these three years, the whole of Patna was in a state of perfect anarchy. The Ranees at Patna were quarrelling for dominion, and their partizans were pillaging the country indiscriminately around. Life and property were nowhere secure. All respectable persons fled to Sonepore and were followed by numbers of the general population. On the death of the old Rajah the people acknowledged his appointed successor, who then returned to Patna. He was, however, but a youth and found none to advise or assist him, except such as had shared in the outrages of the interregnum. Even his father, dismayed at the state of general disturbance and disappointed at the preference given to his son, retired on a pilgrimage to Allahabad and there died. The young Maharajah, Prithee Singh Deo lived only three years after succeeding to the Guddee. The next ruler was Ramchundur Deo, the captive of the

Mahrattas, who now had completely overrun and spoliated the country already so unhappily ripe for spoliation.

It was scarcely to be expected that after an anarchy of three years and a total disruption of order under the force of subsequent events that the Zemindars of the frontier, who had been so long revelling in wild independency, would soon be brought back into proper subjection, especially when the power by entire loss of resources of the succeeding Maharajah (father to the present one) was almost utterly paralyzed. Still less could it be supposed that within the short space of the reign of that one Maharajah, the vacuum in the population would be filled up. Yet it is satisfactory to be able to state that a move towards a clearance of the jungle, and an extension of cultivation is certainly being made, and that out of 22 Zemindars four only are complained of, and of these four, only one is rebellious.

Literary Intelligence.

The following is an extract from a letter from Major Pearse, on certain Buddhist antiquities of the Hazara valley.

"In reading the Proceedings of your Society, No. 4 of 1861, page 413, I was much interested by the description of a small crystal figure of a duck found in one of the topes or Stupas near Shah ke Dehri.

"It reminds me that there is one object I obtained from a tope of Shah ke Dehri, of which I should have published the account in our Journal long ago, but I never did so. It may be interesting still at this distant date to do so.

"In January 1850, Major Jas. Abbott, Deputy Commissioner of Hazara, was absent from that district on duty in which I had just arrived. A zumeendar brought me for sale either an emerald, or a green piece of glass or crystal about 2 inches in oblong length, $1\frac{1}{4}$ inches broad, and $\frac{3}{4}$ of an inch thick; the centre of this emerald was scooped out and in it was inserted a small gold casket, and in the casket I found a small piece of bone, which I believe, from subsequent enquiries, to be the bone of the smallest joint of the smallest finger. The goldsmiths of the country all pronounced the ornament to be an emerald. If it was so, it was of a bad pale colour with a

great quantity of flaws. I had intended it for presentation to the British Museum. But the fame of the jewel was so hinted about, that my own Sikh Guard coalesced and carried off the box in which the relic was. The theft was proved, the culprits were all punished, and everything was recovered, but the one great thing, notwithstanding that Major Abbott and myself offered very large rewards for its recovery.

"You may be aware that whilst in Hazara, I greatly amused myself in excavating topes, and only desisted by finding it not at all a paying thing, and besides the natives of the country took to opening the topes and selling any relics found to Major Abbott and myself. Thus from living in the country, hearing the legends of the land, studying coins and books, and from my own explorations, I formed my own conclusions on these topes, which in the main, I believe all subsequent theories and discoveries have proved to be pretty correct. The conclusion was that such large grand topes as Manykyala and Bulhur were the Westminster Abbeys of bygone Buddhist cities, at once a great religious building and the regal burial-place, answering to the great Rangoon Pagoda, and to the Bodh Nath of Nepal, only that these buildings are seen in the days of Buddhistic decadence, those existed in the days of its glory. Around Bulhur and Manykyala are the easily traceable remains of cities that must once have had 150,000 inhabitants each. Taking Bulhur and Shah ke Dehri, places on the right and left banks of the Hurroo river and going up the stream ten miles, you do not go over a yard of what was not, in olden times, built over. I have gone over every inch of it and was astounded to find every where building remains. Thus all the smaller topes, I conclude from the facts already adduced and from what I see of modern Buddhism, were at once both religious and burial buildings in the enciente of old Buddhist cities. And further they belonged either to noble families, good families, guilds, wards, parishes or priests.

"I went to see the Stupa from which my emerald relic was excavated. I conceived, judging from its foundation, that when it stood in its integrity, it was from 50 to 80 feet high, or such a building as could be afforded by a Chinese Mandarin or a Thibetan Lama of our time, and such as still abound in Nepal. I therefore concluded that my emerald relic had belonged to a noble Buddhist lady; that it was in

her lifetime her drop pendant of her forehead ornament, for so all the Hindoos of Hazara pronounced it to be, and that on her death the little gold casket was set in it, and her relic bone placed in it and buried.

"With reference to the duck crystal ornament mentioned at page 413 by Mr. Westropp, it is not a rare figure, but is on the contrary a very common one.

"From all the topes we excavated there was a perfect similarity of objects found in all. And all the objects quite similar to those found by Masson; the coins were of the same kings. A good deal of Greek, nearly purely so, and Græco-Buddhistic statuary was found. I excavated two or three small topes with all the figures of Buddha at the different sides in perfect preservation, and similar in all respects to the Buddhist temples of Nepal. From this I always concluded that these cities did not perish by the hands of the Iconoclast Muhammadans of the 8th and 9th centuries, but had fallen into desuetude centuries before.

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"Steatite vases or boxes were plentiful enough. I found but one inscription on a copper-plate, and that I presented the Society with."

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PART I.—HISTORY, LITERATURE, &c.

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Coins of the Nine Nâgas, and of two other Dynasties of Narwar and Gwalior.—By Major-General A. CUNNINGHAM.

[Received 13th July, 1865. Read 2nd August, 1865.]

The old Hindu coins which are engraved in the accompanying plate, were nearly all obtained in the Gwalior territory, and chiefly in the cities of Gwalior, Narwar, and Gobad. Most of them are now published for the first time, as only five specimens out of the whole number will be found in James Prinsep's plates. These are Nos. 7, 11, and 12 of the first series, No. 15 of the second, and No. 25 of the third series. Most of the coins now published are very rare, and several of them are unique; but Nos. 27 and 29 are common, and No. 7 is so exceedingly numerous that upwards of 3,000 specimens have passed through my hands, and there are as many more in the Stacy cabinet of the Asiatic Society's collection. Stacy's specimens were obtained at Gobad, and more than half of mine were found at the same place, but the remainder were procured at Mathurá and Delhi, as well as at Gwalior and Narwar.

2. It is always difficult to feel any interest about ancient kings whose names are known to us only from their coins, and whose kingdoms can only be guessed at by the find-spots of their money. But in the present case I am fortunate in being able to illustrate each of the three different series by references to inscriptions. The last series

of coins give their own dates, which accord exactly with the dates of the inscriptions and with a solitary notice in Ferishta.

3. The first series of coins, from No. 1 to No. 14, may be attributed, I think with considerable probability, to a dynasty of kings whom the Purâṇas call the "Nine Nâgas," and who would appear to have been contemporary with the Guptas. In the Vishṇu Purâṇa, it is stated that "the Nine Nâgas will reign in Padmâvati, Kântipuri and "Mathurá, and the Guptas of Magadha along the Ganges to Prayâga "and Sâketa, and Magadha." Padmavati was at first identified by H. H. Wilson with some unknown city in Berar, far to the south of the Narbadá, and afterwards with Bhâgalpur on the Ganges, but the mention of Mathurá utterly precludes the possibility of either of those places having belonged to the Nâgas. Both cities should no doubt be looked for within some moderate distance of Mathurá. The scene of Bhavabhuti's Mâlatí and Mâdhava is laid in the city of Padmávati in the Vindhyan mountains. As his description of the locality is a favourable specimen of Hindu poetry, I will not curtail it.

"How wide the prospect spreads, mountain and rock,
"Towns, villages and woods, and glittering streams,—
"There where the *Pârâ* and the *Sindhu* wind,
"The towers and temples, pinnacles and gates,
"And spires of *Padmávatí*, like a city
"Precipitated from the skies, appear
"Inverted in the pure translucent wave."

The *Sindhu* is, I think the *Sindh* river on which the city of Narwar is situated, and the *Pârâ* is the *Pârbati* or *Pârá* river, which flows only 5 miles to the north of the Sindh. Narwar also is in the midst of the Vindhyan mountains, and at a moderate distance, about 160 miles, from Mathurá, so that there are no geographical difficulties to overthrow the proposed identification. On the contrary the subsequent mention of the *Madhuvatí* and the *Lavana* as streams in the neighbourhood of the city, renders this identification almost complete, as the first may be identified with the *Mohwar* or *Madhuwar* on the south, and the other with the *Nân* or *Lûn* to the north. With regard to the third city named Kântipuri, I agree with Wilford in identifying it with the ancient *Kutwâl* or *Kutwâr*, on the Ahsin river, 20 miles to the north of Gwalior. The kingdom of the Nâgas there-

fore would have included the greater part of the present territories of Bharatpur, Dholpur, Gwalior, and Bundelkhand, and perhaps also some portions of Malwa, as Ujain, Bhilsa and Sâgar. It would thus have embraced nearly the whole of the country lying between the Jumna and the upper course of the Narbada, from the Chambal on the west to the *Kayân* or Cane on the east, an extent of about 1,800 square miles, in which Narwar occupies a central and most commanding position.

4. The identification of Narwar with Padmávatí, the capital city of the Nine Nâgas, is strongly corroborated by the coins which I am about to describe, as most of the earlier specimens were obtained at Narwar, and the remainder at Gwalior. It is also supported by the Allahabad Pillar inscription of Samudra Gupta, in which the king boasts of the extent of his dominions, and enumerates the different princes and countries which had become subject to his power. In the 18th line he mentions *Ganapati-Nâga* as one of the nine tributary princes of Aryavurtta. Now *Ganapati* or *Ganendra* is the name of the Râjá whose coins are the most common and the most widely diffused of all these Narwar kings. The legends of his coins are also in the very same character as those of the Gupta coins and inscriptions. I think therefore that there is every probability in favour of the identity of these two princes. My discovery of an inscription of Samudra Gupta in Mathurá itself is sufficient to show that the Nâgas must have lost that city at an early date. It may also be taken as corroborative of the decay of their power, and of the supremacy of Samudra Gupta, as stated in the Allahabad Pillar inscription. It may be objected that the coins of Ganapati do not bear the additional name of Nâga, and that James Prinsep has rendered Ganapati Nâga as two separate names. To these objections I can reply at once that, so far as I am aware, Nâga is never used alone as a man's name, but always in conjunction with some other word, either preceding it as in Nâga-sena, Nâgârjuna, Nâgâditya, Nâgadatta, &c., or following it as in Skanda-Nâga, Brihaspati-Nâga, and Deva-Nâga of the coins now under review. For this reason I conclude that the name of Samudra Gupta's contemporary must almost certainly have been Ganapati-Nâga. The omission of the latter part of the name in the legends of the coins is sufficiently explained by the minute size of the money, which did not afford room

for a long name. Thus on some of the coins of Brihaspati-Nâga the name is given at full length, while on others it is contracted to Brihaspati and Brihaspa, and even to Briha. Similarly, the name of Deva Nâga is contracted to Deva Nâ and Deva, while that of Ganapati himself is variously rendered as *Ganapatya* and *Ganendra* on the larger coins, and as *Gana* and even *Ga* on the smaller coins. A similar omission of the family appellation may be observed on many of the contemporary coins of the Guptas, on which the names of Chandra, Samudra, Kumâra, Skanda and Nâra are found alone under the Raja's arm without the additional title of Gupta which, as we know from other coins and inscriptions, certainly belonged to all of them. From these instances I infer that the title of Nâga belonged not only to Ganapati himself but to every one of the early princes of Narwar, whose coins form the first series of the accompanying plate.

5. The period to which these princes must be assigned depends solely on the date of their contemporaries, the Guptas. In 1851, when I wrote my account of the Bhilsa Topes, I referred the beginning of the Gupta era to the year 319 A. D., but shortly afterwards on comparing the Gupta gold coins with their Indo-Scythian prototypes, and the Gupta silver coins with the *Sah* coins of Saurâshṭra, I saw that the first Guptas must certainly have been contemporary with the earlier princes of the Kushân Scythians, and consequently that their date could not possibly be later than the first century of the Christian era. In 1855 Mr. Thomas devoted a special essay to the determination of the date of the Guptas, in which the subject was most fully and ably treated. In this article, and subsequently in his valuable notes on Prinsep's essays, he inclines to refer the dates of the Gupta coins and inscriptions to the Saka era, an opinion in which I fully concur. But in assigning the Bhilsa inscription of Chandra Gupta, which is dated in the year 93 to the first king of that name, he must have overlooked the Udayagiri Cave inscription of the year 82, which, according to H. H. Wilson, refers to Chandra Gupta's great-grandson, the Rájá of Sanakânika. The only scheme, as far as I can see, that will suit all the known dates and other conditions of this dynasty, is to make Chandra Gupta 1st, the founder of the era. By adopting this scheme, his great-grandson the Rájá of Sanakânika may be allowed to have been reigning in the year 82, and his grandson Chandra Gupta

2nd of Magadha in the year 93. But if we assign Chandra Gupta 1st to the year 93, we must then allow that he continued to reign for at least eleven years after the accession of his own *great-grandson* the Râjá of Sanakânika. According to Mr. Thomas's arrangement of the Gupta coins, with which I generally agree, the pieces that bear the title of Vikramâditya are assigned to Chandra Gupta 1st, and those that bear the simpler title of Vikrama to Chandra Gupta 2nd. We know from Abu-Rihân that in his time the origin of the Saka era was attributed to a prince named Vikramâditya after his victory over the Sakas. We learn also from the Allahabad pillar inscription that Samudra Gupta, the son of Chandra Gupta Vikramâditya, professed to have received tribute from the Sakas. From all these concurring testimonies, I am inclined to adopt the *Saka* era, which began in A. D. 79, as the actual era of the Gupta dynasty, and to attribute its establishment to Chandra Gupta 1st.

6. According to this view the date of Samudra Gupta, and therefore also of his contemporary Ganapati Nâga, would be the beginning of the second century, or about A. D. 110. The dynasty of the *Nine Nâgas* may accordingly be assigned to the first and second centuries of the Christian era. In the following list I have arranged the names of the Nâga kings according to the devices on their coins, beginning with those types which seem to me to be the earliest on account of the more ancient appearance of their accompanying inscriptions. It is worthy of note, as corroboratory of the date which I have assigned to the Nâgas that the whole of the devices on these copper coins are to be found on the silver coins of the Guptas themselves, or on those of their acknowledged contemporaries.

No.	Kings' names.	Types.	Fig. in Plate.
I.	Bhima Nâga, ...	Peacock to left.	2
II.	Kha, ...	Ditto right.	1
III.	Va, ...	Ditto ditto.	...
IV.	Skanda Nâga, ...	Ditto ditto.	3
	Ditto, ...	Bull recumbent to right.	4
V.	Brihaspati Nâga, ...	Ditto ditto.	5-6
VI.	Ganapati, ...	Bull walking to left.	7,8,9
	Ditto, ...	Wheel.	...
VII.	Vyâghra Nâga, ...	Ditto.	11
VIII.	Vasu Nâga, ...	Ditto.	12
IX.	Deva Nâga, ...	Ditto.	13,14
	Ditto, ...	Bull recumbent to right.	...
	Ditto, ...	Trisul.	...

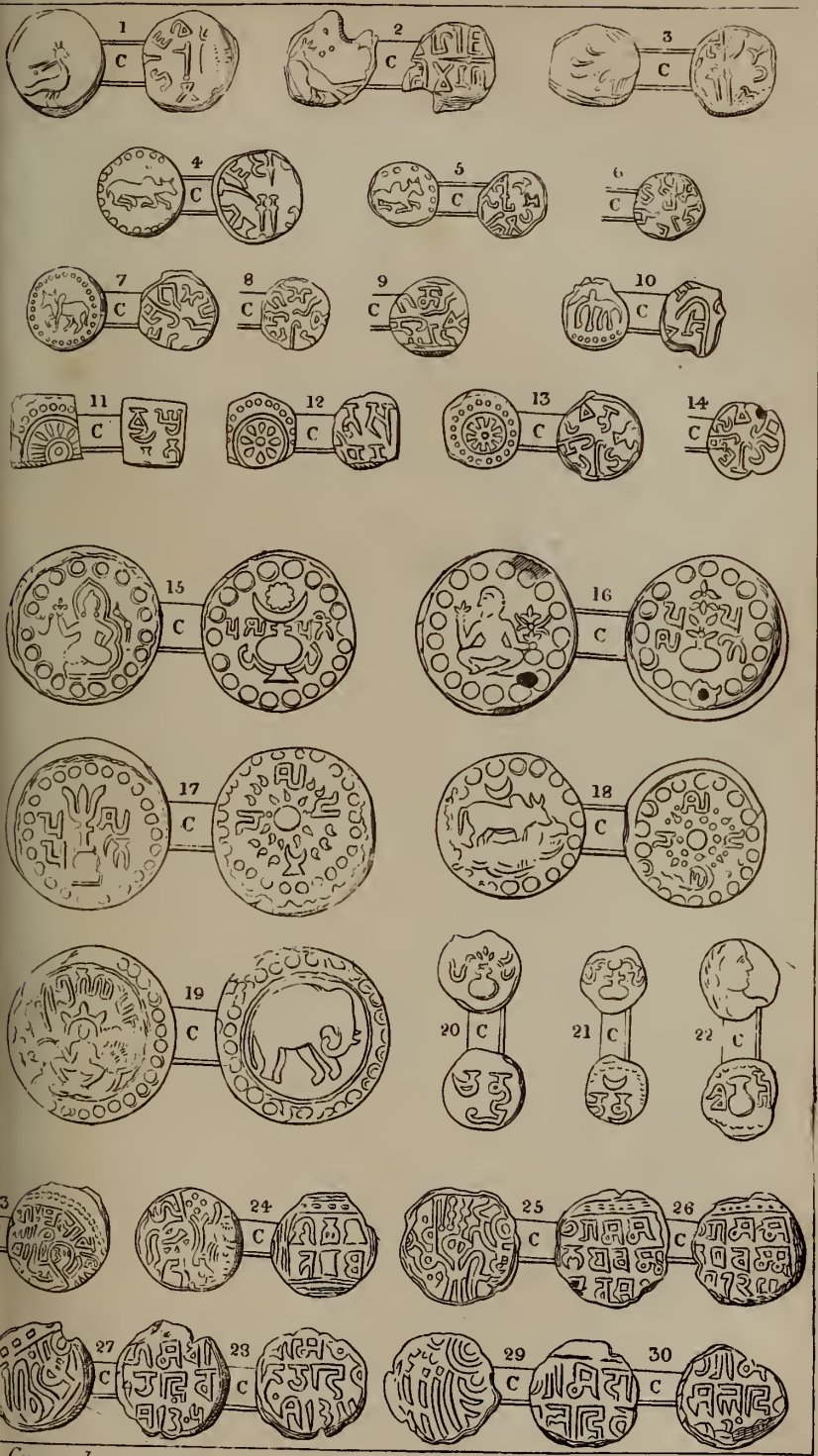
7. I will now proceed to the more technical description of the coins themselves for the benefit of the professed numismatist. The pieces are all of small size, and many of them are so minute, that their average weight is only 7 grains each. The whole of them, however, may be readily divided into four distinct classes, which correspond with the known divisions of the old Indian *pana* or copper coin of 145.833 grains. These divisions were,

	Weight.
The $\frac{1}{2}$ *pana*, ...	72.916 grains.
„ $\frac{1}{4}$ *pana*, or *kâkini*	36.458 „
„ $\frac{1}{8}$ *pana*, or $\frac{1}{2}$ *kâkini*	18.229 „
„ $\frac{1}{16}$ *pana*, or $\frac{1}{4}$ *kâkini*	9.114 „

As the whole of these coins, excepting only the smallest of 9 grains, are mentioned in the Code of Manu, the antiquity of the names is undoubted. In B. VIII, verse 404, the ferry tolls are fixed at the following rates :

An empty cart, ...	1 *pana*.
A loaded man, ...	$\frac{1}{2}$ „
A woman, or ox, ...	$\frac{1}{4}$ „
An unloaded man, ...	$\frac{1}{8}$ „

But the *pana* was also called the "copper *Karsha*," and under this



A Cunningham

name it is mentioned by Hesychius, who lived about A. D. 350 to 380, as κερσα Ασιανον νομισμα

8. Of the ½ *pana*, the few specimens that I possess belong to the Peacock type, but the heaviest weighs only 64 grains. Of the ¼ *pana* or *kâkini*, the specimens are common and of all the types. One peacock coin of Maharaja *Va* * * weighs 36 grains, five specimens of Bhima average 34 grains each, three illegible coins give 34.2 grains, twelve peacock coins of Skanda give 34.1 grains, five Bull coins of Skanda give 37.2 grains, nine Bull coins of Ganapati average 34.5 grains, and two of Deva Nâga weigh respectively 39 and 35 grains. Altogether these 37 specimens offer a mean weight of 34.87 grains, which, making allowance for wear, is sufficiently near the standard which I have adopted for the quarter *pana* or *Kâkini*. Of the half *kâkini*, the specimens are very numerous, embracing three Bull coins of Skanda, all the coins of Brihaspati, the greater number of those of Ganapati, and two coins of Deva Nâga. The three coins of Skanda give a mean of 16 grains each, thirteen coins of Brihaspati give 18.3 grains, thirty-four coins of Ganapati give 17.55 grains each, and two of Deva Nâga give 18.5 each. The mean of these specimens gives a weight of 17.76 grains for the half *kâkini*, which is within half a grain of the standard. Of the quarter *kâkini*, which was the smallest "coin" of the old Hindu mint, the only examples belong to Ganapati. Twenty of my specimens weigh 140 grains or exactly 7 grains each, the heaviest being 11½ and the lightest 4½ grains. In the original monetary scheme of the Hindus, the copper *pana* was equal in weight to 80 *raktikas* (or ratis), and in value to a handful of cowree shells. The average handful was fixed at 80 cowrees a number, which I have tested repeatedly with cowrees of all sizes as the handful always ranged between 70 and 85 shells. To this circumstance the coin owed its name of *pana* or the handful from *pâni*, the hand. Both the name and the value are even now preserved in the Calcutta reckoning of cowrees in which 4 cowrees make 1 gandá and 20 *gandás* make 1 *pan*, that is 80 cowrees are still equal to 1 *pan*.

I. Bhima Nâga.

Fig. 2.—5 specimens.

Obv.—Peacock standing to left.

Rev.—A horizontal line like a spear-head.

Legend. *Mahárája Bhima Nâga.*

II. Kha (———)

Fig. 1.—Unique—50 grains.

Obv.—Peacock standing to right.

Rev.—Two uncertain upright objects.

Legend. *Mahârâja Kha* * * * *

This name must have ended in *Nâga*, as there is room for at least four more letters. The full name may have been Kharjjura *Nâga*, as there is a trace of the vowel *u* at the foot of the second letter.

III. Va (———)

Unique—36 grains.

Obv.—Peacock standing to right.

Rev.—Two uncertain upright objects.

Legend. *Mahârâja Va* * * *

This name must also have ended in *Nâga*. It may have been Vatsa Nâga, but it was more probably of three syllables, as *Varuna*.

IV. Skanda Naga.

Fig. 3—12 specimens. Average weight 34.1 grains.

Obv.—Peacock standing to right.

Rev.—As on Fig. 1.

Legend. *Mahârâja Skanda Nâgasya.*

V. Brihaspati Naga.

Figs. 5, 6.—31 specimens—all half *kâkinis*, averaging 18.3 grains.

Obv.—Recumbent Bull to right in a dotted circle.

Rev.—Legend, *Mahârâja Brihaspati Nâga.*

Most of the legends are incomplete in the name, for want of space, several of them reading *Brihaspa* as on No. 6, whilst a few have only *Briha*. It is to be noted that the uncertain object which occupied the field of the previous coins has now disappeared.

VI. Ganapati (Naga.)

Figs. 7, 8, 9.—Extremely common:—*Kâkinis*, ½ *kâkinis*, and ¼ *kâkinis.*

Obv.—Bull walking to left, in a dotted circle.

Rev.—Legend. *Mahârâja Sri Ganapatya.*

The name varies on different coins both in its form and in its spelling. On No. 7, I read *Gaṇapatya*, and on No. 8, *Gaṇendra*, both properly spelt with the central *ṇ*. On No. 9 the name of Gaṇendra.

incorrectly spelt with the dental *n*. These coins are extremely common. Mr. Thomas has noted that there are 3,479 specimens in the Stacy collection, of which I know that by far the greater number were obtained at Gobad. At the close of the Gwalior Campaign in 1844, Col. Stacy showed me a bag full of these coins weighing about 4 *seers* or 8 lbs. which his coin collector had just brought from Gobad; and as he had not purchased the whole find, I managed to secure the remainder, which were about 2 seers or 4 lbs. in weight, and numbered about 1,750 specimens. Since then on different occasions I have procured 812 specimens at Mathura and 357 at Delhi, besides many more at other places more especially at Gwalior and Narwar, which altogether make my number considerably over 3,000.

Unique.—*Kâkini* of 35 grains.

Obv.—Wheel in a circle of dots.

Rev.—Legend. *Mahârâja Sri Gane (ndra.)*

VII. Vya'ghra Na'ga.

Fig. 11.—Unique. Half *kâkini* of 18 grains, square.

Obv.—Wheel in a dotted circle.

Rev.—Legend. *Vyâghra (Nâ) ga.*

VIII. Vasu (Na'ga.)

Fig. 12.—Square. Half *kâkini* of 19 grains, duplicate in Dr. Swiney's collection, Thomas's Prinsep, Plate 34, Fig. 30.

Obv.—Wheel in a dotted circle.

Rev.—Legend. Vasu Nâga.

IX. Deva Na'ga.

Figs. 13, 14.—18 *kâkinis* and 2 half *kâkinis*.

Obv.—Wheel in a dotted circle.

Rev.—Legend. *Mahârâja Sri Deva Nâgasya.*

IX*a*. Six specimens—all *kâkinis*.

Obv.—Recumbent Bull to right in a dotted circle.

Rev.—A *Trisul*, or trident, in the field.

Legend. As on Fig. 13.

IX*b*. Unique. Half *kâkinis* of 17 grains.

Obv.—Trisul in a dotted circle.

Rev.—Legend. As on Fig. 13.

9. On a general view of all the coins of the Nâga series, it will be observed that the unique specimens of both *Vyâghra* and *Vasu* are of square form, and that they also differ from the others in omitting the title of Mahârâja. It is possible therefore that they may not belong to the dynasty of the Nine Nâgas, although their type of the wheel is also that of Deva Nâga and Gaṇapati. It seems probable that a careful scrutiny of the coins in the Stacy collection would increase considerably the variety of types, and perhaps also might add to the number of names of these Nâga kings.

10. The second series of coins consists of five specimens, of which no less than four belong to the same king, *Pasupati*, whose name occurs in the oldest of my Gwalior inscriptions. In that record he is stated to be a mighty sovereign, the son of Toramâṇa, who was himself first made known to us by the inscription on the great boar statue at Eran. A single silver coin of Toramâna has also been described by Mr. Thomas, who reads the date as "*one hundred and eighty odd*" of the Gupta era, or about 20 years later than the Eran inscription of Budha Gupta, that is about A. D. 263. If therefore we place Toramâna between the years 260 and 285 A. D., the date of his son Pasupati will be 285 to 310, or about 300 A. D. The coins of Pasupati consist exclusively of copper, and are so extremely rare, that, so far as I am aware, three out of the four specimens now made known are unique, and of the fourth specimen I have only two examples.

PASUPATI.

Fig. 15.—Copper coin weighing 92 grains.

Obv.—Figure of the king seated cross-legged in the Indian fashion, his right hand holding a flower, and his left resting on his hip;—the whole surrounded by a circle of large dots.

Rev.—A vase surmounted by a crescent and star or perhaps a flower, and enclosed in a circle of large dots. Legend in Gupta characters in one straight line, *Pasupati.*

Fig. 16.—Copper coin weighing 109 grains: duplicate 105 grains.

Obv.—Figure of the king seated in the Indian fashion, holding a flower in his right hand and a vase of flowers in his left hand;—the whole surrounded by a circle of large dots.

Rev.—A vase of flowers, surrounded by the same dotted circle. Legend in two lines, *Pasupati.*

Fig. 17.—Copper coin weighing 92 grains.

Obv.—A short trident or trisul, on a stand surrounded by a circle of small dots.—Legend in two lines, *Pasupati.*

Rev.—A globe surrounded by rays, enclosed in a dotted circle. Legend disposed circularly, *Pasupati.*

Fig. 18.—Copper coin weighing 43 grains.

Obv.—Humped Bull to right with a crescent above, and surrounded by a dotted circle.

Rev.—Type and legend the same as No. 17.

Fig. 19.—Copper coin weighing 112 grains.

Obv.—Figure of the king seated in the Indian fashion on a high backed throne, and surrounded by a circular line and an outer circle of dots:—Legend over the head in Gupta characters which are not easily legible. I read doubtfully *Sri Guhila-pati.*

Rev.—An elephant to right surrounded by a circular line and an outer circle of dots.

11. I have added the last coin to this series because it corresponds both in weight and in fabric with the specimens of Pasupati's mintage. The type of the obverse also agrees so closely with that of the first example just described that I have little doubt that this coin belongs to some member of the same family. The specimen is unique. I have added two small coins of Chandra Gupta, Figs. 20 and 21, for the purpose of shewing that similar vases of flowers were used as types by the Gupta dynasty which immediately preceded the family of Toramâna. Fig. 22 is another small coin with the flower-vase type, but bearing a different name, *Swarga*, regarding which I am unable to offer any remarks save that its type and fabric range it with the contemporary coins of the Guptas.

12. The third series of coins belongs to a much later period of Indian history, shortly after the capture of Delhi by the Muhammadans. The coins themselves are utterly rude and barbarous imitations of the horseman mintage of the Brahman kings of Kabul;—but they are otherwise interesting and important, as they bear legible dates, from which I have been able to verify two of the names as those of actual Rájás of Narwar. Of the earliest of these coins belonging to *Malaya Varmma Deva*, I have seen only 5 specimens. On one of them, Fig. 26, the date is S. 1280, or it may be S. 1285 as the unit

figure is partly cut off. On a second coin the date is S. 83, and on a third S. 90 odd, the unit being cut off. Here we see that the last two dates must undoubtedly refer to the same century as that of the first coin, because the name of the prince and the fabric of the coins are precisely the same. Of the second prince named *Châhaḍa Deva*, I have numerous specimens, bearing various dates from 1303 to 1311, of which Figs. 27 and 28 give S. 1305 and S. 1311. Of the third prince, named *Á'sala Deva*, the specimens, though numerous, are always small and much worn, and the dates are therefore generally imperfect. Two of the more perfect coins, however, give the dates of 1311 and 1312, and a third has 1330 odd : see Figs. 29 and 30. In illustration of these coins, I have engraved a curious specimen of the contemporary coinage of Ala-ud-din Masâûd, Fig. 23, which bears on the obverse the well known recumbent Bull with the Nâgari legend *Sri Ala-vadina* and the date of 1300, inserted on the quarter of the Bull. This date must certainly refer to the Vikramâditya *Samvat* as Masâûd reigned from A. D. 1242 to 1246, and S. 1300 is equal to A. D. 1243.

13. The coins of this third series of Narwar princes are found chiefly about Gwalior, Jhansi, and Narwar, but a few stray specimens may be picked up at Agra and Mathura. The obverse bears the rude figure of a horseman which is only traceable on the coins of Á'sala Deva by comparing them with the earlier pieces of Malaya Varmma. A brief description will therefore be sufficient for this barbarous coinage.

I. Malaya Varmma Deva.

Figs. 25, 26.—Copper coins weighing from 50 to 56 grains.

Obv.—Rude horseman with no trace of the legend of *Sri Hamir* which is found on all the contemporary Muhammadan mintages.

Rev.—Legend in three lines श्रीमन्मलयवर्म्मदेव स- १२८- *Sri-man Malaya Varmma Deva.* S. 128 and also S. 83.

II. Châhaḍa Deva.

Figs. 27, 28.—Copper coins weighing from 50 to 59 grains.

Rev.—Legend in three lines श्रीमच्चाहडदेव स- १३०५, *Sri-Mat Châhaḍa Deva, S.* 1305.

III. Á'sala Deva.

Figs. 29, 30.—Copper coins weighing from 50 to 57 grains.

Rev.—Legend in three lines श्रीमदासलदेव स- १३११- *Sri-Mad Asala Deva, S.* 1311.

14. All my researches have failed to discover any trace of the first of these princes, but I have found the name of *Châhaḍa Deva* in two different inscriptions, as well as in Ferishta's history. In the year A. H. 649, or 1251 A. D., the historian relates that Naser-ud-din Mahmud, the king of Delhi "proceeded to the siege of Narwar. The Raja *Jâhir Dew*, having lately constructed the fort on the summit of a rock, prepared to defend it to the last. He accordingly marched out to oppose the Muhammadans, with 5,000 horse and 200,000 foot. This immense host being defeated with great slaughter, the place was invested and reduced to surrender after a few months' siege." In Dow's translation the Raja is called *Tâhir Deo*, and under this name he is entered in Prinsep's tables, but with the date of A. D. 1251 transposed as 1215, and the name of Narwar erroneously referred to *Nahrwara*, or *Analwâra-patan*, in Gujarat. The inscriptions which mention *Châhaḍa Deva* are dated in S. 1348 and 1355 or A. D. 1291 and 1298, but the first refers apparently to a younger son and the second to a grandson.

15. Of the third prince named *Asala Deva*, I can find no trace in history, but he is mentioned in the Narwar inscription of S. 1355 as the son and successor of *Châhaḍa Deva*, and I found his name on a *Sati* pillar at Rai, with the date of S. 1327 or A. D. 1270, at which time he was the reigning sovereign. The beginning of his reign is fixed in the year S. 1311 by the agreement of the date of his father's latest coins with that of his own earliest coins. The following table gives the chronology of these three princes as determined from various sources :—

Accession.

	Samvat.	A. D.	
1. Malaya Varmma Deva,	1267	1210	Coins S. 1280 odd, 82 & 1290 odd.
2. Châhaḍa Deva, ...	1292	1235	Coins S. 1303 to 1311. Ferishta A. D. 1251.
3. Asala Deva, ...	1311	1254	Coins S. 1311 to 1330 odd.
	1336	1279	Inscription, S. 1327.

All the inscriptions referring to these Narwar princes, will be duly transmitted to Bábu Rájendralála Mitra in the hope that he will kindly undertake their translation.

On the Sena Rájás of Bengal as commemorated in an Inscription from Rájsháhi, decyphered and translated by C. T. Metcalfe, *Esq., C. S.—By Bábu* Rájendralála Mitra.

[Received 5th July, 1865. Read 5th July, 1865.]

Subjoined are the text and translation of a Sanskrit inscription of some interest lately found in a part of Rájsháhi called the "Burrin," close by the village of Deopárah, Thánnah Godágári. Mr. C. T. Metcalfe, to whom the Society is indebted for the original and the translation, gives the following account of the place where the monument was found. "The tank where I found it," he says, "is some 40 miles from Goa (Gour?); but it stands on the bank of a river which was the old *Pudda* bed, and which river now flows 6 miles to the south, before Rampur Bauleah. The locality is evidently the site of some temple, and the stone records, I should say the inscription, the praises of the founder. While making some further examinations I came to the top of a series of black stone-steps leading underground; one monster stone was 1 yard in thickness. In the tank itself are 2 slabs which can be felt with a bamboo and which, a hoary-headed old man says, were above ground when he was a *chokra* (boy) and kept the village cattle, *i. e.* some 60 years ago." The place was of some distinction, even during the Mahomedan period, for there still stands a magnificent masjid about 650 years old. Mr. Metcalfe describes it as "built entirely of stone without a bit of mortar, and put together like a child's toy-house, the stones fitting the one into the other. The carving on it is beautiful."

The stone slab upon which the inscription is recorded, was found in a dense jungle apparently away from its original position, but amidst a number of large blocks of stone half buried under the earth. It measures 3 ft. 2 inches by 1 ft. $9\frac{3}{4}$. Its material is basalt carefully polished on the upper surface.

The letters of the inscription are of the Tirhoot or Gour type, similar to that of the Bákerganj plate of Kesava Sena, decyphered by James Prinsep. Bengali MSS. three centuries old, are written in very much the same characters, and the facsimile of the *Yajñadatta-badha* published by Chezy, bears some resemblance to it. It is in fact

the first transition stage of the Kuṭila in its passage to the modern Bengali. Mr. Metcalfe found considerable difficulty in getting the record decyphered, owing to modern pandits not being familiar with its style of writing, but I have carefully compared his transcript with the original and satisfied myself that his reading is perfectly correct.

The language of the inscription is pure Sanskrit, but its style is highly inflated and hyperbolical. Umápati Mis'ra, the author of it, is never satisfied with an ordinary comparison. If he has to describe a high temple, he cannot stop without making its pinnacle stand as an obstruction to the course of the sun. His kings must upbraid the heroes of the *Rámáyaṇa* and the *Mahábhárata* as vain boasters and insignificant upstarts, and his war-boats, even when stranded on a sand-bank in the Ganges, must eclipse the glory of the moon. This style, common enough in oriental writing, was particularly remarkable in Northern India in the 9th, 10th and the 11th centuries of the Christian era. Whether at Gour or Benares or Kanauj or Oujein or Mathura, this straining after bombast was so universal, that no one familiar with the monumental literature of the period, can mistake it for a moment, and it may therefore be taken as characteristic of the time. I have myself met with it so often, that had I no other guide to ascertain the age of the record under notice, I would have taken its style to be a conclusive proof of its being of the 10th or 11th century.

The subject of the record is, the dedication of a temple which is described to have "extended to all directions in space, and vied in loftiness with the Mount Meru round which the sun, moon and the stars run their course." Its pinnacle of gold, which was shaped like a water-jar, was equal to the Meru in weight. Its locality was the margin of the tank where the inscription was found. Judging from the insignificant remains now traceable in that locality, I believe the edifice was by no means a very extraordinary one. Its presiding deity was Pradyumnesvara or S'iva as the destroyer of Cupid, a form in which he is not often worshipped by his votaries in Bengal. This divinity, who is generally represented as a vagrant mendicant, is said to have exchanged, by the favour of the dedicator of the temple, his tiger skin toga for silken dresses, his serpent neck-chains for garlands of jewels, his ashes for sandal wood powder, his rosary for pearls, and his human bone ornaments for precious gems.

Of the dedicator of the temple, Vijaya, the record is, as usual in such cases, the most lavish in its praise. According to it, he was the greatest of kings that ever held sway on earth; the most valiant, the most charitable, and the most virtuous. While describing the hero as a devout follower of Mahádeva, it does not hesitate to make him even superior to that dread manifestation of the divinity, for the one, says it, destroys all alike, while the other, killed his enemies and cherished his friends. There is, however, very little in the verses devoted to his glorification which may be taken for facts. The time of his reign is not given, nor the name of his caste, nor that of the place where he caused the temple to be erected. He is related to have invaded Assam (Kámarúpa) and the Coromandel Coast between the Chilka Lake and Madras (Kaliñga), and to have sent a fleet of war-boats up the Ganges to conquer the Western kings; but nothing is said of the results of these invasions: the last is, in a manner, acknowledged to have proved a failure; for the only thing noticeable in it, was the stranding of one of the boats on a sand-bank, poetically described as "the ashes on the forehead of S'iva, changed to mud by contact with the water of the Ganges."

The genealogy of the king includes three names, those of Hemanta Sena, Sumanta Sena, and Víra Sena. The last was evidently the founder of the family, for he appears as a descendant of the moon, without any reference to his immediate progenitors. All the three were kings of Gour, but their names occur nowhere in history. Vijaya the last of the series was, according to tradition, known by the name of Sukha Sena, and under that name he occurs in the Áyín Akbary, as the father of Ballála Sena. His name occurs in the Bakerganj plate as the first of a series of four kings, the last of which was Kesava Sena. Vijaya there appears as the father of Ballála Sena. Again, in a manuscript of the *Dánaságara*, a treatise on gifts attributed to Ballála Sena, the author describes himself as the son of Vijaya Sena and the grandson of Hemanta Sena. These facts justify the assumption that the three records allude to the same family, and that Sukha Sena was an alias of Vijaya Sena. If this be admitted, the Sena dynasty of Bengal will have to be extended by the addition of the three names which occur in the inscription now under notice.

Of the descendants of Vijaya, the most distinguished was, no doubt,

his son Ballála. "This prince," to quote the words of an able writer in the *Calcutta Review*, "was held in such high estimation all over Bengal, that the most extravagant fancies have been indulged and the wildest tales invented in order to connect his memory with the marvellous and the sublime." The same writer continues; "Poets have invested him with the dignity of a divine original and described his infantile precocity in the most glowing colours. He has been represented as the son of the fluvial god Brahmaputra, who had deceived his mother by assuming the form of her own husband. His nativity is said to have taken place in the solitude of a thick forest, where his mother had been banished a few months before her parturition through the jealousy and treachery of his father's two other wives. In these sylvan shades and under the especial protection of heaven he passed his infantile days, undisturbed by the noise and distractions of towns and cities, and uncontaminated by the pleasures and irregularities of riotous society. His divine parent, "the uxorious Amnis," as Horace would perhaps call him, instructed him in the different branches of a Hindu's education, and in the tactics of war and diplomatic policy. While yet a boy he is said to have exhibited extraordinary proofs of heroism and strength. He had discomfited unassisted and alone a whole host of disciplined troops commanded by princes and veteran captains, and armed with all the weapons of native warfare." The whole of this statement, however, is founded upon vague traditions or modern records of doubtful authority. We may dismiss it, therefore, without a remark. The Bakerganj inscription of Ballála's grandson does not allude to the facts noted in it with sufficient circumstantiality to give them any prominence. From what it says, we may take for granted, however, that he was a great patron of learning and himself an author of some pretension.—Vedártha smṛiti sañgrahádi purusha. The treatise on gifts alluded to above shews that his reading was extensive and his knowledge of the s'ástras respectable.* He is,

* The prominent mention made in the work of the author's tutor, Aniruddha, would waken a suspicion that, like many other crowned heads in India and Europe, Ballála had assumed to himself a credit which rightly belonged to another. However that be, the authentieity of the work is undoubted. It has been quoted by the author of the *Samaya Prakásá* who lived several hundred years ago, and Raghunandana who flourished at the end of the 15th century, alludes to it in two places in his *Suddhitattva*: अत्र साचाच्छूद्रदत्तघृतनष्टुल्लाद्यनुपयोगीति दानसागरः Serampore edition, p. 194. Again: उपकरणं धान्यादि,नियमस्थाय,उपवासादिव्रत-

however, better known in this country by the system of hereditary nobility which he established in his court than by his devotion to letters. The main object of that system was to give preëminence to

श्रीखाय इति दानसागरः। Ibd. 20—3. The work is divided into 70 Sections and devoted to a description of 1375 gifts, the mode of consecrating them, the proper persons to give them to, the time meet for making such gifts, &c. &c. The author enumerates in his introduction the different authorities he had consulted in compiling his work, and as his list gives an idea of the works which were reckoned as standard authorities in his time, 9 hundred years ago, I quote it entire.

Puráṇas.	Vishṇu-dharma.	Yama.
Brahma.	Gopatha Bráhmaṇa.	Yogayajnavalkya.
Varáha.	Rámáyaṇa.	Devala.
Agni.	Mahábhárata.	Baudháyana.
Bhavishya.	Manu.	Angirasa.
Matsya.	Vasishṭha.	Dánavyasa.
Kurma.	Samvarta.	Vrihaspati ? ?
Ádya.	Yájnavalkya.	Sankha.
Upapuráṇa.	Gotama.	Likhita.
Ádya,	Kátyáyana.	Apastamba.
Sámba.	Yávála.	Sátyáyana.
Káliká.	Sandána.	Maha Vyása.
Nandi.	Vrihaspati.	Laghu Vyása.
Áditya.	Vrihad Vasishṭha.	Laghu Hárita.
Nárasiñha.	Hárita.	Chhandoga perisishṭa.
Márkandeya.	Pulasta.	
Vishnudharmottara.	Vishṇu.	
Sástras.	Sátatapa.	

S'lokas are often repeated by panditas, which tradition ascribes to this prince. It is said that once when his son Lakshmaṇa was long absent from home, his danghter-in-law brought the circumstance to his notice by writing the following s'loka on the wall before the place where he used to dine:—

पतत्यविरतं वारि वृत्यन्ति शिखिनो मुदा।
अद्य कान्तः क्षतान्तो वा दुःखस्यान्तं करिष्यति॥

"The clouds are ponring without intermission and the peacocks are dancing with joy; on snch a day death or my darling alone can remove my suffering."

Touched by it he invited his son back to his home with the following stanza:—

सन्नग्ना दशमध्वजाद्यगतिना सन्तापिता निर्जने
तूर्य्यद्वादशवत् द्वितीयमतिमन्नेकादशेभस्तनी।
सा षष्ठी वृषपञ्चमस्य भविता भ्रूसन्नमीवर्जिता
प्राप्नोत्यष्टमवेदनां प्रथम हे तूर्णं वृतोयो भव॥

"O thou who art disposed as the second (the Bull—listen)." Alone and oppressed is she with the breasts like the eleventh (pitchers-globes) of the elephant, by the approach of him who has the tenth (Makara on his flag Cupid), even as are the twelfth (fishes) and the fonrth (crabs), on the approach of the shark (makara). That sixth (virgo), with eyebrows without compare, (lit. devoid of the seventh libra), who should belong to the royal fifth (lion-prince is suffering from the pangs of the eighth (scorpio). O, first (aries—my son) hasten and be thou the third

the descendants of the five Brahmins and Káyasthas who had been brought to Bengal by Ádis'úra. The particular qualities which were to characterise his nobles were "good manners, learning, humility, reputation, pilgrimage, faith, fixed profession, austerity, and charity"* but as there was no standard measure for those qualities, and it was difficult to secure them without attaching penalties to personal delinquencies which could never be enforced, he had recourse to other and more definite means for their perpetuation. He availed himself of the popular notion that children invariably inherit the moral qualities of their parents, and hoped that by maintaining the blood of his newly created nobles pure and undefiled, he would attain his end. He forbad all intermarriage between the original Brahmans and Káyasthas of the country and the newcomers, and ordained various and complicated rules for the gradual degradation of those families which should permit any stain to fall on the gentility of their blood. Mis-alliances could not, how-

(gemini)." The play on the names of the twelve signs of the zodiac in this s'loka cannot be preserved in the English translation.

On another occasion he was himself absent from home for a long time, having been detained in a forest by the charms of a lowly born damsel. The scandal was great, and his son, to stop it, requested his return with the following verse :—

शैत्यं नाम गुणस्तवैव सहजः स्वाभाविकी स्वच्छता
किं ब्रूमः शुचितां भवन्ति शुचयः स्पर्शेन यस्यापरे।
किञ्चान्यत् कथयामि ते स्तुतिपदं यज्जीवितं जीवनं
त्वञ्चेन्नीचपथेन गच्छसि पयः कस्त्वां निषेद्धुं क्षमः ॥

"Generally cool art thou, O river, and transparent by nature. Of thy purity what can I say ? everything becomes pure by thy touch. What else need I tell in thy praise ? thou art the life of all living things. And yet strange to relate, thou flowest downwards and none can withhold thee."

To it the king sent the following reply :—

तापो नापगतस्तृषा न च क्षुधा धौता न धूलो तनो-
र्नं स्वच्छन्दमकारि कन्दकवलः का नाम केली कथा ॥
दूरोत्क्षिप्तकरेण हन्त करिणा स्पृष्टा न वा पद्मिनी
प्रारब्धो मधुपैरकारणमहो झङ्कारकोलाहलः ॥

"The elephant has not yet soothed its skin nor allayed its thirst; the dust on its body still remains unwashed, and the tuberous roots of the lotus have hitherto not yielded it a mouthful of food, much less an entertainment; the lotus remains untouched by his far projectile arm : verily the bees have raised an unmeaning hue and cry by their murmurs."

The authenticity of these s'lokas is, however, not such as may be relied upon.

* Ácháro vinayo vidyá pratishṭhá tírtha darsana, nishṭhá vṛitti tapo dánam navadhá kula-lakshaṇam.

ever, be altogether prevented, and the successors of Ballála somewhat encouraged them, by raising the social status of those plebeans who succeeded in securing the alliances of kulinas. Wealthy maulikas largely availed themselves of the opportunity which was thus given them of rising in social rank, and the cupidity of our nobility has of late encouraged them by a system of polygamy which has made kulinism in Bengal, a positive nuisance to society.

The son and successor of Ballála was Lakshmaṇa Sena. The author of the Bakerganj plate makes him erect altars and pillars of victory at Benares, Allahabad, and Jagannath, but "it may reasonably be doubted," says Prinsep, "whether these monuments of his greatness ever existed elsewhere than in the poet's imagination." His prime minister and Lord Chancellor (Dharmadhikára,) was Haláyndha, son of Dhananjaya, of the Vátsya race, a Brahmin of great learning and a descendant of Bhaṭṭanáráyaṇa, the author of the Venisañhára. His eldest brother, Pashupati, wrote a treatise on the *sráddha* and other ceremonials under the title of *Pashupati Paddhati*. His next brother was a great scholar and professor of Smṛiti and the Mimañsá; he wrote a treatise on the diurnal duties of Brahmins which still exists—*Áhnika Paddhati*. Haláyudha himself is said to have written several works on Smṛiti, of which the most important is the *Bráhmaṇa Sarvasva*. In it, he describes his patron in the usual grandiloquent terms of his time, but there is nothing in it to shew that he was other than a prince of mediocre merit. He is said by the Mahomedan historians to have greatly embellished the city of Gour, and called it after his own name *Lakhnouty* or *Lakshmaṇa-vatí;* but the inscriptions are silent on the subject, as they are as regards the popular belief of Ballála Sena's having built the town of Gour.

Lakshmaṇa was followed successively by his two sons, Mádhava Sena and Kesava Sena. The *Rájávalí* brings in a Su or Súra Sena after Kesava, and Mahomedan writers have a Noujib, a Narayan, a Lakhmana, and a Lakhmaniyá to follow him; but no monumental record has yet been found to prove their ever having existed. An As'oka Sena also occurs as one of the kings of Gour, but his position in the list is nowhere defined. Of these therefore I have nothing to say. I shall make an exception, however, in favour of the last of the series. The *Tabkát i Násiri* of Minhájuddin Jowzjáni says that the last king of

the Sena dynasty was Lakhmaniyá, and this authority must be accepted as correct, as the work was written within fifty-eight years after the conquest of Bengal by Bakhtiar Khilijy, and its author had ample opportunities, during his sojourn in Bengal, of conversing with the contemporaries of Lakhmaniyá who had taken part in that conquest, and of collecting the most authentic information available in his time. The account given in that book is as follows :—

ثقات رواة رحمهم الله چنین روایت کرده اند که چون ذکر شجاعت ومبارزت وفتوح ملك محمد بختیار رحمة الله براے لکهنیه رسید که دارالملک او شهرنودیه بود واو راے بس بزرگ بود ومدت هشتاد سال درتخت بود وبدین موضع حکایتے از حالات آن راے استماع افتاده است در قلم آمد ، وآن آنست که چون پدرآن راے از دنیا نقل کرد این راے لکهنیه درشکم مادر بود تاج برشکم مادر او نهادند وهمگنان پیش مادر او کمر بستند وخاندان ایشان را رایان هند بزرگ داشتندے وبمنزلت خلیفهٔ هند شمردندے - چون ولادت لکهنیه نزدیك رسید ومادرش را آثار وضع حمل ظاهر شد منجمان وبرهمنان را جمع کرد تا طالع وقت را نگاه دارند باتفاق گفتند که اگر این فرزند را درین ساعت ولادت باشد نحوست هرچه تمامتر باشد وبپادشاهي نرسد واگر بعد ازین بد وساعت ولادت باشد مدت هشتاد سال بادشاهي کند چون مادر او این حکم از منجمان بشنید بفرمود تا او را هردو پائے برهم بستند ونگونسار در آویختند ومنجمان را بنشاندند تا طالع مي نگریستند وچون وقت شد اتفاق کردند که وقت ولادت آمد بفرمود تا او را فرو گرفتند - در حال لکهنیه را ولادت بود - چون بزمین آمد مادرش از شدت تحمل آن حالت در گذشت - لکهنیه را برتخت نهادند وهشتاد سال پادشاهي کرد ،

Translation.—Contemporary historians, on whom be the blessings of God, have thus related : "That when the news of the valour and the wars and subjugation of kingdoms by Mohammed Bakhtyar, may the mercy of God be on him, reached Lakhmaniyá, the capital of his kingdom was Nuddea. The Ráya was very learned and had sat on the throne for 80 years. It will not be amiss to mention here an anecdote of the Ráya which has come to my knowledge ; it is this : When the father of the Ráya passed away from this world, Ráya Lakhmaniyá was in his mother's womb. The crown was therefore placed on the womb, and the officers of State all girt themselves and stood round and behind the mother. The family of this prince was known as the Ráya of Ráyas of Hind by the wise men of the time, and reckoned as

the viceroys (khalifá) of India. When the time for the birth of Lakhmaniyá approached near, and the mother felt the pains of delivery, the astrologers and Brahmans were assembled together, so that they may watch the auspicious moment of birth. They unanimously said that should this boy be born immediately, it will be unfortunate in every respect, and he will never attain to royalty. But should he be delivered two hours hence, he will reign for 80 years. When the mother heard this from the astrologers, she ordered that she may be hung up by her two feet as long as the auspicious moment should not come, and that the astrologers should be in attendance to watch that moment. When the proper time arrived and the astrologers said that it was at hand, she was taken down. Thus was Lakhmaniyá born, but his mother immediately died of the pains she had been subjected to. Lakhmaniyá was immediately placed on the throne, where he reigned for eighty years."

Three things may be taken for granted in this statement; first that the name of the last king of the Sena dynasty was Lakhmaniyá; second, that he was a posthumous child; and third, that he reigned for eighty years. It must be admitted, however, that the word Lakhmaniyá is very unlike a Bengali proper name. The only Bengali or Sanskrit word to which it bears any resemblance is the patronymic* *Lákshmaṇeya*, "a son, grandson or descendant of Lakshmaṇa," and if it be admitted that the *Lakhmaniyá* of the Mahomedan historians is a corruption of the Sanskrit *Lákshmaṇeya*, it would not be too much to assume that the prince under notice was the grandson of Lakshamaṇa son of Ballála.

The reigns of Mádhava and Kesava Sena were short and inconsequential, and it is very likely that the Lakhmaniyá who succeeded Kesava, and reigned in Bengal for 80 years, was taken by the Mahomedans to be the immediate successor of Lakshmaṇa, son of Ballála, who had a long and prosperous reign of many years. I adopt this assump-

* The affix *ḍhak* is ordinarily used after feminine nouns, स्त्रीभ्यो ढक् Pánini iv, I. 120, but under the especial rule *s'ubhrá-dibhyas'cha* (*P.* iv, I. 123.) Lakhshmaṇa of the Vasishṭha gotra takes that affix. "*Lakshmaṇa syámayorvásishṭhe.*" I know not whether the Senas were of the Vasishṭha gotra, but such niceties of grammar were so little attended to in the middle ages that I do not think that anybody would have objection to its use in the case of persons not of the Vasishṭha gotra. If such an objection be raised, we must take Lakshmaniya to be a matronymic and assume the name of our prince's mother to have been Lakshmaṇá.

tion owing as much to the names of Su Sena Noujib and a second Lakshmaṇa not occurring in any authentic early document, as to there being no sufficient time available between the dates of Ballála Sena and that of the Mahomedan conquest for the allocation of three reigns, after making the necessary allowance for Lakshmaṇa, Madhava and Kesava Senas and Lakhmaniyá. It is possible that those reigns were only of a few months' duration each, but there is nothing authentic to support such a theory, and therefore, I feel fully justified in the assumption I have made above.

The inscriptions are very unsatisfactory on the subject of dates. The Bakerganj plate professes to have been recorded in the month of Jaishṭa in the third year of the king's reign, but does not name any current era. The Rájasháhi stone has no date whatever. But it is not difficult to find the probable time when the different members of the Sena dynasty flourished in Bengal. According to the author of the *Samaya Prakás'a*, the *Dánaságara* was written (or completed ?) in the S'aka year 1019* = A. D. 1097. Ballála must therefore have lived at about the end of the eleventh century, and this accords well with the statement of the Áyín Akbary which makes that prince commence his reign in the year 1066. Lakshmaṇa, according to Abul Fazel, assumed the sovereignty of Bengal in 1116, which gives a period of 51 years to Ballála. I doubt, however, the accuracy of the last date. The date of Bakhtiar's conquest of Bengal is well known (1203), and the testimony of Minhajuddin regarding the eighty years' reign of Lákshmaniya cannot be easily set aside. This carries us back to 1123. On the other side if we allow only three years to Ballála after the completion of his Dánaságara we come to the end of the 11th century, leaving only 23 years between 1101 and 1123 for distribution among Lakshamaṇa, Mádhava and Kesava. The exact period of Laksmaṇa's reign is not known. Abul Fazel allots to him only 8 years, but Haláyudha, his prime minister, suggests a much longer time. He says that he was in his boyhood made a court paṇdit, by the king ; that in his early manhood, he attained to the rank of a minister ; and that

* निखिलनृपचक्रतिलकश्रीवल्लालसेनदेवेन। पूर्णे ऽग्नि-नव-दृग्मिते शकाब्दे दानसागरोरचितः ॥

subsequently he was raised to the office of the Lord Chancellor *Dharmádhikára*.* This is not practicable within the space of eight years, and I feel no hesitation in assigning to him two and a half times that number of years; the remaining three years being left for Mádhava and Kesava and possibly for Su or Sura Sena should a prince of that name be hereafter verified. For the present I am disposed to throw out a hint that Su Súra Noujeb and As'oka were probably the proper name and aliases of the prince whose patronymic was Lakhmaniyá. Prinsep, following the A'yin Akbary, takes 1136 to be the date of the Bakerganj plate, but as that authority makes Lakhmaniyá begin his reign in the year 1200 A. D. and fly to Orissa three years after, when Minhajuddin, who had ample opportunities of conversing with the contemporaries of Lakshmana, and was himself in Bengal a few years after his overthrow, assures us that that prince reigned for 80 years, we may without compunction reject its evidence as unworthy of belief. The ancestors of Ballála from Hemanta to Víra Sena were hitherto unknown to history, and even now the inscription under notice does not name the time when they flourished. The final settlement of their dates must, therefore, be left for future research. If we assign to them the usual Indian average of 18 years to a reign, the Sena dynasty may be arranged as follows :—

* For those who may be curious on the subject I quote a few stanzas from the *Bráhmana Sarvasva*.

बभूव तस्यां प्रकृतेर्महानिव स्थिरो निवासायतनं हलायुधः।
यत्कीर्तिरक्षोनिधिवीचिदण्डदोलाधिरोहव्यसनं बिभर्त्ति॥
लब्धं जन्म धनञ्जयाङ्गभवतः श्रीलक्ष्मणक्ष्मापते-
राद्यत्या लघुता निजस्य वयसः प्राप्ता महापाचता।
शब्दब्रह्म करोदरामलकवद्वेद्योत्तरा सत्क्रिये-
त्यस्मि प्रार्थयितव्यमस्य कृतिनः किञ्चिन्न सांसारिकं॥
येनासोदजितं न सिन्धुलहरी धौताङ्गनायां चितौ
यस्याज्ञातमभून्न सप्तभुवने नानाविधं वाङ्मयं।
देवः स विजगन्नमस्य महिमा श्रीलक्ष्मणः क्ष्मापति-
र्नेता यस्य मनीषिताधिकपुरस्कारोत्तराः सम्पदः॥
बाल्ये ख्यापितराजपण्डितपदः श्वेतांशुबिम्बेज्वल-
च्छ्लोत्सिक्तमहामहस्तनुपदं दत्वा नवे यौवने।
यस्मै यौवनशेषयोग्यमखिलक्ष्मापालनारायणः
श्रीमान् लक्ष्मणसेनदेवनृपतिर्धर्माधिकारं ददौ॥

	A. D.
Vira Sena, ...	994
Sámanta Sena, ...	1012
Hemanta Sena, ...	1030
Vijaya *alias* Sukha Sena, ...	1048
Ballála Sena, ...	1066
Lakshmana Sena, ...	1101
Madhava Sena, ...	1121
Kesava Sena, ...	1122
Lakhmaniya, *alias* As'oka Su or Sura Sena,	1123
The last overthrown by Bhakhtiar in	1203

This arrangement brings the age of Víra Sena, probably the first of the family who settled in Bengal, to very near the time which I have assigned to Ádis'úra in my paper on Mahendrapála,* and it would not be too much to assume that Víra was the immediate successor of Ádis'úra. There is, however, no monumental or any ancient authentic record to prove the date of A'dis'úra. The authorities quoted in my paper agree in bringing him down to the time of Ballála, and must therefore be rejected as false. The author of the *Káyastha Kaustubha* places the advent of the Kanauj Brahmans in Bengal in the year 380 Bengali or 892 A. D., which would place A'dis'úra in the midst of the Pálas and be altogether inconsistent with the history of the five original Brahmans and Káyashtas of Bengal. Pere Tieffenthaler's authorities carry Ádis'úra still further back, and place him twenty-two generations away from Ballála. My date of Ádis'úra is founded upon the genealogical tables of the Káyasthas as now current in this country. Those tables give 27 generations from the time of Ádis'úra, and at 3 generations to a century the time of that prince is carried to 964 of the Christian era. If there be any error in the tables, it would no doubt falsify my deduction, but as long as that error is not detected, that deduction will, I expect, command more attention than the authorities I have quoted. But be that as it may, as far as we are at present informed, it must be admitted that the two princes lived at times very close to each other. It is said by some that Ádis'úra was the father of Ballála; while others maintain that he was the progenitor of the Sena dynasty. The first statement may at once be rejected as inconsistent with the inscriptions and the

* Ante Vol. XXX, p. 11.

Dánaságara ; but the second may be true, and if so, Vira Sena may well be taken to be the same with Ádis'úra. The name Ádis'úra does not sort either with the Pálas or with the Senas. The word *s'úra* is a synonym of *Víra* a hero, and the *ádi* is indicative of the initial position which Víra Sena occupies in the genealogy of the dynasty. It is stated in the genealogical tables of the Káyasthas that when Ballála established his system of *Kula* the original five Káyasthas of Kanauj had multiplied to 56 families. Assuming that each generation of the original Káyasthas had multiplied two-fold, five generations from Ádis'úra to Ballála would give eighty individuals, who may well represent the alleged number of families. Of the Brahmans the total number of families that lived at the time of Ballála is not known. But it is evident that it was not large, for we find that he included only ten families in the ranks of his nobles, *viz.* two of the descendants of Bhaṭṭanáráyaṇa, two of those of Daksha, one of those of S'rí Harsha, three of those of Chhándaḍa, and two of those of Vedagarbha. They do not suggest a longer period than would be covered by five generations. It should be noted that the editor of the Venisañhára,* Muktáráma Vidyávágis'a, in his genealogical table of the Tagore family makes Haláyudha minister of Lakshmaṇa Sena, to be the 16th in descent from Bhaṭṭanáráyaṇa; but inasmuch as his statement has been contradicted by the author of the *Khitís a-vañsávali-charita*† who would have him to be the third in descent from Bhaṭṭanáráyaṇa, and both have been contradicted by Haláyudha himself, who calls his father Dhanañjaya, whereas the one makes him the son of Nipu and the other that of Rámarúpa, we may well reject his testimony as inadmissible. It must, however, be admitted that the identity I suggest is a mere conjecture, and I hope it will be taken as such and no more.

There is one more circumstance in connexion with the Senas to which I wish to allude, before I conclude,—it is with reference to their caste. The universal belief in Bengal is, that the Senas were of the medical caste, and families of Vaidyas are not wanting in the present day who trace their lineage from Ballála Sena. There is, however, nothing authentic to justify this belief. It is well known that a great many of the pedigrees given in Burke's *Landed Gentry* are utterly worthless, and it is notorious that many families of

* Ed. Calcutta, 1855. † Pertche's Ed. p. xvi.

obscure origin have their veins filled with the blue blood of generations of kings by the opportune help of popular genealogists, and we feel strongly tempted to believe that the pedigree of the so-called Ballála's descendants is no better. The *Kulapañjiká* of Kulácháryа Ṭhakura describes Ádis'úra as the "sun of the Kshatriya race." *(Kshatriya vañsa hañsa);* the Bakerganj and the Rájsháhi inscriptions agree in calling the Senas, the descendants of the moon or Kshatriyas of the lunar race (Somavañsa); the latter describes Sámanta Sena as "a garland for the head of the race of noble Kshatriyas"—*brahma kshatriyáṇám kulos'iro dáma;* and their testimony cannot be rejected in favour of modern tradition. Nor is it difficult to account for the mistake which has given rise to that tradition. There lived in former days in the North-West a race of Kshatriyas of the name of *Ambashṭha.* The Vishṇu Puráṇa alludes to them when enumerating the several races of the North-West Provinces, (मद्रा रामास्तथाम्बष्ठाः पारशिकादयस्तथाः) and Páṇini quotes *Ambashṭha* as an example of the same word meaning a Kshatriya race and a country where they live (Páṇini IV, I, 171.) The Mahábhárata uses the word both as the name of a race of Kshatriyas, and that of a Kshatriya king, and the Mediní, the Víswaprakás'a and the Sabdaratnákara explain it as the name of a country.* It is very likely that the Senas belonged to this section of the military class, and in Bengal, in later days, was confounded with the *Ambashṭhas* of Manu who were a mixed tribe of Brahmans and Vaisyas, and therefore taken to be of the medical caste. Such confounding of names and their meanings has been so common in India, that one need not be at all surprised at finding the Senas degraded from a military to a mixed caste, from a misapprehension of the meaning of their name. Abul Fazel in the *Áyín Akbary* and Pere Tieffenthaler make the Senas to belong to the *Káyastha* caste, and this may be explained by the fact that the Káyasthas in the North-West are even to this day called by the name of Ambashṭhas. If this be not accepted, tradition shall have to be opposed to authentic inscription. James Prinsep noticed in the Bákerganj plate the title of *S'ankara Gauḍes'wara* which, written as the word *s'ankara* is with a palatal *s*, can only mean "the excellent lord of Gauḍa," unless शङ्कर "excellent" be taken as a euphuism of *sankara*, a mixed race. There is a temple at Kashmir known by the name of San-

* Goldstücker's Sanskrit Dictionary, voce Ambashṭha.

kara* Gaureswara, owing probably to its having been erected by order of one of the Sena Rájás. The epigraph of the *Dánaságara* assigns to Ballála Sena the title of निःशङ्कशङ्कर which, according as the *s* of *Sankara* is taken to be a palatal or a dental, means "undoubtedly the most excellent," or "undoubtedly of a mixed race." It is very unlikely that anybody would assume the latter for a distinctive title. This is, however, a question of so little consequence to the antiquarian, that I need not dwell upon it any longer.

P. S. As Mr. Metcalfe's translation does not profess to be literal I have not thought proper to alter it in any way, except in the cases of verses 4, 5 and 20, which are susceptible of very different interpretations, one of which would make Víra Sena a king of Dekkan and his great grandson the first who subjugated Bengal, and another take him to be only a Southron by race, but a king of Bengal. (12th Sept. 1865.)

Transcript and Translation of an Inscription from Rájsháhi.—By C. T. Metcalfe, Esq., C. S.

ॐ नमः शिवाय ।

वक्त्रोंशुकाहरणसाध्वसकृष्टमौलि-
माल्यच्छटाहृतरतालयदीपभासः ।
देव्याख्यामुकुलितं मुखमिन्दुभाभि-
र्व्वीक्ष्याननानि हसितानि जयन्ति शम्भोः ॥ १ ॥

Victory be to the mouths of Shambhu (Shiva), who laughed on looking through the light of the moon at the shame-contracted face of Debi who, for fear of the removal of her breast-cloth, turned aside her head, the garland of which drowned the light of the candle in the hymeneal chamber.

लक्ष्मीवल्लभभाभृच्छैलजादयितयोरद्वैतलीलागृहं
प्रद्युम्नेश्वरशब्दलाञ्छनमधिष्ठानं नमस्कुर्म्महे ।
यच्चालिङ्गनभङ्गकातरतयां यास्यित्वान्तरे कान्तयो-
र्द्देवीभ्यां कथमप्यभिन्नतनुताश्लिष्येऽन्तरायः कृतः ॥ २ ॥

We bow down before the idol of Harihara (Vishnu and Shiva), known under the name of Pradyumneshwara, where the Debis, fearing

* Ante Vol. XVII. Pt. II, p. 283.

lest they should no longer enjoy the embrace of their husbands, went inside (the idol); and became an obstacle to the amalgamation of the two deities.

[When Hari and Hara intended to amalgamate themselves into one form, their wives, being afraid of not recognising their husbands, became an obstacle to executing their purpose, and the deities instead of being able to assume a new form, retained half of each.]

यत् सिंहासनमीश्वरारस्य कनकप्रायं जटामण्डलं
गङ्गाप्रीकरमञ्जरीपरिकरैर्यचामरप्रक्रिया ।
श्वेतोत्फुल्लफणाच्छलः शिवशिरःसन्दानदामोरग-
श्छत्रं यस्य जयत्यसावचरमो राजा सुधादीधितिः ॥ ३ ॥

Victory be to the first king moon, who sits enthroned on the matted hair (Jaṭá) of Shiva, fanned by a chauri having drops of Ganges water; the white expanded hood of the serpents which adorn the head of Shiva, became the covering of his *chatta* (umbrella), and the serpents, its handle.

[Here the moon is represented as a king, who has the matted hair of Shiva for his throne, and the hood of the serpent's for his umbrella.]

वंशे तस्यामरस्त्रीवितरतकलासाक्षिणो दाक्षिणात्य-
श्लोणीन्द्रैर्वीरसेनप्रभृतिभिरभितः कीर्त्तिमद्भिर्व्वभूवे ।
यच्चारित्रानुचिन्तापरिचयसुचयः सूक्तिमाध्वीकधाराः
पाराशर्य्येण विश्वश्रवणपरिसरप्रीणनाय प्रणीताः ॥ ४ ॥

In his race, who enjoyed the companionship of the celestial maidens, and the virtuous deeds of which race were celebrated in honied verses by Vyasa for the satisfaction of the universe, were born king Víra Sena and others, who were Dakhinátyas* and famous everywhere.

तस्मिन् सेनान्ववाये प्रतिसुभटशतोत्सादनब्रह्मवादी
सब्रह्मक्षत्रियाणामजनि कुलशिरोदाम सामन्तसेनः ।
उद्गीयन्ते यदीयाः स्खलदुदधिजलोल्लोलशीतेषु सेतोः
कच्छान्तेष्वप्सरोभिर्ईश्वरयतनयस्पर्द्धया युद्धगाथाः ॥ ५ ॥

* The word *Dákshinátya kshaunindra* may mean "a king of the Southern country" Dekkan, or "a king of the Southern race," in the same way in which *páschátya*, *Sáraswat*, *Drábiḍa*, indicate races. R. M.

In that Sena family was born Sámanta Sena, the destroyer of hundreds of the enemy's champions. He was a worshipper of Brahma and a garland for the head of the race of the noblest Kshetriyas; and verses celebrating his heroic deeds were sung by the celestial maidens on the border of the dam cooled by the agitated waves of the ocean, in a manner which might even excite the envy of Rama, the son of Dasharatha.

यस्मिन् सङ्गरचत्वरे पटुरटत्तूर्य्योपहूतद्विष-
द्वर्गे येन कृपाणकालभुजगः खेलायितः पाणिना ।
द्वैधीभूतविपक्षकुञ्जरघटाविश्लिष्टकुम्भस्थली
मुक्ताश्शूलवराटिकापरिकरैर्व्याप्तं तदद्याप्यभूत् ॥ ६ ॥

He did in the field of battle play with his hands his serpent-like swords, where the noise of his battle-drums depressed the spirit of his enemies, and the pearls which fell from the globe over the head of his enemies' elephants, unseamed by his sword, are still to be found scattered in the shape of heavy kouries.

गृहाद्गृहमुपागतं व्रजति पत्तनं पत्तना-
द्वनात् वनमनुद्रुतं भ्रमति पादपं पादपात् ।
गिरेर्गिरिमधिश्रितन्तरति तोयधिन्तोयधे-
र्यदीयमरिसुन्दरीसरकपृष्ठलग्नं यशः ॥ ७ ॥

His fame mounting the backs of his enemies' wives, did travel from house to house, from city to city, from forest to forest, from mountain to mountain, and from ocean to ocean.

दुर्व्वृत्तानामयमरिकुलाकीर्ण्णकर्ण्णाटलक्ष्मी-
लुण्टाकानां कदनमतनोत्तादृगेकाङ्गवीरः ।
यस्मादद्याप्यविहतवसामांसमेदःसुभिक्षां
हृष्यत्पौरस्त्यजति न दिशं दक्षिणां प्रेतभर्त्ता ॥ ८ ॥

He did extirpate the enemies who plundered the riches of the Carnatic, and the marrow, flesh and bones, (of the dead bodies of his enemies' troops) to be found in abundance there, has caused Yama not to leave the southern quarters up to the present time, becoming himself gladly an inhabitant of the place.

[Yama is lord of the Pretas, a kind of evil spirits or demons, who live upon human flesh and blood.]

उद्गन्धीन्यायुधूमैर्म्मगशिशुरसिताखिन्नवैखानसस्त्री-
स्तन्यक्षीराणि कीरप्रकरपरिचितब्रह्मपारायणानि ।
येनासेव्यन्त शेषे वयसि भवभयाक्रन्दिभिर्म्मस्करीन्द्रैः
पूर्ण्णात्मङ्गानि गङ्गापुलिनपरिसरारण्यपुण्याश्रमाणि ॥ ९ ॥

In his old age he settled himself in the sacred groves of the hilly forests situated on the bank of the Ganges, where the smoke of the incense offerings reached to the skies, and young deer sucked the milk of the wives of the moonies (saints); where parrots have got by rote the Vedas; and where the slopes of the mountains are filled up by the saints who resort there on approach of death.

अचरमपरमात्मज्ञानभोग्यादमुग्धा-
न्निजभुजमदमत्तारातिमाराङ्कवीरः ।
अभवदनवसानोद्भिन्ननिर्ण्णिक्तवत्त-
दूणनिवहमह्निां वेश्महेमन्तसेनः ॥ १० ॥

From this king, in his manhood, when he had not devoted himself to the contemplation of God, was born Hemanta Sena, who was famous for killing his enemies proud of their strength, and who did acquire from his birth all the pure and virtuous qualities possessed by his ancestors.

मूर्द्धन्यर्द्धेन्दुचूड़ामणिचरणरजः सत्यवाक् कण्ठभित्ता
श्रोत्रं श्रोत्रेरिकेशाः पदभुविभुजयोऽङ्कूरमौर्व्वीकिणाङ्कः ।
नेपथ्यं यस्य जज्ञे सततमियदिदं रत्नपुष्पाणि हारा
स्ताड़ङ्कं नूपुरसघक्कानकवलयमप्यस्य नृत्याङ्गनानाम् ॥ ११ ॥

He did bear on his head the dust of Shiva's feet, had truth on his throat (*i. e.* spoke truth), had the Vedas in his ear, (*i. e.* heard the Vedas,) had the hairs of his enemies under his feet, (*i. e.* received homage from his enemies), and had the scars of bow-strings on his arms. Such were his ornaments, while the pearl flowers, ear-rings and golden bracelets formed the ornaments of his dancing girls.

[This sloke is so full of participles that it is difficult to translate it clearly.]

यद्दोर्व्वल्लिविलासलब्धगतिभिः शल्यैर्विदीर्णोरसां
वीराणां रणतीर्थवैभववशाद्दिव्यं वपुर्व्विभ्रताम् ।

संसक्तामरकामिनीस्तनतटीकाश्मीरपत्राङ्कितं
वक्षः प्रागिव मुग्धसिद्धमिथुनैः सातङ्कमालोकितं ॥ १२ ।

The breasts of the heroes, who on account of their fall in battle with him, being piereed by his spears, which were spiritedly played by his arms, assumed eelestial forms, and were embraced by the celestial maidens, whose breasts were reddened by good-smelling red powders, were looked with terror by the Shiddhas, a species of celestial inhabitants, (for, on account of their breasts being reddened by their embraeing the eelestial maidens, the Shiddhas were reminded of the time when they fell in battle, their breasts being then besmeared with blood, piereed by his spear).

[It is represented in Hindu mythology, that heroes, after their fall in battle, assume celestial forms and ascend to heaven.]

प्रत्यर्थिव्ययकेलिकर्म्मणि पुरः स्फेरं मुखं बिभ्रतो
रेतस्यैतदसेश्च कौशलमभूद्दाने द्वयोरद्भुतं ।
शत्रोः कोपि दधेऽवसादमपरः सख्युः प्रसादं व्यधा-
देको हारमुपाजहार सुहृदामन्यः प्रहारं द्विषाम् ॥ १३ ॥

His arms and his swords could both assume diverse aspects, the one in acts of benevolence, and the other when killing his foes, both were ingeniously employed. One intended destruction to his enemies, and the other blessing to his friends; one adorned his friends with garlands, and the other his enemies with wounds.

महाराज्ञी यस्य स्वपरनिखिलान्तःपुरबधू-
शिरोरत्नश्रेणीकिरणसरणिस्फेरचरणा ।
निधिः कान्ते साध्वी व्रतवितनिनोज्वलयशा
यशोदेवी नाम त्रिभुवनमनोज्ञाकृतिरभूत् ॥ १४ ॥

His queen was of the name of Yasho Debia, who possessed a delightful figure, was a treasure to her husband, was famous for performing ceremonial rites, and the path of her feet was adorned by the rays of the pearls stuck on the crest of the diadem of her friends and enemies' wives.

ततस्त्रिजगदीश्वरात् समजनिष्ट देव्यास्ततो-
प्यरातिबलघातनोज्वलकुमारकेलिक्रमः ।

चतुर्जलधिमेखलावलयसीमविश्वम्भरा
विशिष्टजयसान्वयो विजयसेनपृथ्वीपतिः ॥ १५ ॥

From this king of the world and the queen, was born Vijaya Sena, the emperor of the earth, who diverted his youthful days by destroying the strength of his enemies, and extended his conquests to the end of the four oceans* which girdle the world like bracelets.

गणयतु गणयः को भूपतींस्तानने न
प्रतिदिनरणभाजा ये जिता वा हता वा।
इह जगति विधेहे स्वस्य वंशस्य पूर्व्वः
पुरुष इति सुधांशौ केवलं राजशब्दः ॥ १६ ॥

Who can count the number of kings daily killed or conquered by him? The moon, being his first progenitor could only retain the title of Raja before him in this world.

[That is, he defeated or destroyed all the Rajas of this earth, and acquired its possession.]

सङ्ख्यातीतकपीन्द्रसैन्यविभुना तस्यारिजेतुस्तुलां
किं रामेण वदाम पाण्डवचमूनाथेन पार्थेन वा।
हेतोः खड्गलतावतंसितभुजामात्रस्य येनार्जितं
सप्ताम्भोधितटीपिनद्धवसुधाचक्रैकराज्यम् फलम् ॥ १७ ॥

As he, being armed only with a sword and with no other assistance, obtained the undisputed dominion of the earth girdled by the seven oceans, can we compare him to Rama, the leader of innumerable monkey forces? or to Pártha (Arjuna) the generalissimo of the Pándava forces?

[In conquering the earth, Rama and Partha had advantages of large armies, while he had none.

Pártha the third son of Pándu was a famous warrior. In the war of the Kurus and Pandavas, he was the general of the Pándavas. His heroic deeds are celebrated in the Mahabharat.

"*Monkey forces.*" This mention of monkey forces, appears to me to agree curiously with the scenes in Homer Il. iii. 6. When speaking of India, he writes—

Ανδρασι Πυγμαιοισι φονον και κῆρα φερουσαι

and he goes on to say. (I forget the remaining lines,) that the king of India kept an army of 3000 of them as guards.]

* Ceylon doubtless.

एकैकेन गुणेन यैः परिगतं तेषां विवेकादृते
कश्चिद्धन्त्यपरश्च रक्षति सृजत्यन्यश्च कृत्स्नं जगत् ।
देवोयं तु गुणैः कृतो बहुतिथैर्द्धीमान् जघान द्विषो
वृत्तस्थानपुषच्चकार च रिपुच्छेदेन दिष्या प्रजाः ॥ १८ ॥

Of the (three) qualities of the Deity, which manifest themselves singly, without discrimination, one destroys the universe, the other preserves, and the third creates it. But this king resembled the Deity, on account of his having these eminent qualities, and employing them with discretion, for he destroyed his enemies, preserved the virtuous, and made his subjects happy by destroying their foes.

दत्त्वा दिव्यभुवः प्रति क्षितिभृतामुर्व्वीमुरीकुर्व्वता
वीरास्रृग्लिपिलाञ्छितेऽसिरमुना प्रागेव पत्रीकृतः ।
नेत्थं चेत् कथमन्यथा वसुमती भोगे विवादोन्मुखी
तत्राक्षत्रकृपाणधारिणि गता भङ्गं द्विषां सन्ततिः ॥ १९ ॥

He assigned heaven for the residence of his opponent kings, and took upon himself the dominion of the earth; his sword decked with heroes' blood, fulfilled this contract. Had it been otherwise, then why did the descendants of his enemies, fly from the field of battle, where he challenged them with his sword?

त्वं नान्यवीरविजयीति गिरः कवीनां
श्रुत्वाऽन्यथा मननरूढनिगूढरोषः ।
गौडेन्द्रमद्रवदपाहृतकामरूप-
भूपं कलिङ्गमपि यस्तरसा जिगाय ॥ २० ॥

"Thou hast no hero to conquer" said the bards. On hearing it, through a misconception (the words being susceptible of the meaning "thou hast conquered no hero,") a deep anger rose and assailed the king of Gauda who overcame the king of Kamrupa, and forthwith conquered him of Kalinga.*

* The latter part of the s'loka may mean that the king (not the anger) assailed the king of Gour, subjugated the king of Kámrupa and quickly conquered him of Kalinga; or, he assailed the king of Gour who had subjugated the king of Kámarupa, and quickly conquered him of Kalinga; or he quickly conquered the king of Kalinga who had overcome the king of Kámarupa without the intervention of the king of Gour. R. M.

शूरंमन्य इवासि नान्य किमिह खं राघव श्लाघसे
स्पर्द्धां वर्द्धन मुञ्च वीर विरतो नाद्यापि दर्पस्तव।
इत्यन्योन्यमहर्निशप्रजयिभिः कोलाहलैः क्ष्माभुजां
यत्कारागृहयामिकैर्न्नियमितो निद्रापनोदक्रमः ॥ २१ ॥

O Rághava, O Aswineya, O Vardhana, do you boast, calling yourself a hero? away with your boasting, stop your pride. The cries that arose day and night among the captive kings prevented the guards of the prison-house from sleeping (at any time).

पाश्चात्यचक्रजयकेलिषु यस्य यावद्
गङ्गाप्रवाहमनुधावति नौविताने।
भर्गस्य मौलिसरिदम्भसि भस्मपङ्क-
लग्नोज्झितेव तरिरिन्दुकला चकास्ति ॥ २२ ॥

The fleet which he equipped for conquering the western countries, went up the stream of the Ganges, and one of the ships became stuck in the ashes which are on the forehead of Shiva, and which have been changed into mud by constant mixture with the water of the Ganges, and being left there, shines as the moon.

[The Hindu Shasters affirm that the Ganges proceeds from the Jaṭá (matted hair of Shiva), and hence this sloka means, that this king having resolved to conquer up to the source of this river, one of his ships going up the stream became stuck on the forehead of Shiva, where it shines like the moon.]

मुक्ताः कर्पासबीजैर्म्मरकतशकलं शाकपत्रैरलाबू-
पुष्पै रूप्याणि रत्नं परिणतिभिदुरैः कुक्षिभिर्दाडिमानाम्।
कुष्माण्डीबल्लरीणां विकसितकुसुमैः काञ्चनं नागरीभिः
शिक्ष्यन्ते यत् प्रसादाद्भुजविभवजुषां योषितः श्रोत्रियाणाम् ॥२३॥

Through his favour the wives of the rich Brahmins learned to make diamonds from cotton seeds, black diamonds from grass leaves, silver from the flower of long gourds, pearls from brittle cavities of pomegranates, and gold from flowers of gourd-creepers and euphorbia.

अश्रान्तविश्राणितयज्ञयूप-
स्तम्भावलीं द्राग्वलम्बमानः।

यस्यानुभावाद्भुविसञ्चचार-
कालक्रमादेकपदोपि धर्म्मः ॥ २४ ॥

Though on account of this age, the praise of his virtue is one-legged, yet, through his power, it has travelled over the world, holding the sacrificial posts continuously erected by him (on the earth).

[The import of the sloka is, that he was constantly engaged in performing sacrifices, on which occasion posts are erected on the spot where the ceremony is performed.

Among the Hindus, there are four ages; Satya Yuga is the age of purity, Treta, Dwapara and Kali. In the first, virtue is supposed to be four-legged, in the second, three-legged, in the third two-legged, and in the last one-legged; thereby showing that the world is gradually becoming sinful. This is Kali Yuga, and is said to have commenced from the latter part of the reign of Yudhisṭhir, king of Hastinapura, the modern Delhi.]

मेरोराहृतवैरिसङ्कुलतटादाहूय यज्वामरान्
व्यत्यासं पुरवासिनामकृत यः स्वर्गस्य मर्त्यस्य च ।
उत्तुङ्गैः सुरसद्मभिश्च विततैस्तल्लैश्च शेषीकृतं
चक्रे येन परस्परस्य च समं द्यावापृथिव्योर्व्वपुः ॥ २५ ॥

Having invited the gods from Meru, which was infested by enemies, this sacrificer made the inhabitants of the heaven and earth to change their places; and by digging deep ponds* and erecting lofty temples, he made the heaven and the earth to resemble each other.

[It is supposed that the peaks of Meru are inhabited by the gods. When any sacrifice is performed, they are suffered to come down to the earth to partake of the offerings.]

दिक्शाखामूलकाण्डं गगनतलमहाम्भोधिमध्यान्तरीयं
भानोः प्राक्प्रत्यगद्रिस्थितिमिलदुदयास्तस्य मध्याह्नशैलम् ।
व्यालम्बस्तम्भमेकं त्रिभुवनभवनस्यैकशेषं गिरीणां
सप्रद्युम्नेश्वरस्य व्यधित वसुमतीवासवः सौधमुच्चैः ॥ २६ ॥

* The Burrin or high land of Rajashahi is covered with the most enormous tanks that astonish every body. I do not know of ever hearing of any other district with the same number of tanks as this. It is no exaggeration to say, that there is a tank measuring 200 to 500 yards in the north of this district, and some most extensive and beautiful.

This king of the earth erected a temple to Pradyumneshwar, which was girdled by the oceans and contained inside the whole ethereal firmament. It extended to all directions in space, and vied in loftiness with Meru, round which the sun, moon and the stars move. It became the mid-day mountain of the sun who rises and sets in the eastern and western mountains.

प्रासादेन तवामुनैव हरितामध्वा निरुद्धो मुधा
भानोद्यापि कृतोस्ति दक्षिणदिशः कोणान्तवासी मुनिः ।
अन्यामुच्चयतोयमच्छतु दिशं विन्ध्योप्यसौ वर्द्धतां
यावच्छक्ति तथापि नास्य पदवीं सौधस्य गाहिष्यते ॥ २७ ॥

O sun! in vain have you obliged Agastya to remain in the southern quarter; look, this lofty temple has obstructed the passage of your horses.* Let Agastya go in any direction he likes, and let Vindya increase its heights as much as it can, but it shall never be able to attain the loftiness of this temple.

[According to the Puráns, the sun is represented as moving round Sumeru, a mountain supposed to be situated in the middle of the earth. This particular honour paid to it, excited the jealousy of Vindhya, another mountain, (the mountains are supposed to possess animal life), and he worshipped Shiva and obtained the power of increasing his body as high as he wished. Vindhya did so, and obstructed the passage of the sun which doomed the half of the earth to darkness. The gods, having perceived this, were alarmed and prevailed upon Agastya, a moonie and spiritual guide of Vindhya, to leave Kashi (Benares) and to prevent his increase. Agastya acceded to their wishes, and went to Vindhya who, seeing his guru, prostrated himself on the ground. Agastya, thereupon in order to serve the purposes of the gods, ordered him to remain in that posture till his return from the southern quarters, where he is supposed still to reside.]

स्रष्टा यदि स्रष्यति भूमिचक्रे, सुमेरुमत्पिण्डविवर्त्तनाभिः ।
तदाघटः स्यादुपमानमस्मिन् सुवर्णकुम्भस्य तदर्पितस्य ॥ २८ ॥

If Brahma, making the earth as a potter's wheel builds a pot, taking as much mud as the Sumeru is in weight, then that pot can bear resemblance to the golden one placed by this king on the summit of this temple.

* The mythological story of Phœbus and his horses.

विलेप्यविलासिनीमुकुटकोटिरत्नाङ्कुर
स्फुरत्किरणमञ्जरीच्छुरितवारिपूरं पुरः।
चखान पुरवैरिणः सजलमग्नपौराङ्गना
स्तनैणमदसौरभोचलितचञ्चरीकं सरः ॥ २९ ॥

Before the temple of Shiva, he dug a pond in which reflected the rays of the pearls stuck in the diadem of the crest of the female serpent and to which the black bees are attracted by the sweet scent of the musks applied to the breasts of the maidens who go to bathe there.

[The snakes are supposed to reside in Patal, a region below this earth. He dug his pond to such a depth, to cause the rays of the diamonds over the heads of the female snakes to pierce, through its waters.]

उचिचाय दिगम्बरस्य वसनान्यर्द्धाङ्गना स्वामिनो
रत्नालङ्कृतिभिर्व्विभूषितवपुःशोभाः प्रतं सुभ्रुवः।
पौराढ्यांश्च पुरीः श्मसानवसतेर्भिक्षाभुजोस्थापयां
लक्ष्मीं सत्यतनोद्दरिद्रभरणे सुज्ञो हि सेनान्वयः ॥ ३० ॥

This descendant of the Sena family did wisely provide for the poor, inasmuch as he clothed Digambar (naked) with coloured dresses, adorned his body with golden ornaments, erected a palace for him, as he used to live in Shashána (a place where dead bodies are burnt,) and made him rich, as he maintained himself by begging.

[In the Hindu mythology, Shiva is represented as naked, living in Shashána, and maintaining himself by begging. He is ornamented, with serpents.]

चिचर्च्च चौमेभचर्म्मा हृदयविनिहितस्थूलहारोरगेन्द्रः
श्रीखण्डोदभस्माकरमिलितमहानीलरत्नाक्षमालः।
वेषस्तेनास्य तेने गरुडमणिलता गोनसः कान्तमुक्ता
नेपथ्य, नृस्थिरिच्छा समुचितरचनः कल्पकापालिकस्य ॥ ३१ ॥

This king dressed Shiva at his own choice in the shape of Kalpa Kápálika, replacing his (Shiva's) tiger's hide by coloured silken clothes, his serpents by bulky garlands pendent over his breasts, his ashes by sandal wood powders, his rosary by blue pearls, and his human bones by gems.

[A Kalpa is a period of 4,320,000,000 of years (constituting a day and night of Brahma), after which period the universe is supposed to be destroyed by Shiva, who assumes on the occasion the form of Kápálika, having a tiger's hide for his dress, serpents round his neck, ashes over his body, and a rosary of human bones in his hand.

The carpenter in Marryat's "Midshipman Easy" was evidently acquainted with the Kalpa theory.]

बाहोः केलिभिरर्द्वितीयकनकच्छत्रं धरित्रीतलं
कुर्व्वाणेन न पर्य्याप्तेषि किमपि स्वेनैव तेनेहितम् ।
किन्तस्मै दिशतु प्रसन्नवरदेप्यर्द्धेन्दुमौलिः परं
स्वं सायुज्यमसावपश्चिमदशाश्लेषे पुनर्द्दास्यति ॥ ३२ ॥

He acquired by his arms the government of the world, and gained what was good for him in earth by his own powers. He has nothing to ask for in this world; but, O Shiva, who hast the half-moon on thy crest, bless him and give him in the end final absorption into yourself.

प्रस्तोतुमस्य चरितस्य चरितं क्षमः स्यात्
प्राचेतसो यदि पराशरनन्दनो वा
तत्कीर्त्तिपूरसुरसिन्धुविगाहनेन
वाचः पवित्रयितुमत्र तु नः प्रयत्नः ॥ ३३ ॥

It is Valmika and Vyasa who are able awhile to do justice to his life; we have tried this only to purify our words by emerging in the holy river of his fame.

[Valmika, a saint, is the author of the Ramayana, a famous and beautiful historical poem, containing a life of *Rama*.

I believe *Rama* to be Bacchus, or rather Bacchus to be Rama. I have no authority for this idea beyond a curious similarity between the fables of this country and the fables as told by the Greeks.

Rama conquered the Continent of India,

and

nunc quoque qui puer es, quantus tum, Bacche, fuiste
Cum timuit thyrsos India victa tuos!
Victa racemifero lyncas dedit India Baccho.

Ovid. Art. Amorum i. 189, 190. *Metam. xv.* 413.]

यावद्वास्तोस्पतिपुरधुनीभूर्भुवः स्वः पुनीते
यावच्चान्द्री कलयति कलोत्तंसतां भूतभर्त्तुः ।
यावच्चेतो गमयति सतांश्चेतिमानं त्रिवेदी
तावत्तासां रचयतु सखी तत्तदेवास्य कीर्त्तिः ॥ ३४ ॥

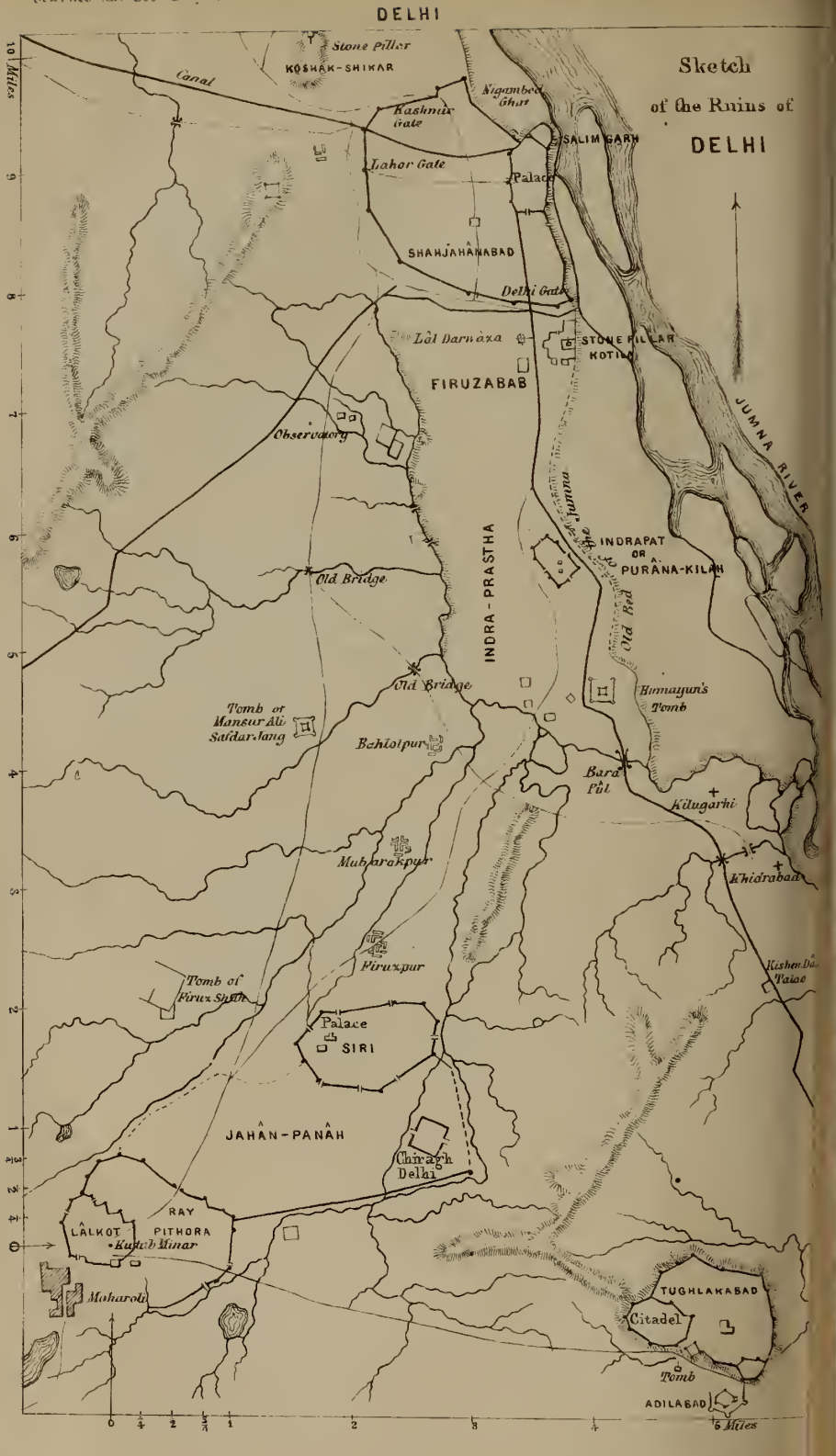
As long as the Ganges will purify the heaven, the earth, and the Patála, (a region under the earth, Purgatory), as long as the moon will become an ornament of Shiva, and as long as the three Vedas (Rig, Yajus and Sháma) impart true knowledge to the virtuous, so long may his fame, becoming their friends, do similar duties which are done by them!

निर्णिक्तसेनकुलभूपतिमौक्तिकाना-
मग्र्यश्रिलग्रथनपद्मलसूत्रवल्लिः ।
एषा कवेः पदपदान्वर्थविचारशुद्ध-
बुद्धेरुमापतिधरस्य कृतिः प्रशस्तिः ॥ ३५ ॥

This garland of praises, consisting of the gems of the pure Sena family kings, has been constructed by Oomapatidhar, a poet, whose understanding has been refined by study of words and their meanings, (*i. e.* by the study of literature).

धर्म्मोपनम्रा मनदासनम्रा
बृहस्पतेः सूनुरिमां प्रशस्तिं
चखान वारेन्द्रकशिल्पिगोष्ठी-
चूड़ामणीराणक शूलपाणिः ॥ ३६ ॥

This praise has been inscribed (dug) by humble Shulapani, the head of the Barendra artists, son of Brihaspati, grandson of Manadása and great-grandson of Dharma.



Lithog. at the Surv. General's Office, Calcutta, Augt. 1866.

Report of the Proceedings of the Archæological Surveyor to the Government of India for the Season of 1862-63.—*By Major-General* A. Cunningham, *Archæological Surveyor to the Govt. of India.*

[*Received* 3*rd Feb.*, 1865.] [*Read* 1*st March*, 1865.]

(Continued from Vol. XXXIII. page lxxxvii.)

II.—MATHURA.

159. In the Brahmanical city of Mathura, in A. D. 634, the temples of the gods were reckoned by Hwen Thsang at five only, while the Buddhist monasteries amounted to 20, with 2,000 resident monks. The number of *Stupas* and other Buddhist monuments was also very great, there being no less than seven towers, containing relics of the principal disciples of Buddha. The king and his ministers were zealous Buddhists, and the three great fasts of the year were celebrated with much pomp and ceremony, at which times the people flocked eagerly to make their offerings to the holy *Stupas* containing the relics of Buddha's disciples. Each of them, says Hwen Thsang, paid a special visit to the statue of the *Bodhisatwa* whom he regarded as the founder of his own school. Thus the followers of the *Abhidharma*, or transcendental doctrines, made their offerings to *Sâriputra ;* they who practised *Samâdhi* or meditation, to *Mudgalaputra ;* the followers of the *Sautrântikas*, or aphorisms, to *Purva Maitreyani Putra ;* they who adhered to the *Vinaya* or discipline, to *Upâli ;* the *Bhikshuni* or Nuns, to Ananta ; the *Annpâsampannas*, or novices, to *Râhula* (the son of *Buddha) ;* and they who studied the "Greater means of advancement," to the great Bodhisatwa *Manju Sri* or *Avalokiteswara*, who plays such a conspicuous part in later Buddhism. But notwithstanding this apparently flourishing condition of Buddhism, it is certain that the zeal of the people of Mathura must have lessened considerably since A. D. 400, when Fa Hian reckoned the body of monks in the 20 monasteries to be 3,000, or just one-half more than their number at the time of Hwen Thsang's visit in A. D. 634.

160. Fa Hian and his companions halted at Mathura for a whole month, during which time "the clergy held a great assembly and discoursed upon the law." After the meeting they proceeded to the *Stupa* of *Sâriputra*, to which they made an offering of all sorts of

perfumes, and before which they kept lamps burning the whole night. Hwen Thsang describes these processions as carrying flying streamers and stately parasols, while the mists of perfumes and the showers of flowers darkened the sun and moon! I can easily realize the pomp and glittering show of these ceremonies from the similar scenes which I have witnessed in Barma. I have seen streamers from 100 to 200 feet in length carried in processions, and afterwards suspended from pillars or holy trees. I have beheld hundreds of gorgeous parasols of gold and silver brocade flashing in the sun; and I have witnessed the burning of thousands of candles day after day before the great *Stupa* of *Shwe-Dagon* at Rangoon, which is devoutly believed to contain eight hairs of Buddha. Before this sacred tower, I have seen flowers and fruits offered by thousands of people, until they formed large heaps around it, while thousands of votaries still came thronging in with their offerings of candles, and gold leaf, and little flags, with plantains and rice, and flowers of all kinds.

161. From these accounts of the Chinese pilgrims it would appear that the Buddhist establishments at Mathura must have been of considerable importance, and this conclusion is fully borne out by the number and interest of the recent discoveries. Contrary to his usual practice, Hwen Thsang has unfortunately given us but few details regarding the monasteries and temples of Mathura. This is the more to be regretted, as we now know that one of the monasteries was established by the great Indo-Scythian King *Huvishka*, about the beginning of the Christian era, and that one of the stone statues, judging by the size of its hand, could not have been less than 20 feet in height.

162. The first place described by Hwen Thsang is a monastery situated on a mound, at 5 or 6 *li*, or about one mile, to the east of the city. Cells were formed in the sides of the mound, which was approached through a hollow, and in the midst was a *Stupa* containing the nails of Buddha. This monastery is said to have been built by the holy *Upagupta*, who, as we learn from one of the legends of *Pâtali Putra*, was a contemporary of Asoka. The nails and beard of the holy man were still preserved.

163. On another mound to the north of this monastery, there was a cave containing a stone chamber, 20 feet high and 30 feet long,

which was full of bamboo spikes only four inches in length. These spikes represented the number of husbands and their wives who had been converted by *Upagupta*.

164. At 24 or 25 *li*, or just four miles to the south-east of the stone chamber, there was a large dry tank, with a *Stupa* on its bank, which marked the spot where Buddha was said to have taken exercise. On this spot also, according to the local legends, a monkey had offered honey to Buddha, which the teacher graciously accepted and directed that it should be mixed with water and given to the monks. The glad monkey made a wild bound, and fell into the tank and died; but owing to the powerful influence of his good act, he became a man in his next birth.

165. In a forest at a short distance to the north of the tank there was another holy spot, where the four previous Buddhas were said to have taken exercise; and all around it there were numerous *Stupas*, which marked the places where no less than 1,250 *arhats*, or holy men, including *Sâriputra*, *Mudgalaputra*, and others, used to sit in meditation. But besides these, there were several other *Stupas* on the spots where Buddha at different times had explained the law.

166. The two principal sites described by Hwen Thsang can, I think, be fixed with tolerable certainty; namely, that of the famous *Upagupta* monastery, and that of the monkey's offering. The first is said to be at 5 or 6 *li*, or just one mile, to the east of the city; but as an eastern direction would take us to the low ground, on the opposite bank of the Jumna, where no ruins now exist, I feel quite satisfied that we should read *west* instead of *east*. This change is rendered almost certain by the discovery of numerous Buddhist remains inside the great square of the *Katra*, which is just one mile to the westward of the old fort of Mathura. But it is rendered quite certain by the more recent discovery of very important Buddhist remains and old inscriptions in a mound *beside a tank* which is situated just three miles to the south-east of the *Katra* mound. This tank mound I take to be the place where Buddha was said to have taken exercise, and where the monkey made his offering of honey. The direction is precisely the same, and the distance agrees also as well as can be made out from Hwen Thsang's statements. He gives the distance as four miles from the stone chamber, which was at some unstated, but certainly short,

distance to the north of the *Upagupta* monastery. The nearest mounds are about half a mile to the north of the *Katra*, which will make the whole distance $3\frac{1}{2}$ miles, if measured in a direct line by the British road, which passes outside the city, but which will be fully four miles if measured by the old road, which goes through the city. Had the Chinese pilgrim given us the name of the monastery built by *Upagupta*, we might perhaps have obtained some absolute proof of its identity with the site of the *Katra ;* but I believe that the very strong reasons which I have just before given are amply sufficient to fix the site of the *Upagupta* monastery at the present *Katra*.

167. There are a great number of lofty earthen mounds around Mathura which are covered with fragments of stone and brick. Nothing, however, is known about them, although every one of them has a separate name. The numerous fragments of stone which are found upon them show that they are not old brick-kilns, as might have been supposed from their vicinity to the city. Apparently, they are natural mounds such as are found everywhere along the lower course of the Jumna, and which have usually been taken advantage of for the sites of forts or temples. Thus the old fort of Mathura is perched upon a similar mound, and so also is the Jâma Masjid in the middle of the *Katra* Square. Most of the names of these mounds refer to the Brahmanical divinities ; but there are two of them, such as the *Anand Tila* and the *Vinayak Tila*, that are unmistakably Buddhist, and which may possibly refer to the two *Stupas* of *Ananda* and *Upáli* (the *Vinayaka*, or teacher of *Vinaya*) as described by Hwen Thsang. Both of these mounds are to the north of the city. To the south there are seven mounds known as the *Sát Tila*, which are severally named as follows :—1, *Dhú-ka-Tila ;* 2, *Sapt Rishi ;* 3, *Bal*, or *But*, *Tila ;* 4, *Narad ;* 5, *Kans ;* 6, *Kal-jug ;* 7, *Nágshesha*. Now, it is remarkable that the number of great *Stupas* of the disciples of Buddha was also seven ; but unfortunately as nothing is recorded regarding their relative positions, we are left entirely to conjecture whether these seven mounds may possibly represent the seven famous *Stupas* of Buddha's principal disciples. I think that it would be worth while to make some excavations in all of these seven mounds to the south, as well as in the two northern mounds which still bear Buddhistical names.

168. The *Katra* mound has been successively occupied by Buddhists, Brahmans, and Musalmans. The *Katra*, or market-place, is an oblong enclosure like a *Sarâ*, 804 feet in length by 653 feet in breadth. In the midst of this square stands the *Jâma* Masjid, on a large mound from 25 to 30 feet in height. The mosque is 172 feet long and 66 feet broad, with a raised terrace in front of the same length, but with a breadth of 86 feet, the whole being 30 feet in height above the ground. About 5 feet lower, there is another terrace 286 feet in length by 268 feet in breadth, on the eastern edge of which stands the mosque. There is no inscription on the building, but the people ascribe it to Aurungzib, who is said to have pulled down the great Hindu temple of *Kesava Deva*, or *Keso Ray*, that formerly stood on this high mound, a most noble position, which commands a fine view of the whole city. Curiously enough, I have been able to verify this charge against Aurungzib by means of some inscriptions on the pavement slabs which were recorded by Hindu pilgrims to the shrine of Kesava Ray. In relaying the pavement, the Muhammadan architect was obliged to cut many of the slabs to make them fit into their new places. This is proved by several of the slabs bearing incomplete portions of Nâgari inscriptions of a late date. One slab has "*bat* 1713, *Phâlgun*," the initial *Sam* of *Sambat* having been cut off. Another slab has the name of *Keso Ray*, the rest being wanting; while a third bears the late date of S. 1720. These dates are equivalent to A. D. 1656 and 1663; and as the latter is *five* years subsequent to the accession of Aurungzib, it is certain that the Hindu temple was still standing at the beginning of his reign.

169. The greater part of the foundations of the Hindu temple of Kesava Ray may still be traced at the back of the Masjid. Indeed the back wall of the mosque itself is actually built upon the plinth of the temple, one of the *cyma reversa* mouldings being filled up with brick and mortar. I traced the walls for a distance of 163 feet to the westward, but apparently this was not the whole length of the temple, as the mouldings of the Hindu plinth at the back of the Masjid are those of an exterior wall. I think it probable that the temple must have extended at least as far as the front of the mosque, which would give a total length of 250 feet, with an extreme breadth of nearly 72 feet, the floor of the building being no less than 25 feet above the

ground. Judging from these dimensions, the temple of *Kesava Deva* must have been one of the largest in India. I was unable to obtain any information as to the probable date of this magnificent fanc. It is usually called Kcso Ray, and attributed to Raja Jaga Deva, but some say that the enshrined image was that of *Jaga Deva*, and that the builder's name was Ray or *Raja Kesava Deva.* It is possible that it may have been one of the "innumerable temples" described by Mahmud in his letter to the Governor of Ghazni, written in A. D. 1017, as we know that the conqueror spared the temples either through admiration of their beauty, or on account of the difficulty of destroying them. Mahmud remained at Mathura only 20 days, but during that time the city was pillaged and burned, and the temples were rifled of their statues. Amongst these there were "five golden idols whose eyes were of rubies, valued at 50,000 dinars," or £25,000. A sixth golden image weighed 98,300 *mishkals*, or 1,120 lbs., and was decorated with a sapphire weighing 300 *mishkals*, or 3½lbs. But "besides these images, there were above one hundred idols of silver, which loaded as many camels." Altogether the value of the idols carried of by Mahmud cannot have been less than three millions of Rupees, or £300,000.

170. The date of Mahmud's invasion was A. D. 1017, or somewhat less than 400 years after the visit of the Chinese pilgrim Hwen Thsang, who in A. D. 634 found only five Brahmanical temples in Mathura. It is during these four centuries, therefore, that we must place, not only the decline and fall of Buddhism, but its total disappearance from this great city, in which it once possessed twenty large monasteries, besides many splendid monuments of its most famous teachers. Of the circumstances which attended the downfall of Buddhism we know almost nothing; but as in the present case we find the remains of a magnificent Brahmanical temple occupying the very site of what must once have been a large Buddhist establishment, we may infer with tolerable certainty that the votaries of *Sakya Muni* were expelled by force, and that their buildings were overthrown to furnish materials for those of their Brahmanical rivals; and now these in their turn have been thrown down by the Musalmans.

171. I made the first discovery of Buddhist remains at the temple of *Kesava Ray* in January 1853, when, after a long search, I found

a broken pillar of a Buddhist railing sculptured with the figure of *Máyá Devi* standing under the *Sál* tree. At the same time I found the capitals of two large round pillars of an early date, which are most probably Buddhist, along with a fragment of an inscription of the Gupta dynasty, containing the well known genealogy from Gupta, the founder, down to Samudra Gupta, where the stone is broken off. During the present year I have discovered the peculiarly curved architrave of a Buddhist gateway, which is richly sculptured on both sides with buildings, figures, and trees, including a representation of a gateway itself. I found also a very perfect standing figure of Buddha, the Teacher, which had lately been discovered in clearing out a well at the north-west corner of the temple. The figure is $3\frac{1}{2}$ feet high, with the left hand grasping the drapery, and the right hand raised in the act of teaching. On the pedestal there is a dated inscription, in two lines, in characters of an early period. The date is given in figures and is uncertain, but the remainder of the inscription, which is in perfect order, is easily legible. It records the gift of a statue of *Sakya Bhikshu* to the *Yasa Vihâra*, or "splendid monastery," which I take to have been the name of the Buddhist establishment that once existed on this spot. I think also that there are good grounds for believing that this was the famous monastery which was founded by the holy *Upagupta* during the reign of Asoka.

172. In the same well there were found five other pieces of Buddhist sculpture, of which the only specimens worth mentioning are a colossal arm and hand, and a small figure of Buddha, the Ascetic, with an imperfect inscription on its pedestal in characters of the Gupta dynasty. All these discoveries are sufficient to show that the mound of Kesava Ray must have been the site of a Buddhist establishment of much wealth and of considerable size. The inscribed statue proves that here stood the *Yasa* monastery, and the gateway architrave shows that there must also have been a *Stupa* surrounded with the stone railing which is peculiar to Buddhist architecture, and which on that account I have ventured to call the Buddhist railing. The site is a most promising one for a discovery, and as the Masjid has long been disused, owing to many dangerous cracks in both roof and walls, I believe that there would not be any objection whatever to a complete exploration of the mound.

173. The most extensive discoveries at Mathura have been made in a mound close to the Jail, which, according to the inscriptions, would appear to have been the site of at least two different monasteries, named the *Huvishka Vihâra* and the *Kundokhara Vihâra*. The first of these names I deciphered in 1860 from a circular inscription round the base of a column, and the second name I found early in the present year, 1863, on a large flat slab of stone which had apparently been used as a seat.

174. In my notice of the first discovery, which was published in the Asiatic Society's Journal for 1860, I identified this *Huvishka* with his namesake of the Wardak inscription, and with the *Hushka* of the Raja Tarangini; and this identification has since been adopted by all who have made any reference to either of these records. The question is one of considerable importance, as it enables us to fix the date of the building of the monastery in the latter half of the century immediately preceding the Christian era, at which period the three Indo-Scythian princes, *Hushka* and his brothers, *Kanishka* and *Jushka*, ruled over Kabul, Kashmir, and the Punjab. The bases of about 30 pillars belonging to this monastery have now been discovered, of which no less than 15 are inscribed with the names of the donors who presented the columns to the monastery. But as one of these gifts consisted of six pillars, a second of 25, and a third of 26 pillars, there still remain 40 columns to be discovered, which will bring up the total number to 70. The diameter of the circular shafts of these pillars varies from 17 to 18 inches, and the side of the square base from $23\frac{1}{2}$ to 24 inches. They are all very coarsely worked, the rough marks of the chisel never having been smoothed away.

175. The name of the second monastery, *Kundokhara*, refers, I believe, to the tank which lies immediately to the westward of the mound. At most of the old Buddhist sites I have found tanks named in a similar manner, as the *Buddhokhar* at Buddha Gaya, the *Pansokhar* at Nâlanda, the *Narokhar* and *Chandokhar* at Sarnath, Benares, the *Buddhokhar* at Punâwa, and the *Chandokhar* at Dharâwat. All of these I believe to be formed of *Pushkhara*, or *Pokhar*, the well known term for a tank, added to the name of Buddha, or to that of the person at whose expense it was excavated.

176. The discoveries already made in the Jail mound, amongst

the ruins of the *Huvishka* and *Kundokhara* monasteries, have been very interesting on account of their variety, as they comprise statues of all sizes, bas-reliefs, pillars, Buddhist railings, votive *Stupas*, stone umbrellas, and many other objects peculiar to Buddhism, of a date as early as the first century of the Christian era. Amongst the broken statues there is the left hand of a colossal figure of Buddha, the Teacher, which measures exactly one foot across the palm. The statue itself, therefore, could not have been less than from 20 to 24 feet in height, and with its pedestal, halo, and umbrella canopy it must have been fully 30 feet in height. Stone statues of this great size are so extremely difficult to move, that they can be very rarely made. It is true that some of the Jain statues of Gwalior are larger, such as the standing colossus in the *Urwâhi* of the fort, which is 57 feet high, with a foot 9 feet in length, and the great seated figure on the east side of the fort, which is 29 feet high, with a hand 7 feet in length. But these figures are hewn out of the solid rock, to which they are still attached at the back. There are larger statues also in Barma, but they are built up on the spot of brick and mortar, and cannot be moved. I look forward, therefore, with great interest to the discovery of other portions of the Mathura Colossus, and more especially to that of the pedestal, on which we may expect to find the name of the donor of this costly and difficult work.

177. Most of the statues hitherto discovered at Mathura have been those of Buddha, the Teacher, who is represented either sitting or standing, and with one or both hands raised in the attitude of enforcing his argument. The prevailing number of these statues is satisfactorily illustrated by Hwen Thsang, who records that when Buddha was alive he frequently visited Mathura, and that monuments have been erected "*in all the places where he explained the law.*" Accordingly, on this one spot there have already been found two colossal standing figures of the Teacher, each 7½ feet in height, two life-size seated statues, and one three-quarter size seated statue, besides numerous smaller figures of inferior workmanship.

178. The most remarkable piece of sculpture is that of a female of rather more than half life-size. The figure is naked, save a girdle of beads round the waist, the same as is seen in the Bhilsa sculptures and Ajanta paintings. The attitude and the positions of the

hands are similar to those of the famous statue of Venus of the Capitol. But in the Mathura statue the left hand is brought across the right breast, while the right hand holds up a small portion of drapery. The head is slightly inclined towards the right shoulder, and the hair is dressed in a new and peculiar manner, with long curls on each side of the face, which fall from a large circular ornament on the top of the head. The back of the figure is supported by a thick cluster of lotus stalks covered with buds and flowers, which are very gracefully arranged and boldly executed. The plump face with its broad smile is the least satisfactory part of this work. Altogether this statue is one of the best specimens of unaided Indian art that I have met with. I presume that it represents a dancing girl, and that it once adorned one of the gateways of the great *Stupa* near the monastery of *Huvishka*.

179. Three statues of lions have also been discovered, but they are inferior both in design and in execution to most of the other sculptures. They are all of the same height, 3 feet, and are all in the same attitude, but two of them have the left foot advanced, while the third has the right foot brought forward. The attitudes are stiff, and the workmanship especially of the legs, is hard, wiry and unnatural. It is the fore part only of the animal that is given, as if issuing out of the block of stone in rear, from which I infer that they must originally have occupied the two sides of some large gateway, such as we may suppose to have belonged to the great monastery of *Huvishka*.

180. The most numerous remains are the stone pillars of the Buddhist railings, of which at least three different sizes have been found. Those of the largest size are $4\frac{1}{2}$ feet in height, with a section of $12\frac{1}{2}$ by 6 inches. When complete with base and coping, this railing would have been about 7 feet in height. The middle-sized pillars are 3 feet 8 inches high, with a section of 9 by $4\frac{3}{4}$ inches. The railings formed of these pillars would have been $5\frac{1}{2}$ feet in height. Those of the smallest size are $2\frac{3}{4}$ feet high, with a section of $6\frac{1}{2}$ by $3\frac{3}{4}$ inches, which would have formed a railing of only 4 feet in height. Of this last size no more than six specimens have yet been found, but two of them are numbered in the ancient Gupta numerals as 118 and 129, so that many more of them still remain to be discovered. If we assume the number of these pillars to have been no more than 129, the length of railing which they formed would have been 144 feet, or with two

entrances not less than 160 feet. This might have been disposed either as a square enclosure of 40 feet side, or as a circular enclosure of upwards of 50 feet diameter. The last would have been sufficient for the circular railing of a *Stupa* 40 feet in diameter.

181. No inscriptions or numbers have been found on any of the large sized pillars, but there can be no doubt that they must have formed parts of the surrounding railings either of *Stupas* or of holy trees, such as are represented in the Sanchi bas-reliefs, or as we see them in still existing examples at Sanchi and Sonâri. Of the middle-sized railing I found a single broken rail, and also a single specimen of the architraves or coping stones. In the Sanchi and Sonâri examples the coping is quite plain, but this Mathura specimen is ornamented on both faces with semi-circular panels or niches containing figures and flowers.

182. The sculptures on the Mathura pillars are of two kinds; namely, large single figures on the front, and on the back either small bas-reliefs in compartments one above the other, or else full-blown flowers at regular intervals. Both in the single figures and in the bas-reliefs we find the same mixture of religious and social subjects as in the sculptures of Sanchi and Buddha Gaya. On one pillar we have a standing figure of Buddha, the Teacher, with a halo and umbrella canopy, and on the back four small bas-reliefs representing, 1st, a holy tree with suspended garlands, surrounded by a Buddhist railing; 2nd, a pair of figures, male and female; 3rd, a kneeling figure presenting an offering to a standing figure; and 4th, an elephant with rider. One of the other single figures is a female holding a water vessel to her lips, and no less than four of the others are representations of Mâyâ Devi standing under the *Sâl* tree, and holding one of its branches, in which position she is described as having given birth to Buddha. A specimen one of the large sized Mathura pillars may be seen in the Asiatic Society's Museum in Calcutta, where it was deposited by Colonel Stacy.

183. But perhaps the most curious of all the Mathura sculptures is that which was figured and described by James Prinsep in 1836 as a Statue of Silenus. The block is 3 feet 10 inches in height, 3 feet broad, and 1 foot 4 inches thick. On the top there is a circular bason 16 inches in diameter and 8 inches deep. On the front there is a group of three figures about three-fourths of life-size, with two

smaller figures, and on the back a group of four figures of half life-size. In the front group the principal figure is a stout, half naked man resting on a low seat, with ivy or vine-crowned brow, and outstretched arms, which appear to be supported by the figures, male and female, standing one on each side. The dress of the female is most certainly not Indian, and is almost as certainly Greek. The dress of the male figure also appears to be Greek. Colonel Stacy describes it as "a kerchief round the neck with a tie in front as worn by sailors;" but as it widens as it approaches the shoulders, I presume that it must be the short cloak of the Greeks which was fastened in front in the very same manner as represented in this sculpture. Prinsep agrees with Stacy in considering the principal figure to be Silenus: "his portly carcass, drunken lassitude, and vine-wreathed forehead, stamp the individual, while the drapery of his attendants pronounces them at least to be foreign to India, whatever may be thought of Silenus's own costume, which is certainly highly orthodox and Brahmanical. If the sculptor were a Greek, his taste had been somewhat tainted by the Indian beau-ideal of female beauty. In other respects his proportions and attitudes are good; nay, superior to any specimen of pure Hindu sculpture we possess; and considering the object of the group, to support a sacrificial vase (probably of the juice of the grape), it is excellent." Of the group on the back I have but little to say: the two female figures and one of the men are dressed in the same Greek costume as the figures of the other group, but the fourth figure, male, is dressed in a long tunic, which is certainly not Greek, and cannot well be Indian. The religious Buddhist would have his right shoulder bare, and the layman would have the *dhoti*, or waist-cloth. The Greek-clad male figure may possibly be Silenus, but I am unable to offer even a conjecture as to the figure in the tunic.

184. The question now arises, how is the presence of this piece of Greek sculpture to be accounted for? Perhaps the most reasonable solution is to assume the presence of a small body of Bactrian Greek sculptors who would have found ready employment for their services amongst the wealthy Buddhists, just in the same way as goldsmiths and artillerymen afterwards found service with the Mogul Emperors. It must be remembered that Mathura is close to the great sandstone

quarries which for ages past have furnished materials for sculptors and architects of Upper India. All the ancient statues that I have met with in Rohilkhund and Oudh are made of this stone, and there can be little doubt that the Buddhist custom of making gifts of statues and pillars to the various monasteries must have created such a steady demand for the sculptor's works as would have ensured the continuous employment of many skilled workmen. Many of the Bactrian Greeks may thus have found remunerative service amongst the Indian Buddhists. Indeed, this is the only way in which I can account, not only for the very superior execution of many of the earliest specimens of Indian art, but also for many of their ornamental details, such as the fluting of the pillars in the Western Punjab architecture and the honeysuckle and astragal ornaments of Asoka's monoliths, all of which are of undoubted Greek origin. In the great fort of Narwar there still exists a Roman Catholic chapel, with a burial-ground attached, containing fifty tombs of all sizes, of which two only are inscribed. One records the death of a German, named Cornelius Oliver, in A. D. 1747; the other of a young girl named Margarita, the daughter of a *Hakim* or Doctor. The first is recorded in Portuguese, the other in Persian. That the fifty tombs are those of Christians is proved, not only by the presence of the cross on several of the uninscribed head-stones, but by the occurrence of letters I. H. S. surmounted by a cross, on the wall immediately above the altar. I presume that these Christians were gunners who formed the artillery portion of the garrisons of the important fortress of Narwar. Here, then, we have the clearest proof of the existence of a small body of foreigners in the very heart of India, who were permitted the open exercise of their religion by the most bigoted of all mankind, the Indian Muhammadans. Such also I think may have been the position of a small party of Bactrian Greeks amongst the tolerant Buddhists of the great city of Mathura, about the beginning of the Christian era. Their very names are unknown, and their occupations are uncertain, but their foreign religion is attested beyond all doubt by the presence of a Bacchic altar, bearing the known figure of the wine-bibbing Silenus.

III.—KHALSI OR SRUGHNA.

185. About 15 miles to the westward of Masuri, and on the right bank of the Jumna just above the junction of the Tons river, there

stands a huge quartz boulder eovercd with one of the well known inscriptions of Asoka. The inscribed rock is situated close to the little villages of Byâs and Haripur, and about one mile and a half to the south of the large and well known village of Khâlsi, by which name I propose to distinguish this copy of Asoka's edicts from those of *Kapurdagiri*, *Junagiri*, *Rohitâs*, and *Ganjam*. In speaking of Firuz Shah's Pillar at Delhi, which we know was brought from the foot of the hills on the western bank of the Jumna near Khidrabad, I have already identified the district of Khâlsi with part of the ancient kingdom of Srughna, as described by Hwen Thsang. As my reasons for eoming to this eonelusion are based entirely upon the statements of the Chinese pilgrim, it is neecssary that they should be given in detail.

186 On leaving *Sthâneswara* or *Thânesar* Hwen Thsang records that he went 400 *li*, or 66 miles, to the westward, to the kingdom of Su-lu-kin-na. or Surghna, whieh he describes as bcing bounded by the Ganges on the east, and by high mountains on the north, and as bcing watered by the Jumna, which ran through the midst of it. The Capital, which was 20 *li*, or upwards of three miles, in eireuit, was situatcd immediately on the west bank of the Jumna, and although mueh ruined, its foundations were still standing. Amongst other monuments it possessed a *Stupa* of King Asoka. The direction given by Hwen Thsang is undoubtedly wrong, as the Jumna is not more than 24 milcs distant from Thânesar towards the east. But the mention of the hills shows most elearly that the bearing should be north-east, and as the reeorded distanee of the Jumna at the foot of the hills agrees with the aetual distance, the situation of the Capital of Srughna must be looked for along the western bank of the Jumna, somewhcre between Khâlsi and Khidrabad. At first I was inclined to fix the position of the Capital in the immediate neighbourhood of the inscribed roek of Khâlsi, but I could neither find nor hear of any ruins in its vicinity, and the distance is besides too great, being, 71 miles in a direct linc, or about 80 miles by the road. If Hwen Thasng's distance is correet, the most probable position of the Capital is *Paota*, on the right bank of the Jumna, whieh is 57 miles distant from *Thânesar* in a direct line, or about 65 miles by the road. I believe also that *Paota* is the very place from whenee Firuz Shah removed the Delhi column, for the name of its original site is variously written as *Taopar*, or *Topara*, or *Taoparsuk*, any

one of which by the mere shifting of the diacritical points might be read as *Paotar*. It is possible also that the word *Suk* may still preserve a trace of the ancient name of *Sughan*, which is the spoken form of the Sanskrit *Srughna*. I propose to explore this neighbourhood during the ensuing cold season. In the meantime I am satisfied with having shown that the inscribed rock of Khâlsi is situated within 18 or 20 miles of the site of the ancient Capital of Srughna, in whose great monastery the Chinese pilgrim spent upwards of four months, because the monks discussed the most difficult questions so ably that all doubts were cleared up. By the hands of this learned fraternity were most probably engraved the two copies of the edicts of Asoka which are still extant, on the Khâlsi rock and on the Delhi Pillar of Firuz Shah.

187. Between Khâlsi and the Jumna the land on the western bank of the river is formed in two successive ledges or level steppes, each about 100 feet in height. Near the foot of the upper steppe stands the large quartz boulder which has preserved the edicts of Asoka for upwards of 2,000 years. The block is 10 feet high, and about 8 feet thick at bottom. The south-eastern face has been smoothed, but rather unevenly, as it follows the undulations of the original surface. The main inscription is engraved on this smoothed surface, which measures 5 feet in height with a breadth of $5\frac{1}{2}$ feet at top, which increases towards the bottom to 7 feet $10\frac{1}{2}$ inches. The deeper hollows and cracks have been left uninscribed, and the lines of letters are undulating and uneven. Towards the bottom the letters increase in size until they become about thrice as large as those of the upper part. Owing either to this enlargement of the letters, or perhaps to the latter part of the inscription being of later date, the prepared surface was too small for the whole record, which was therefore compressed on the left hand side of the rock.

188. On the right hand side an elephant is traced in outline, with the words *Gaja tame* inscribed between his legs in the same characters as those of the inscription. The exact meaning of these words I do not know; but as the Junagiri rock inscription closes with a paragraph stating that the place is called *Sweta Hasti*, or the "white elephant," I think it probable that *Gaja tame* may mean the "dark or black elephant," and may therefore be the name of the rock itself. Amongst the people, however, the rock is known by the name of *Chhatr Sila*,

or "the canopy stone," which would seem to show that the inscribed block had formerly been covered over by some kind of canopy, or perhaps only by an umbrella, as the name imports. There are a number of squared stones lying about close to the rock, as well as several fragments of octagonal pillars and half pillars or pilasters, which are hollowed out or fluted on the shorter faces, after the common fashion of the pillars of Buddhist railings. There is also a large carved stone, 7 feet long, $1\frac{1}{2}$ foot broad, and 1 foot in height, which from its upper mouldings I judged to have formed the entrance step to some kind of open porch in front of the inscription stone.

189. When found by Mr. Forrest early in 1860 the letters of the inscription were hardly visible, the whole surface being encrusted with the dark moss of ages; but on removing this black film the surface became nearly as white as marble. At first sight the inscription looks as if it was imperfect in many places, but this is owing to the engraver having purposely left all the cracked and rougher portions uninscribed. On comparing the different edicts with those of the *Kapurdagiri*, *Junagiri* and *Dhouli* versions, I find the Khâlsi text to be in a more perfect state than any one of them, and more especially in that part of the 13th Edict which contains the names of the five Greek Kings, Antiochus, Ptolemy, Antigonus, Magas, and Alexander. The Khâlsi text agrees with that of Dhouli in rejecting the use of the letter *r*, for which *l* is everywhere substituted. But the greatest variation is in the use of the palatal sibilant *s*, श, which has not been found in any other inscription of this early date. This letter occurs in the word *Pásanda*, which curiously enough is spelt sometimes with one *s*, and sometimes with the other, even in the same edict. As the proper spelling of this word is *Pashanda*, it seems almost certain that the people of India Proper did not possess the letter *sh* in the time of Asoka.

190. I made a complete impression of the whole of this important inscription. I also copied the whole of the inscription on the left side by eye, as well as most of the more obscure parts in the front inscription. I have since compared the entire text with those of the other rock tablets, and I am now engaged in making a reduced copy of this valuable record for early publication. I propose, however, first to compare it with the *Kapurdagiri* version in the Arian characters. With good copies of all the different texts before them, the scholars

of Europe will be able to give a more satisfactory interpretation of Asoka's edicts than has hitherto been made, even with the aid of all the learning of Burnouf and Wilson.

IV.—MADAWAR, OR MADIPUR.

191. From Srughna the Chinese pilgrim proceeded to Mo-ti-pu-lo, or *Madipur*, to the east of the Ganges, a distance of 800 *li*, or 133 miles. Madipur has been identified by M. St. Martin with *Mandâwar*, a large old town in Western Rohilkhand near Bijnor. I had made the same identification myself before reading M. St. Martin's remarks, and I am now able to confirm it by a personal examination of the locality. The actual distance from *Paota* on the Jumna to *Mandâwar* viâ *Haridwâr*, is not more than 110 miles by the present roads; but as it would have been considerably more by the old native tracks leading from village to village, the distance recorded by Hwen Thsang is most probably not far from the truth, more especially when we remember that he paid a visit to Ma-yu-lo, or *Mayurapura*, now *Myapoor*, near Hardwâr at the head of the Ganges Canal. But the identity of the site of *Madâwar* with Madipur is not dependent on this one distance alone, as will be seen from the subsequent course of the pilgrim, which most fully confirms the position already derived from his previous route.

192. The name of the town is written मडावर, *Madâwar*, the *Mundâwur* of the maps. According to *Johari Lal*, Chaodri and Kanungo of the place, *Madâwar* was a deserted site in Samvat 1171, or A. D. 1114, when his ancestor *Dwârka Dâs*, an Agarwâla Baniya, accompanied by *Katâr Mall*, came from *Morâri* in the Mirat District, and occupied the old mound. The present town of *Madâwar* contains 7,000 inhabitants, and is rather more than three-quarters of a mile in length by half a mile in breadth. But the old mound which represents the former town is not more than half a mile square. It has an average height of 10 feet above the rest of the town, and it abounds with large bricks, a certain sign of antiquity. In the middle of the mound there is a ruined fort, 300 feet square, with an elevation of 6 or 7 feet above the rest of the city. To the north-east, distant about one mile from the fort, there is a large village, on another mound, called *Madiya;* and between the two lies a large tank called *Kûnda Tâl*, surrounded by numerous small mounds which are said to be the re-

mains of buildings. Originally these two places would appear to have formed one large town about $1\frac{1}{4}$ mile in length by half a mile in breadth, or $3\frac{1}{2}$ miles in circuit. The *Kanungo* states that *Madâwar* formed part of the dominions of Pithora Raja, and that it possessed a large Hindu temple of stone, which was afterwards destroyed by one of the Ghori Sultans, who built the present Jâma Masjid on its site, and with its materials. The stones of the mosque are squared blocks of soft grey sandstone, and as many of them exhibit cramp-holes on the outside, there can be no doubt that they must originally have belonged to some other building.

193. To the south-east of the town there is a large, deep, irregularly shaped piece of water called *Pirwâli Tâl*. It is nearly half a mile in length, but not more than 300 feet broad in its widest part. It is filled in the rains by a small channel carrying the drainage of the country from the north-east, and its overflow falls into the *Mâlini* River, about two miles distant. This pool is only part of a natural channel of drainage which has been deepened by the excavation of earth for the bricks of the town. But in spite of this evident origin of the *Madâwar* tank, it was gravely asserted by the Buddhists to have been produced by an earthquake which accompanied the death of a celebrated saint named *Vimala Mitra*.

194. According to Hwen Thsang *Madipur* was 20 *li*, or $3\frac{1}{3}$ miles, in circuit, which agrees very closely with what would appear to be the most probable size of the old town. The King was a *Sudra*, who cared nothing for Buddhism, but worshipped the *Devas*. There were 12 Buddhist monasteries, containing about 800 monks, who were mostly attached to the school of the *Sarvástivádas*, and there were also about 50 Brahmanical temples. To the south of the town, at 4 or 5 *li*, or $\frac{3}{4}$ of a mile, there was a small monastery in which *Gunaprabha* was said to have composed 100 works; and at half a mile to the north of this there was a great monastery which was famous as the scene of *Sanghabhadra's* sudden death from chagrin, when he was overcome in argument by *Vasubandhu*. His relics were deposited in a *Stupa* in the midst of a mango grove only 200 paces to the north-west of the monastery. These two chiefs of Buddhism lived about the beginning of the Chirstian era, and the *Stupa* was still standing in A. D. 634, at the time of Hwen Thsang's visit. There is no trace

now existing either of the monasteries or of the *Stupa*, but their sites can be fixed with tolerable certainty by the aid of Hwen Thsang's descriptions. The village of Lâlpur, which is situated on a mound about three quarters of a mile to the south-south-east of the Jâma Masjid, and which is built partly of old bricks, represents the site of the small monastery of *Gunaprabha*. To the north of Lâlpur, and just half a mile distant, is the shrine of Hidâyat Shah, with a Masjid attached, both of which are built of old bricks. This spot I believe to be the site of the great monastery of *Sanghabhadra*. Lastly, to the west-north-west of Hidâyat's shrine, at a distance of 200 paces, there is another shrine, or *Fakir's takia*, standing in the midst of a mango grove, like the old *Stupa* of *Sanghabhadra*, the site of which it represents almost exactly as described by Hwen Thsang.

195. Beside the mango grove, there was a second *Stupa* which contained the relics of *Vimala Mitra*, who, as a disciple of *Sanghabhadra*, must have lived in the first century of the Christian era. The legend relates that on passing the *Stupa* of his master *Sanghabhadra*, he placed his hand on his heart, and with a sigh expressed a wish that he might live to compose a work which should lead all the students of India to renounce the "Great Vehicle" *(Mahâ Yâna)*, and which should blot out the name of *Vasubandhu* for ever. No sooner had he spoken than he was seized with frenzy, and five spouts of burning hot blood gushed from his mouth. Then feeling himself dying, he wrote a letter "expressing his repentance for having maligned the *Mahâ Yâna*, and hoping that his fate might serve as an example to all students." At these words the earth quaked, and he expired instantly. Then *the spot where he died suddenly sank and formed a deep ditch*, and a holy man who witnessed his end, exclaimed, "To-day this master of the scriptures, by giving way to his passions, and by persisting in erroneous opinions, has calumniated the *Mahâ Yâna*, for which he has now fallen into everlasting hell." But this opinion of the holy man would appear to have been confined to the followers of the *Mahâ Yâna*, for the brethren of *Vimala Mitra*, who were *Sarvâstivâdas*, or students of the lesser Vehicle, burned his body and raised a *Stupa* over his relics. It must be remembered, also, that Hwen Thsang, who relates the legend, was a zealous follower of the *Mahâ Yâna*, and this no doubt led him to overlook the manifest contradiction between the

statement of the uncharitable *arhat*, and the fact that his brethren had burned his body in the usual manner. This legend, as well as several others, would seem to show that there was a hostile and even bitter feeling between these two great sects of the Buddhist community.

196. The site of *Vimala Mitra's Stupa* is described as being at the edge of the mango grove, and from the details of the legend it is clear that it could have been at no great distance from the *Stupa* of *Sanghabhadra*. It would appear also that it must have stood close by the great ditch, or hollow, which his opponents looked upon as the rent in the earth by which he had sunk down to "everlasting hell." Now, the mango grove which I have before mentioned, extends only 120 paces to the westward to the bank of the deep tank called the *Pirwâli Tâl*. I conclude therefore that the *Stupa* of *Vimala Mitra* must have stood close to the edge of this tank and on the border of the mango grove which still exists in the same position as described by Hwen Thsang.

197. It seems probable that the people of *Madâwar*, as pointed out by M. St. Martin, may be the *Mathœ* of Megasthenes who dwelt on the banks of the Erineses. If so, that river must be the Mâlini It is true that this is but a small stream, but it was in a sacred grove on the bank of the *Mâlini* that *Sakuntala* was brought up, and along its course lay her route to the Court of *Dushmanta* at *Hastinapur*. While the lotus floats on its waters, and while the *Chakwa* calls its mate on its bank, so long will the little *Mâlini* live in the verse of *Kâlidâs*.

V.—KASHIPUR, OR GOVISANA.

198. On leaving *Madipur* the Chinese pilgrim travelled 400 *li*, or 66 miles to the south-east and arrived in the kingdom of *Kiu-pi-shwang-na*, which M. Julien renders by *Govisana*. The Capital was 14 or 15 *li*, or $2\frac{1}{2}$ miles, in circuit. Its position was strong, being elevated, and of difficult access, and it was surrounded by groves, tanks, and fish ponds. There were two monasteries containing 100 monks, and 30 Brahmanical temples. In the middle of the larger monastery, which was outside the city, there was a *Stupa* of Asoka, 200 feet in height, built over the the spot where Buddha was said to have explained the law. There were also two small *Stupas*, only 12 feet high, containing his hair and nails.

199. According to the bearing and distance from Madipur, as given by Hwen Thsang, we must look for Govisana somewhere to the north of Muradabad. In this direction the only place of any antiquity is the old fort of *Ujain*, which is just one mile to the east of Kâshipur. According to the route which I marched the distance is 44 *kos*, or 66 miles. I estimate the value of the *kos* by the measured distance of 59 miles between the Post Offices of Bareli and Muradabad, which is always called 40 *kos* by the natives. The true bearing of Kâshipur is east-south-east, instead of south-east, but the difference is not great; and as the position of Kâshipur is equally clearly indicated by the subsequent route to *Ahichhatra*, I feel quite satisfied that the old fort of *Ujain* represents the ancient city of *Govisana* which was visited by Hwen Thsang.

200. Bishop Heber describes Kâshipur as a "famous place of Hindu pilgrimage which was built by a divinity named Kashi 5,000 years ago." But the good Bishop was grossly deceived by his informant, as it is well known that the town is a modern one, it having been built about A. D. 1718 by Kashi Nâth, a follower of Raja Devi Chandra, or Deb Chand, of Champâwat in Kumaon. The old fort is now called Ujain, but as that is the name of the nearest village it seems probable that the true name has been lost. The place itself had been deserted for several hundred years before the occupation of Kâshipur, but as the holy tank of *Dron Sâgar* had never ceased to be visited by pilgrims, I presume that the name of the tank must have gradually superseded that of the fort. Even at the present day, the name of *Dron Sâgar* is just as well known as that of Kâshipur.

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201. The old fort of Ujain is very peculiar in its form, which may be best compared to the body of a guitar. It is 3,000 feet in length from west to east, and 1,500 feet in breadth, the whole circuit being upwards of 9,000 feet, or rather less than 2 miles. Hwen Thsang describes the circuit of Govisana as about 12,000 feet, or nearly $2\frac{1}{2}$ miles, but in this measurement he must have included the long mound of ruins on the south side, which is evidently the remains of an ancient suburb. By including this mound as an undoubted part of the old city, the circuit of the ruins is upwards of 11,000 feet, or very nearly the same as that given by Hwen Thsang. Numerous groves, tanks,

and fish ponds still surround the place. Indeed, the trees are particularly luxuriant, owing to the high level of the water which is within 5 or 6 feet of the surface. For the same reason the tanks are numerous and always full of water. The largest of these is the *Dron Sâgar*, which, as well as the fort, is said to have been constructed by the five Pandu brothers for the use of their teacher *Drona*. The tank is only 600 feet square, but it is esteemed very holy, and is much frequented by pilgims on their way to the source of the Ganges. Its high banks are covered with *Sati* monuments of recent date. The walls of the fort are built of large massive bricks, 15 inches by 10 inches by $2\frac{1}{2}$ inches, which are always a certain sign of antiquity. The general height of the walls is 30 feet above the fields; but the whole is now in complete ruin, and covered with dense jungle. Shallow ditches still exist on all sides except the east. The interior is very uneven, but the mass has a mean height of about 20 feet above the country. There are two low openings in the ramparts, one to the north-west and the other to the south-west, which now serve as entrances to the jungle, and which the people say were the old gates of the fort.

202. There are some small temples on the western bank of the *Dron Sâgar*; but the great place of worship is the modern temple of Jwâlâ Devi, 600 feet to the eastward of the fort. This goddess is also called *Ujaini Devi*, and a great fair is held in her honour on the 8th day of the waning moon of Chaitra. Other smaller temples contain symbols of Mahadeva under the titles of *Butesar*, *Muktesar*, *Nâgnâth*, and *Jâgesar*. But all of these temples are of recent date; the sites of the more ancient fanes being marked by mounds of various dimensions from 10 to upwards of 30 feet in height. The most remarkable of these mounds is situated inside the northern wall of the fort, above which the ruins rise to a height of 52 feet above the country, and 22 feet above the ramparts. This mound is called *Bhimgaja*, or *Bhimgada*, that is, Bhim's club, by which I understand a large *lingam* of Mahadeva. Were it not for this name, I should be inclined to look upon this huge mound as the remains of a palace, as I succeeded in tracing the walls of what appeared to have been a large room, 72 feet in length from north to south, by 63 feet in width, the walls being 6 feet thick. About 500 feet beyond the north-east angle of the fort there is another remarkable mound which is rather more than 34 feet in height. It stands in the midst of a

quadrangular terrace, 600 in length by 500 feet in breadth, and, as well as I could ascertain from an excavation at the top, it is the remains of a large square temple. Close by on the east, and within the quadrangle, there are the ruins of two small temples. To the eastward of the Jwâlâ Devi temple, there is a curious circular, flat-topped mound of earth, 68 feet in diameter, surrounded by a brick wall from 7 to 11 feet in height. It is called *Râmgir Gosain-ka-tila*, or "the mound of *Râmgir Gosain*," from which I infer that it is the burial place of a modern Gosain. To the south of the fort, near the temple of Jâgesar Mahadeva, there is a third large mound, 22 feet in height, which was once crowned by a temple 20 feet square inside. The bricks have only recently been removed, and the square core of earth still remains perfect. To the westward of this last, there is a fourth mound, on which I traced the ruins of a temple 30 feet square standing in the midst of a raised quadrangle about 500 feet square. Besides these there are ten smaller mounds, which make up altogether 14, or just one-half the number of the Brahmanical temples which are mentioned by Hwen Thsang.

203. The only ruin which appeared to me to be of undoubted Buddhist origin was a solid brick mound 20 feet in height, to the south-west of Jâgesar Mahadeva, and close to the small village of Khargpur. The base of the mound is upwards of 200 feet in diameter. The solid brick-work at the top is still 60 feet thick, but as it is broken all round, its original diameter must have been much greater, probably not less than 80 feet. But even this larger diameter is too small for a *Stupa* of 200 feet in height of the hemispherical form of Asoka's time; a *Stupa* of that early period, even when provided with both plinth and cupola, would not have exceeded 100 feet in height. Unless therefore we may suppose that there is a mistake of 100 feet in the text of Hwen Thsang, I feel quite unable to offer any identification whatever of the Buddhist remains of Govisana as described by the Chinese pilgrim.

VI.—RAMNAGAR, OR AHICHHATRA.

204. From Govisana Hwen Thsang proceeded to the south-east 400 *li*, or 66 miles, to *Ahi-chi-ta-lo*, or *Ahichhatra*. This once famous place still preserves its ancient name as *Ahichhatr*, although it has been deserted for many centuries. Its history reaches back to B. C.

1430, at which time it was the Capital of Northern *Pânchâla*. The name is written *Ahi-kshetra*, as well as *Ahi-chhatra*, but the local legend of Adi Raja and the Nâga, who formed a canopy over his head when asleep, shows that the latter is the correct form. This grand old fort is said to have been built by *Raja Adi*, an Ahir, whose future elevation to sovereignty was foretold by *Drona*, when he found him sleeping under the guardianship of a serpent with expanded hood. The place is mentioned by Ptolemy as *Ἀδισάδρα*, which proves that the legend attached to the name of *Adi* is at least as old as the beginning of the Christian era. The fort is also called *Adikot*, but the more common named is *Ahichhatr*.

205. According to the *Mahábhárat* the great kingdom of *Pânchâla* extended from the Himâlaya Mountains to the Chambal River. The capital of North *Pânchâla*, or Rohilkhand, was *Ahi-chhatra*, and that of South *Pânchâla*, or the Central Gangetic Doab, was *Kâmpilya*, now *Kampil*, on the old Ganges between Budaon and Farokhabad. Just before the great war, or about 1430 B. C., the King of *Pânchâla*, named *Drupada*, was conquered by *Drona*, the preceptor of the five Pândus. *Drona* retained north *Pânchâla* for himself, but restored the southern half of the kingdom to *Drupada*. According to this account the name of *Ahi-chhatra*, and consequently also the legend of *Adi Raja* and the serpent, are many centuries anterior to the rise of Buddhism.

206. It would appear, however, that the Buddhists must have adopted and altered the legend to do honour to their great teacher, for Hwen Thsang records that outside the town there was a *Nâga-hrada*, or "serpent tank," near which Buddha had preached the law for seven days in favour of the Serpent King, and that the spot was marked by a *Stupa* of King Asoka. Now, as the only existing *Stupa* at this place is called *Chattr*, I infer that the Buddhist legend represented the *Nâga* King after his conversion as forming a canopy over Buddha with his expanded hood. I think, also, that the *Stupa* erected on the spot where the conversion took place would naturally have been called *Ahi-chhatra*, or the "serpent canopy." A similar story is told at Buddha Gya of the Nâga King *Muchalinda*, who with his expanded hood sheltered Buddha from the shower of rain produced by the malignant demon *Mâra*.

207. The account of *Ahi-chhatra* given by Hwen Thsang is unfortunately very meagre, otherwise we might most probably have identified many of the existing ruins with the Buddhist works of an early age. The Capital was 17 or 18 *li*, or just three miles, in circuit, and was defended by natural obstacles. It possessed 12 monasteries, containing about 1,000 monks, and nine Brahmanical temples, with about 300 worshippers of *Iswara Deva* (Siva), who smeared their bodies with ashes. The *Stupa* near the serpent tank, outside the town, has already been mentioned. Close beside it there were four small *Stupas* built on the spots where the four previous Buddhas had either sat or walked. Both the size and the peculiar position of the ruined fortress of *Ahi-chhatra* agree so exactly with Hwen Thsang's description of the ancient *Ahi-chhatra*, that there can be no doubt whatever of their identity. The circuit of the walls, as they stand at present, is 19,400 feet, or upwards of $3\frac{1}{2}$ miles. The shape may be described as an irregular right-angled triangle, the west side being 5,600 feet in length, the north side 6,400 feet, and the long side to the south-east 7,400 feet. The fort is situated between the *Râm Ganga* and *Gânghan Rivers*, which are both difficult to cross; the former on account of its broad sands, the latter on account of its extensive ravines. Both on the north and east the place is rendered almost inaccessible by the *Piria Nala*, a difficult ravine with steep broken banks, and numerous deep pools of water quite impassable by wheeled vehicles. For this reason the cart road to Bareli, distant only 18 miles due east, is not less than 23 miles. Indeed the only accessible side of the position is the north-west, from the direction of *Lakhnor*, the ancient capital of the Katehria Rajputs. It therefore fully merits the description of Hwen Thsang as being defended by "natural obstacles." *Ahi-chhatra* is only seven miles to the north of *Aonla*, but the latter half of the road is rendered difficult by the ravines of the *Gânghan River*. It was in this very position, in the jungles to the north of *Aonla*, that the Katehria Rajputs withstood the Muhammadans under Firuz Tughlak.

208. The ruins of *Ahi-chhatra* were first visited by Captain Hodgson, the Surveyor, who describes the place as "the ruins of an ancient fortress several miles in circumference, which appears to have had 34 bastions, and is known in the neighbourhood by the

name of the "Pândus Fort." According to my survey there are only 32 towers, but it is quite possible that one or two may have escaped my notice, as I found many parts so overgrown with thorny jungle as to be inaccessible. The towers are generally from 28 to 30 feet in height, excepting on the west side, where they rise to 35 feet. A single tower near the south-west corner is 47 feet in height above the road outside. The average height of the interior mass is from 15 to 20 feet. Many of the present towers, however, are not ancient, as an attempt was made by Ali Muhammad Khan, about 200 years ago, to restore the fort with a view of making it his stronghold in case he should be pushed to extremities by the King of Delhi. The new walls are said to have been $1\frac{1}{2}$ *guz* thick, which, agrees with my measurements of the parapets on the south-eastern side, which vary from 2 feet 9 inches to 3 feet 3 inches in thickness at top. According to popular tradition, Ali Muhammad expended about a *crore* of rupees, or one million pounds sterling, in this attempt, which he was finally obliged to abandon on account of its costliness. I estimate that he may perhaps have spent about one lakh of rupees, or £10,000, in repairing the ramparts and in rebuilding the parapets. There is an arched gateway on the south-east side, which must have been built by the Musalmans, but as no new bricks were made by them, the cost of their work would have been limited to the labour alone. The ramparts are 18 feet thick at the base in some places, and between 14 and 15 feet in others.

209. There are three great mounds inside the fort, and outside, both to the north and west, there are a number of mounds of all sizes, from 20 feet to 1,000 feet in the diameter. To the north-west, distant one mile, there is a large tank called the *Gandhân Sâgar*, which has an area of 125 *bighas*, and about one quarter of a mile beyond it there is another tank called the *Adi Sâgar*, which has an area of 150 *bighas*. The latter is said to have been made by *Adi Raja* at the same time as the fort. The waters are collected by an earthen embankment faced on both sides with bricks of large size. The *Gandhân Sâgar* is also embanked both to the east and south. The mounds to the south of the tanks are covered with large bricks, both plain and moulded; but judging from their shapes, they must all have belonged to temples, or other straight walled buildings, and not to

Stupas. There is nothing to show whether these are the remains of Buddhist or of Brahmanical buildings, but from their extent it is probable that they were the former.

210. According to Hwen Thsang there were only nine Brahmanical temples at *Ahi-chhatra* in A. D. 634, all of which would appear to have been dedicated to Siva. But as Buddhism declined, this number must have been increased, for I discovered the ruins of not less than 20 temples of various sizes, of which one is gigantic, four are large, five are of middle size, and 12 of small dimensions. Three of these are inside the fort, and the others are grouped together outside on the west road. I made excavations in most of these mounds, all of which yielded moulded bricks of various patterns, but only two of them afforded sculptures by which their original purpose could be absolutely identified. These two temples are marked as Nos. I and IV in my survey of the ruins.

211. The remains of No. I temple form a mound, 65 feet 9 inches in height above the country, and upwards of 30 feet above the walls of the fortress. This lofty mound stands inside the fort near the middle of the north wall, and forms the most conspicuous object amongst the ruins of the mighty fortress of *Ahi-chhatra*. The floor of the temple is 60 feet above the ground, and at this enormous height stood a colossal *lingam*, 3 feet 6½ inches in diameter, and upwards of 8 feet in height, which must have been visible from both east and west through the open doors of the temple for a distance of some miles. The interior of the temple is only 14 feet 4 inches by 10½ feet. The north and south walls are 9 feet 5 inches thick, and the east and west walls only 5 feet 9 inches; but on these two sides there are open porches outside the two entrances which increase the thickness of the walls to 19 feet on the west side, and to 14 feet 11 inches on the east. The exterior dimensions of the temple are 48 feet 3 inches by 29 feet 4 inches. From these dimensions I calculate that the temple must have been about 100 feet in height above its own floor, or 165 feet above the country. The base of the stone *lingam* is square, the middle part octagonal, and the upper part hemispherical. A *trisul*, or trident, is cut upon the base. The upper portion of the *lingam* is broken. The people say that it was struck by lightning,

but from the unshattered state of the large block I am more disposed to ascribe the fracture to the hammer of the Muhammadans.

212. Mound No. II, which is also inside the fort to the west of the large mound, is 35 feet in height, and from 5 to 10 feet above the general line of the ramparts. It shows the remains of a large square building with a long flight of steps on the west side. No. III mound is only 30 feet in height, and is covered with scrub jungle. There are traces of walls on the surface, but the jungle prevented their immediate excavation. I will take an early opportunity of exploring both of these mounds, as I feel satisfied that they are the remains of large Brahmanical temples.

213. No. IV mound stands about 1,000 feet outside the west gate of the fort. It is 300 feet square at base, and 30 feet in height, and has two smaller mounds attached to the north-east corner. On excavating the surface I discovered the foundations of a temple, 11 feet square inside, with walls $3\frac{1}{2}$ feet thick, and a long pedestal or raised platform for the reception of statues. The entrance is on the east side towards the town. Amongst the ruins I found a seated terracotta figure of Siva, 12 inches in height, with four arms and three eyes, and one hand holding a large lotus flower. I found also in red stone a small right hand grasping the hilt of a sword, and a left hand of three-quarter life size, grasping a large conch. As the last must have belonged to a figure of Vishnu, it is possible that the temple was dedicated to that god, but a projecting portion of the pedestal leads me to believe that it must have been occupied by a *lingam*, and if so, the principal figure would have been that of Mahadeva. There was also a large quantity of ashes inside this temple, from which I infer that it was most probably destroyed by the Musalmans in one of their early expeditions against the Katehria Rajputs.

214. The Buddhist remains at *Ahi-chhatra* are both more extensive and more ancient than those of the Brahmans. In my survey I have marked them by the letters of the Alphabet to distinguish them from the Brahmanical ruins, which are numbered. Only three of the Buddhist mounds have been excavated, but as most of the others have furnished materials for the neighbouring villages, it does not seem likely that their excavation would be attended with any success. I

will, however, manage to have them examined at the end of the ensuing season.

215. The most important of the Buddhist ruins is an irregular shaped mound, about 1,000 feet square, from the centre of which rises a large *Stupa* of solid brick-work, which the people call *chhatr*. I have already identified this with the great *Stupa* which was built over the spot where Buddha converted the Serpent King. It is surrounded by eight smaller mounds, of which four would appear to be the ruins of *Stupas*, and three of temples, whilst one only is doubtful. Now, Hwen Thsang describes the great *Stupa* as having on one side of it four small *Stupas*, which account agrees exactly with the position of the four small mounds above mentioned. I have no doubt, therefore, as to the identity of the *chhatr* mound with the *Stupa* of Hwen Thsang, although I was unable to discover any certain trace of the tank called the *Nâga-hrada*, or "serpent pond" by the Chinese pilgrim. It is quite possible, however, that a tank may once have existed on the south-west side, where the ground is still very low.

216. The great ruins called *Chhatr* is a mass of solid brick-work, 40 feet in height above the fields, and 30 feet in diameter at top. The original building was a hemisphere of 50 feet diameter, which was raised upon a base or plinth 15 feet in height. At some later period an outer casing, $12\frac{1}{2}$ feet thick, was added, which increased the diameter to 75 feet, and the height of the crown of the hemisphere to $52\frac{1}{2}$ feet. Allowing two-sevenths of the diameter for the height of the cupola or pinnacle, which is the proportion observed in the Sanchi bas-reliefs, the total height of the original *Stupa* would have been 57 feet, and that of the later *Stupa* 77 feet. I made several superficial excavations around the base in the hope of finding some portions of the stone railings with which the *Stupa* was most probably surrounded, but without success. I still believe, however, that there must have been the usual Buddhist railings around this *Stupa*, and that a further search would probably bring some of the pillars to light. I found, however, a number of curved wedge-shaped bricks, that must have belonged to a circle of between 15 and 16 feet in diameter, and which, I presume, are the remains of the cupola.

217. If I am right in my identification of this *Stupa* with that which was built near the Serpent Tank, its original construction must be referred to the reign of Asoka, or about 250 B. C. A strong argument in favour of this date is the similarity of its shape to that of the Bhilsa *Topes*, which are undoubtedly of Asoka's age. The date of the enlargement of the *Stupa* can only be fixed approximately by inferring from Hwen Thsang's silence that it must have been in good order at the time of his visit. Admitting this to have been the case, the date of the enlargement cannot be placed earlier than about A. D. 400 to 500.

218. The great *Stupa* attracted the attention of some British Officer, about 30 years ago, who dug a gallery into it, 21 feet in length, and then sunk a well for some unknown depth, which I found filled with rubbish. I made use of this old gallery, and continued it to the centre of the *Stupa*, where it met a shaft which I had sunk from the top. From this point I carried the shaft downwards, making use of the gallery for the removal of the bricks. At a depth of 27 feet from the present top, or at 7 feet below the centre of the older hemisphere, I found a low pyramidal topped vessel of common red unglazed earthenware, 8 inches in diameter. Inside this vessel there was a small steatite box, containing many minute fragments of seed pearls, several pieces of blue glass, one large bead of red amber, and about a tea spoonful of little bits of rock crystal. Mixed with these were ten small cylindrical pierced beads of a dirty white colour like old chalk. They consist chiefly of carbonate of lime with a trace of some other substance, and are most probably only the remains of some artificial beads. The little steatite box is a sphere of 2 inches diameter, but rather pointed at the top and bottom. Its general colour is white with a few purple blotches. The whole is rudely ornamented, the top with flowers, and the bottom with animals of school-boy design. The inside also is rudely ornamented, but with simple lines only. There is no trace of any inscription.

219. At $6\frac{3}{4}$ feet below the deposit just described, or at $13\frac{3}{4}$ feet below the centre of the hemisphere, a second deposit was found imbedded in the ground immediately under the last course of a globular shaped mottled steatite vase, $8\frac{1}{4}$ inches in diameter and 6 inches in height. This vase has a neck 3 inches in diameter inside and $2\frac{3}{4}$

inches in height, thus making the whole height of the vessel $8\frac{3}{4}$ inches. This is divided into two equal portions, the lower half having an inner lip, which is overlapped by the upper half. The vessel is quite plain, excepting only a few belts of simple lines which encircle it. The open mouth was found closed by the lid of a small dark-coloured steatite vase exactly similar to several that were discovered in the Bhilsa *Topes*. Inside there was nothing but a hard cake of earth, 6 inches in diameter, mixed with small stones. A similar earthen cake, but only $2\frac{1}{2}$ inches in diameter, was found in the earthenware jar of the upper deposit. What this cake may be I cannot at present say, but it does not effervesce with acids.

220. The second Buddhist mound which has yielded important evidence of its former occupation, is called *Katâri Khera*. It is situated 1,200 feet to the north of the old fort, and 1,600 feet to the east of the small village of Nasratganj. The mound is about 400 feet square and 20 feet in height. Close by there is a small pond called the *Maswâse Tâl;* but neither this name, nor that of *Katâri Khera*, would seem to have any reference to the old Buddhist establishment which formerly stood there. Unfortunately this mound has furnished bricks to the neighbouring village for many generations, so that but little is now left to point out the nature of the original buildings. A surface excavation brought to light a temple $26\frac{1}{4}$ feet in length by 22 feet in breadth outside, and 11 feet square inside. The plinth is still standing $4\frac{1}{4}$ feet in height, formed of blocks of *kankar*, but the walls have altogether disappeared, excepting some portions of a few courses. The doorway faces the east, from which I infer that the enshrined statue was most probably that of the ascetic Buddha, who is always represented seated in a similar position under the holy Pipal Tree of Buddha Gaya. I am also led to the same conclusion by the discovery of a broken statue of Buddha with two flying figures over the right shoulder, which are the usual accompaniments of the ascetic figures of Buddha. This statue is broken at the waist, and both arms are lost; but the fragment is still 2 feet high and 2 feet broad, from which I infer that the size of the original statue was not less than 4 feet in height by 3 feet in breadth; and this I believe to have been the principal figure of the temple.

221. In the same place five other carved and sculptured stones

were discovered, of which one is an inscribed pillar of a Buddhist railing of middle age. The pillar is broken, but the remaining portions of the socket holes are sufficient for the restoration of the original dimensions. The fragment is 1 foot 11 inches in length, with a section of $8\frac{1}{2}$ inches by 4 inches. The socket holes are 8 inches long, and $4\frac{3}{4}$ inches apart, which in a pillar of two rails would give a height of 3 feet $2\frac{1}{4}$ inches, or of 4 feet 3 inches in a pillar of three rails. The face of the pillar is sculptured with six rows of naked standing figures, there being five figures in the lowest row, and only four figures in each of the others. On one of the sides there is the following short inscription in four lines of the age of the Guptas :—

Acharya Indranandi Sishya Mahâdari Pârswamatisya Kottari.

The last word but one might perhaps be read as *patisya ;* but the remainder of the inscription is quite clear. I understand it to record the gift of "*Mahâdari*, the disciple of the teacher *Indranandi*, to the temple *(Kottari)* of *Parswamati*." Perhaps the term *Kottari* may be preserved in the name of *Katâri Khera*, by which the mound is now known.

222. The other sculptured stones are not of much interest. The largest is a broken statue of a standing figure, 3 feet high by 2 feet broad, which appears to be naked. The head, the feet, and the right arm are gone. A second small stone, 1 foot long and 5 inches broad, bears the figures of the *Navagraha*, or "Nine Planets." On the back there is a short inscription of only eight letters, of which two are somewhat doubtful. I read the whole as *Sahada*, *Bhima*, *Devindra*, but the word *Bhima* is very doubtful. A third stone, $2\frac{1}{4}$ feet long and $1\frac{1}{4}$ feet square, is the fragment of a large pillar, with a lion sculptured on each of its four faces. The naked figures of these sculptures belong to a somewhat late period of Buddhism, after the introduction of the *Tantrika* doctrines, which, as we learn from Skanda Gupta's inscription on the Bhitari Pillar, were prevalent during the time of the later Guptas, in the 3rd and 4th centuries A. D. As the forms of the letters of these inscriptions are also those of the Gupta period, we may conclude with some certainty that the *Kottari*, or temple, of *Parswamati* was erected before the fall of the Gupta dynasty in A. D. 319.

223. Four hundred feet to the south of the great bastion, and close to the south-west angle of the fort, there is another extensive

mound, marked D in my map, upwards of 300 feet square, and 35 feet in height above the road. The principal mass of ruin, which is in the middle of the west side, is the remains of a large temple, 40 feet square outside. In the middle of the south side there are the ruins of a small building which may perhaps have been the entrance gateway. To the right and left of the entrance there are the ruins of two small temples, each 14 feet square outside, and 9 feet 4½ inches inside, raised upon a plinth 24 feet square. The centre of the square is open, and has evidently never been built upon. My excavations were too limited to ascertain more than I have noted above, but I propose to continue the exploration towards the end of the ensuing cold weather. I believe that this mound is the remains of a very large monastery with its lofty enclosed temple, which could not have been less than 80 or even 100 feet in height.

224. Connected with *Ahi-chhatra* is an inscription of the Gupta period on a square pillar found near the village of *Dilwâri*, 3 *kos*, or 4½ miles, to the south of the fort. The inscription consists of 14 lines of five letters each, the letters of one line being placed exactly under those of the line above, so as to form also five straight perpendicular lines. The stone is 2½ feet long, 1 foot broad, and 9 inches thick in the middle, but the continual sharpening of tools has worn down the edges to a breadth of from 7 to 7½ inches. The inscription, which is on one of the narrow faces, has accordingly suffered in the partial loss of some of the initial and final letters of several lines. The other three faces of the stone are quite plain, and there is nothing whatever to show what the pillar may have been originally intended for.

225. My account of *Ahi-chhatra* would not be complete without a reference to the gigantic *lingam* near the village of *Gulariya*, 2½ miles to the north of the fort, and to the Priapian name of the village of *Bhim-laur*, one mile to the east of the fort. *Bhim-gaja* and *Bhim-laur* are common names for the *lingam* in all the districts to the north of the Ganges. I have already quoted Hwen Thsang's remark that the nine Brahmanical temples of Ahi-chhatra in A. D. 634 were dedicated to Siva, and I may now add in illustration, that only in one of the many ruins above the old fort did I find a trace of the worship of any other divinity.

VII.—SORON, OR SUKARA-KSHETRA.

226. From *Ahi-chhatra* the Chinese pilgrim proceeded in a south direction a distance of from 260 to 270 *li*, from 23 to 25 miles, to the Ganges, which he crossed, and then turning to the south-west he arrived in the kingdom of *Pi-lo-shan-na*. His route to the south would have taken him through Aonla and Budaon to the *Budh Ganga* (or old Ganges) somewhere near Sahâwar, a few miles below *Soron*, both of which places stood on the main stream of the Ganges so late as 400 years ago. As his subsquent route is said to have been to the south-west, I believe that he must have crossed the Ganges close to Sahâwar, which is 42 miles from Ahi-chhatra in a direct line. From all my early enquiries I was led to believe that *Soron* was the only ancient place in this vicinity; and as Hwen Thsang does not give any distance for his south-west march, I concluded that *Soron* must have been the place to which he gives the name of Pi-lo-shan-na. I accordingly visited *Soron*, which is undoubtedly a place of very great antiquity, but which cannot, I think, be the place visited by the Chinese pilgrim. I will, however, first describe *Soron* before I proceed to discuss the superior claims of the great ruined mound of *Atranji-Khera* to be identified with the Pi-lo-shan-na of the Chinese pilgrim.

227. *Soron* is a large town on the right, or western, bank of the Ganges, on the high road between Bareli and Mathura. The place was originally called *Ukala Kshetra;* but after the demon *Hiranyaksha* had been killed by the *Varâha Avatar*, or Boar incarnation of Vishnu, the name was changed to *Sukara* Kshetra, or "the place of the good deed." The ancient town is represented by a ruined mound called the *Kilah*, or "fort," which is one quarter of a mile in length from north to south, and somewhat less in breadth. It stands on the high bank of the old bed of the Ganges, which is said by some to have flowed immediately under it so late as 200 years ago. The modern town stands at the foot of the old mound on the west and south sides, and probably contains about 5,000 inhabitants. There are no dwellings on the old mound, which is occupied only by the temple of *Sita-Râmji* and the tomb of *Shekh-Jamâl*. But it is covered with broken bricks of large size, and the foundations of walls can be traced in all directions. The mound is said to be the ruins of a fort built by Raja *Somadatta* of Soron many hundred years ago. But the original

settlement of the place is very much older, being attributed to the fabulous *Raja Vena Chakravartti*, who plays such a conspicuous part in all the legends of North Bihar, Oudh, and Rohilkhand.

228. The temples of Soron are very numerous, and several of them are said to be old. But the only temples of any consequence are those of *Sita-Râmji*, on the top of the mound, and *Varâhaji* to the north-west of the city. A great annual fair is held near the latter temple on the 11th of the waxing moon of *Mârgasirsha*, in remembrance of the destruction of the demon by the Boar incarnation of Vishnu. It contains a statue of *Varâha Lakshmi*, and is visited by crowds of pilgrims. The temple of *Sita-Râmji*, which is said to have been ruined by Aurang Shah (or Aurangzib) was restored by a wealthy Baniya, only four years ago, by building up the space between the pillars with plain white-washed walls. Internally the temple is a square of 27 feet supported on 16 stone pillars; but the people say that the original building was much larger, and that it contained 32 pillars. This account is most probably correct, as the foundations of the walls of the *sanctum*, or shrine, are still standing at the back, or west side, of the temple. There are also 10 superfluous pillars inside the temple, of which two support the broken architraves, and eight are built into the corner spaces of the walls. The style of these columns is similar to that of the set of pillars in the south-east corner of the quadrangle of the Great Kutb Mosque at Delhi, which bear the date of Samvat 1124, or A. D. 1067. That this date is not too early for the Soron temple is proved by the inscriptions of various pilgrims who have visited the shrine. As the oldest legible record bears the date of Samvat 1226, or A. D. 1169, the date of the erection of the temple cannot therefore be placed later than A. D. 1000.

229. These pilgrim's records are generally short and uninteresting, but as there are no less than 38 of them, bearing dates which range from A. D. 1169 to 1511, they become valuable for tracing the history of the temple. The earliest date after the Muhammadan conquest is A. D. 1241, and from that time down to A. D. 1290 there are no less than 15 dated records, showing that Soron continued to be a much frequented place of pilgrimage during the whole period of the *Ghori* dynasty, which ended in A. D. 1289. But during the rule of the next two dynasties, the *Khiljis* and *Tughlaks*, there is only one

inscription, dated in A. D. 1375, in the reign of Firuz. Now, as nearly one-half of this period was occupied by the reigns of the cruel despot Ala-ud-din Khilji and the ferocious madman Muhammad Tughlak, it seems only reasonable to conclude that the people were deterred from making their usual pilgrimages by the persecution of their Muhammadan rulers. The next record is dated in A. D. 1429, and from that time down to 1511 there are 16 dated inscriptions; but as no less than 13 of this number belong to the reign of Bahlol Lodi, I infer that the rule of the Syad dynasty was not favourable to Hindu pilgrimages. I infer also that the temple must have been destroyed during the reign of the intolerant Sikandar Lodi, because the series of inscriptions closes with A. D. 1511, or just six years before the end of his reign. Had the temple existed during the happy century when the sceptre of India was swayed by the tolerant Akbar, the indifferent Jehangir, and the politic Shah Jahan, it is almost certain that some records of the pilgrims' visits would have been inscribed on the pillars of the temple. For this reason I feel satisfied that the destruction of the great temple of Soron must be assigned to an earlier period than that of the bigoted Aurang Shah.

VIII.—ATRANJI-KHERA, OR PI-LO-SHAN-NA.

230. The great mound of ruins called *Atranji-Khera* is situated on the right, or west, bank of the *Kâlí Nadi*, four miles to the south of *Karsâna*, and eight miles to the north of *Eyta*, on the Grand Trunk Road. It is also 15 miles to the south of Soron, and 43 miles to the north-west of *Sankisa* in a direct line, the road distance being not less than 48 or 50 miles. In the *Ayin Akbari* Atranji is recorded as one of the Parganahs of Kanoj, under the name of *Sikandar-pur Atreji*. *Sikandarpur*, which is now called *Sikandrabad*, is a village on the left bank of the *Káli Nadi* opposite Atranji. From this it would appear that Atranji was still occupied in the reign of Akbar. The Parganah was afterwards called *Karsâna*, but it is known by the name of *Sahâwar Karsâna*, or of *Sahâwar* only. The name given by the Chinese pilgrim is *Pi-lo-shan-na*, for which M. Julien proposes to read *Virasana*. So far back as 1848 I pointed out that, as both *pil* and *kar* are Sanskrit names for an elephant, it was probable that *Pilosana* might be the same as *Karsâna*, the large village which I have already men-

tioned as being four miles to the north of *Atranji Khera*. The chief objection to this identification is the fact that *Karsâna* is apparently not a very old place, although it is sometimes called *Deora Karsâna*, a name which implies the possession of a temple of note at some former period. It is, however, possible that the name of *Karsâna* may once have been joined to *Atranji* in the same way that we find *Sikandarpur Atreji* in the *Ayin Akbari*. As the identification of *Karsâna* with *Pilosana* is purely conjectural, it is useless to hazard any more speculations on this subject. The bearing and distance from *Sankisa*, as recorded by Hwen Thsang, point to the neighbourhood of *Sirpura*, near which there is a small village called *Pilkuni*, or *Pilokuni*, which is the *Pilukhoni* of our maps. It is, however, a very petty place; and although it boasts of a small *khera*, or mound of ruins, it cannot, I think, have ever been more than one-fourth of the circuit of two miles which Hwen Thsang attributes to *Pi-lo-shan-na*. But there are two strong points in its favour—namely, 1st, its position, which agrees both in bearing and distance with the Chinese pilgrim's account; and 2nd, its name, which is almost identical with the old name, *sh* being very commonly pronounced as *kh*, so that Hwen Thsang's *Piloshana* would usually be pronounced *Pilokhana*.

231. In proposing *Atranji-Khera* as the site of the ancient *Piloshanna*, I am influenced solely by the fact that this is the only large place besides *Soron* of any antiquity in this part of the country. It is true that the distance from *Sankisa* is somewhat greater than that recorded by the Chinese pilgrim—namely, 45 miles, instead of 33 miles; but the bearing is exact; and as it is quite possible that there may be some mistake in Hwen Thsang's recorded distance, I think that *Atranji-Khera* has a better claim than any other place to be identified with the ancient *Piloshana*. I have not visited the place myself, as I was not aware of its importance when I was in its neighbourhood. I propose, however, to take an early opportunity of exploring it in person. In the meantime I have had it inspected by a trustworthy servant, whose report shows that *Atranji* must once have been a place of considerable extent and importance. According to him, the great mound of *Atranji* is 3,250 in length, and 2,550 in breadth at the base. Now, these dimensions would give a circuit of about two miles, which is the very size of *Piloshana* as recorded by Hwen Thsang.

Its highest point is 44 feet 9 inches, which, if my identification is correct, should be the ruins of the great *Stupa* of Asoka, upwards of 100 feet in height, as this lofty tower is said to have been situated inside a monastery in the middle of the town. Outside the town there were two other monasteries, inhabited by 300 monks. These may perhaps be represented by two small mounds which still exist on the east side of the Great *Khera*. To the south there is a third mound, 165 feet in length by 105 feet in breadth, which may possibly be the remains of one or more of the five Brahmanical temples described by Hwen Thsang.

232. *Atranji-Khera* had two gates, one to the east, towards the *Kâli Nadi*, and the other to the south. The foundation of the place is attributed to *Raja Vena Chakravartti*. The mound is covered with broken bricks of large size and fragments of statues, and old coins are said to be frequently found. All the existing fragments of statues are said to be Brahmanical. There is a temple of Mahadeo on the mound, and there are five *lingams* in different places, of which one is 6 feet in height. The principal statue is that of a four-armed female called *Debi*, but which, as she is represented treading upon a prostrate figure, is most probably *Durgâ*.

233. The only objection to the identification of *Atranji* with Piloshanna is the difference between the distance of 200 *li*, or 33 miles, as stated by Hwen Thsang, and the actual distance of 43 miles direct, or about 48 or 50 miles by road. I have already suggested the possibility of there being some mistake in the recorded distance of Hwen Thsang, but perhaps an equally probable explanation may be found in the difference of the length of the *yojana*. Hwen Thsang states that he allowed 40 Chinese *li* to the *Yojana ;* but if the old *yojana* of Rohilkhand differed from that of the Central Doab as much as the *kos* of these districts now differ, his distances would have varied by half a mile in every *kos*, or by two miles in very *yojana*, as the Rohilkhand *kos* is only $1\frac{1}{2}$ mile, while that of the Doab is two miles ; the latter being one-third greater. Now, if we apply this difference to Hwen Thsang's measurement of 200 *li*, or 33 miles, we increase the distance at once to 44 miles, which agrees with the direct measured distance on the map. I confess, however, that I am rather inclined to believe in the possibility of there being a mistake in Hwen Thsang's recorded

distance, as I find exactly the same measurement of 200 *li* given as the distance between *Sankisa* and *Kanoj*. Now, the two distances are precisely the same—that is, *Sankisa* is exactly midway between *Atranji* and *Kanoj;* and as the latter distance is just 50 miles by my measurement along the high road, the former must also be the same. I would therefore suggest the probability that both of these distances should be 300 *li*, or 50 miles, instead of 200 *li* as recorded in the text. In favour of this proposed correction I may cite the testimony of the earlier Chinese pilgrim Fa Hian, who makes the distance from Sankisa to Kanoj 7 *yojanas*, or 49 miles. At Hwen Thsang's own valuation of 40 *li* to the *yojana*, this measurement would give 280 *li;* and as Fa Hian does not record half *yojanas*, we may increase the distance by half a *yojana*, or 20 *li*, which brings the total up to 300 *li*, or exactly 50 miles.

234. But whatever may be the true explanation of the difference between the actual distances and those recorded by Hwen Thsang, there still remains the important fact that *Sankisa* was exactly midway between *Kanoj* and *Piloshanna*, just as it now is midway between *Kanoj* and *Atranji*. If we couple this absolute identity of position with the fact that *Atranji* is the only old place in the part of the country indicated by Hwen Thsang, we can scarcely arrive at any other conclusion than that the great ruined mound of *Atranji* is the site of the ancient *Piloshanna*.

(To be concluded.)

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Report of the Proceedings of the Archæological Surveyor to the Government of India for the Season of 1862-63.—*By Major-General* A. CUNNINGHAM, *Archæological Surveyor to the Govt. of India.*

[*Received* 3*rd Feb.*, 1865.] [*Read* 1*st March*, 1865.]

(Continued from page 193.)

IX.—SANKISA.

235. The site of *Sankisa* was discovered by me in 1842; but it was not until the end of 1862 that I got an opportunity of exploring the ruins at leisure. The name of the place is written *Seng-kia-she* by the Chinese pilgrims, a spelling which is well preserved in the *Sankisa* of the present day, and which represents with considerable faithfulness the *Sangkâsya* of Sanskrit. Hwen Thsang calls it also by the name of *Kie-pi-tha*, or *Kapitha*, of which I was unable to discover any trace. *Sankisa* was one of the most famous places of Buddhist pilgrimage, as it was there that Buddha was believed to have descended from the *Trayastrinsa* heaven by a ladder of gold or gems, accompanied by the gods Indra and Brahma. According to this curious legend, *Máyâ*, the mother of Buddha, died seven days after his birth, and ascended at once to the *Trayastrinsa* heaven, the abode of the 33 gods, of whom Indra was the chief. But as she had no opportunity in this abode of the gods of hearing the law of Buddha, her pious son ascended to the *Trayastrinsa* heaven, and preached for three months in her behalf. He then

descended to the earth with the gods Brahma and Indra by three staircases, one of which was formed either of crystal or precious stones, another of gold, and the third of silver. According to Fa Hian, Buddha descended by a staircase formed of the "seven precious things,"—that is, the precious metals and precious gems; whilst Brahma accompanied him on his right side by a silver ladder, and Indra on his left by a golden one. But Hwen Thsang assigns the golden staircase to Buddha himself, and the silver staircase on the right to Brahma, and the crystal staircase on the left to Indra. The descent was accompanied by a multitude of *Devas*, who scattered showers of flowers on all sides as they sang the praises of Buddha.

236. Such are the main points of this curious legend, which is believed as firmly in Barma at the present day, as it was by Asoka 2,100 years ago, or by the Chinese pilgrims of the 5th, 6th, and 7th centuries of our era. According to Fa Hian, the three staircases disappeared underground immediately after the descent, leaving only seven steps visible. Apparently these seven steps must have existed in the time of Asoka, as he is reported to have been anxious to behold their foundations, and accordingly sent men to dig down to their base. But the diggers "reached a yellow spring without being able to penetrate to the foundation." The King, however, "felt sensible of a great increase of his faith and veneration," and therefore built a chapel over the three staircases, and upon the middle one erected a full length statue of Buddha 60 feet high. According to Hwen Thsang's account, the three staircases still existed in his time, (A. D. 634), but were completely sunk in the earth. On their foundations, however, the pious Kings of different countries had erected three staircases, similar to the first, of bricks and stones, ornamented with many precious things. The height of these staircases was about 70 feet. Over them there was a *Vihâr* containing statues of Buddha, Brahma, and Indra, who were represented leaning forward as if about to descend. The Barmese say that the descent took place at the full moon of *Thadingkyut*, (October), and that the feet of the steps were at the gate of the city of *Thingka-tha-na-go*, or *Singkasanagara*. Hwen Thsang adds that the three staircases were placed in a line from north to south, with the descent facing the east, and that they stood within the walls of a great monastery.

237. Close to the staircase there was a stone pillar, 70 feet in height, which had been erected by King Asoka. It was formed of a hard, fine-grained reddish stone, and had a brilliant polish. On its summit was a lion, who was seated facing the steps. There were figures also sculptured *inside the pillar* with marvellous art, which were visible only to the virtuous. This is Hwen Thsang's account, with which Fa Hian's agrees in almost every particular; but he adds a curious legend about a dispute between the *Sramanas* and heretics. "If," said the former, "this place ought to be the abode of the Sramanas, let a supernatural testimony proclaim it. They had no sooner finished this speech than the lion on the summit uttered a loud roar."

238. There were several *Stupas* at *Sankisa*, of which the most famous were the following:—

1st.—On the spot where Buddha descended from the *Trayastrinsa* heaven, accompanied by Indra and Brahma. This *Stupa* is not mentioned by Hwen Thsang, but it is noticed by Fa Hian, and in the Barmese life of Buddha.

2nd.—On the spot where the four Buddhas had formerly sat and taken exercise.

3rd.—At the place where Buddha bathed.

4th and 5th.—Two small *Stupas* of Indra and Brahma.

6th.—On the spot where the female mendicant *Pundarikavarnâ* obtained the first sight of Buddha on his descent.

7th.—On the spot where Buddha cut his hair and nails.

239. The only other place of note at *Sankisa* was the tank of a *Nâga*, or serpent, which was situated to the south-east of the great *Stupa*. Fa Hian says that this *Nâga* had white ears; that he lived in the dwelling-place of the "ecclesiastics;" and that he conferred fertility and abundance on the "country by causing gentle showers to fall upon the fields, and securing them from all calamities." A chapel was erected for his use, and he was said to make his appearance once a year. "When the ecclesiastics perceive him, they present him with cream in a copper vessel."

240. Hwen Thsang's account of *Sankisa* is unfortunately so meagre that we have but little to guide us in our attempt to identify the holy places of his time with any of the ruins of the present day. The only spot that can be identified with any certainty is the tank of the

Nâga, which still exists to the south-east of the ruins, in the very position described by Hwen Thsang. The name of the *Nâga* is *Kârewar*, and that of the tank *Kandaiya Tâl*. Milk is offered to him during every day of *Vaisakh*, and on the *Nâg-panchami* of *Sravana*, and "at any other time when rain is wanted." In a note on the word *Chaurâsi* Sir Henry Elliot has given an account of *Sankisa*, in which he asserts that this *Nâga* is the common *Nâg* of the Hindu worship, to whom the *Nâg-panchami* is specially dedicated. But this opinion is certainly wrong, as the above account shows that the *Sankisa Nâga* of the present day is propitiated with offerings of milk whenever rain is wanted, just as he was in A. D. 400, when Fa Hian visited the place. This therefore is not the common *Nâga* of Hindu worship, but the local *Nâga* of *Sankisa*, who is commonly invoked as *Kârewar Nâg Devata*.

241. Before attempting to identify the site of the great monastery with its three famous staircases, its lion pillar and attendant *Stupas*, it will be better to describe the place as it is at present, although but little is now left of the great city of *Sankisa* with all its magnificent monuments. The little village which still preserves the name of *Sankisa* is perched upon a lofty mound of ruins 41 feet in height above the fields. This mound, which is called the *Kilah*, or "fort," is 1,500 feet in length from west to east, and 1,000 feet in breadth. On the north and west faces the sides are steep, but on the other faces the slope is much more easy. Due south from the centre of the *Kilah*, at a distance of 1,600 feet, there is a mound of solid brick-work which is crowned by a modern temple dedicated to *Bisâri Devi*, who is described as a goddess of great power. At 400 feet to the north of the temple mound there is a capital of an ancient pillar bearing the figure of an elephant, standing, but both his trunk and tail are wanting. The capital itself is of the well known bell shape, corded or reeded perpendicularly, with an abacus of honeysuckle similar to that of the Allahabad pillar. The figure of the elephant is by far the best representation of that animal that I have seen in any Indian sculpture. The veins of the legs are carefully chiselled, and the toes of the feet are well and faithfully represented, but the loss of the trunk prevents us from forming a decided opinion as to its excellence as a work of art. If we may judge from the position of the legs, the animal was most probably represent-

ed as standing still with his trunk hanging down. The stone is a fine-grained sandstone of reddish hue, and has been very highly polished. The bell-capital is low, its breadth being greater than its height, in which particular it resembles the Asoka Pillar of *Navandgarh Lauriya*, to the north of Bettiah. Taking all these circumstances into consideration along with the superior execution of the work, I feel satisfied that this capital is of the same age as the well known Asoka Pillars of Allahabad and Navandgarh.

242. Due south from the temple of Bisâri Devi, at a distance of 200 feet, there is a small mound of ruins which appears to be the remains of a *Stupa*. Due east from the temple 600 feet, there is an oblong mound 600 feet in length by 500 feet in breadth, which is known by the name of *Nivi-ka-kot*. *Nivi* would appear to have been the name of the man who formerly brought this piece of ground into cultivation; and *Kot*, in the phraseology of *Sankisa*, means simply any mound of ruins, and is applied to all the isolated portions of the ramparts. *Nivi-ka-kot* would, however, appear to be the remains of some large enclosed building, such as a Buddhist monastery. It is covered with broken bricks of large size, and a few fragments of stone; but I could not trace any remains of walls on the surface. At the south-east and north-east angles of *Nivi-ka-kot* there are large circular mounds which are probably the remains of *Stupas* from which all the available bricks have been removed; and at a short distance to the north there is a third mound of the same character.

243. The *Kilah* and the different mounds of all sizes around the temple form a mass of ruin 3,000 feet in length by 2,000 feet in breadth, or nearly 2 miles in circuit. But this was only the central portion of the ancient city of *Sankisa*, comprising the citadel and the religious buildings that were clustered around the three holy staircases. The city itself, which would appear to have surrounded this central mound on all sides, was enclosed with an earthen rampart, 18,000 feet, or upwards of $3\frac{1}{2}$ miles, in circuit. The greater part of this rampart still remains, the shape being a tolerably regular dodecagon. On three sides, to the east, the north-east and the south-east, there are breaks or openings in the line of rampart which are traditionally said to be the positions of the three gates of the city. In proof of the tradition, the people refer to the village of *Paor-Kheria*, or "*Gate-village*," which is just outside

the south-east gap in the ramparts. But the name is pronounced *Paor*, पौर, and not *Paur*, पोर, and may therefore refer to the staircases or steps (*Paori*), and not to the gate. The Kali, or *Kalindri Nadi*, flows past the south-west corner of the ramparts from the *Râj-ghât*, which is half a mile distant, to the *Kakra Ghât*, which is rather more than one mile to the south of the line of ramparts.

244. To the north-west, three-quarters of a mile distant, stands the large mound of *Ayahat*, which is 40 feet in height, and rather more than half a mile in diameter at base. The name of the old town is said to have been *Agahat*, but the place is now called *Agahat Sarai* (Agahat of the maps) from a modern *Sarai*, which was built in A. H. 1080, or A. D. 1670, on the north-east corner of the mound, by the ancestor of the present Pathân Zamindar. The people say that before this, the place had been deserted for several centuries; but as I obtained a tolerably complete series of the copper coins of the Muhammadan Kings of Delhi and Jounpur, I presume that it could not have been deserted for any very long time. The mound is covered with broken bricks of large size, which alone is a sure test of antiquity: and as it is of the same height as that of *Sankisa*, the people are most probably right in their assertion that the two places are of the same age. In both mounds are found the same old coins without any inscriptions, the more ancient being square pieces of silver covered with various punch marks, and the others, square pieces of copper that have been cast in a mould,—all of which are, in my opinion, anterior to the invasion of Alexander the Great.

245. In identifying *Sankisa* with the *Sang Kasya* of the *Ramayana* and the *Seng-kia-she* of the Chinese, we are supported, not only by its absolute identity of name, but likewise by its relative position with regard to three such well known places as *Mathura*, *Kanoj*, and *Ahi-chhatra*. In size, also, it agrees very closely with the measurement given by Hwen Thsang; his circuit of 20 *li*, or 3½ miles, being only a little less than my measurement of 18,900 feet, or 3½ miles. There can be no doubt, therefore, that the place is actually the same; but in attempting to identify the sites of any of the holy spots mentioned by Hwen Thsang, I find myself baffled at the outset by the indefiniteness as well as the meagreness of the pilgrim's descriptions. It is his usual practice to state the relative bearings and

distances of most of the chief places of Buddhist veneration, but in describing *Sankisa* he has given only one bearing and not a single distance. The tank of the *Nâga* is the one solitary spot that can be identified with certainty, the sites of all the rest being only guesses of more or less probability.

246. But the difficulty regarding the identification of the Asoka Pillar is of a different kind. Both of the Chinese pilgrims make mention of only one pillar at *Sankisa*, which was crowned with the figure of a *lion*, and Fa Hian records a silly legend which refers to the miraculous roar of this lion statue. Now, the only piece of an Asoka Pillar at present existing is the *elephant* capital, which I have already described, and which, however absurd it may seem, I think may possibly be the *lion* pillar of the Chinese pilgrims. The reasons which induce me to think so are the following:—1st, the *elephant* capital is undoubtedly much older than the date of either of the pilgrims, and yet, if it is not the same as the lion capital, it has been left altogether undescribed by them, although its great size could scarcely have allowed it to remain unnoticed; 2nd, the height of the elephant pillar would seem to correspond very closely with that of the lion pillar, as recorded by Fa Hian, who calls it 30 cubits, or from 45 to 60 feet according to the value of the Chinese *chhi*. Now, the diameter of the neck of the elephant pillar is 2 feet 9½ inches, which, compared with the dimensions of the Allahabad pillar, 2 feet 2 inches neck diameter, to 35 feet of height, gives a total for the shaft of the *Sankisa* Pillar of 44 feet 3 inches. By adding to this the height of the capital, we obtain 52½ feet as the probable height of the *Sankisa* Pillar. 3rd, as the trunk of the elephant has long been lost, it is possible that it was missing before the time of the Chinese pilgrims, and if so, the nature of the animal might easily have been mistaken at a height of 50 feet above the ground. Indeed, supposing the pillar to be the same, this is the only way in which I can account for the mistake about the animal. But, if the pillar is not the same, the silence of both pilgrims regarding this magnificent elephant pillar seems to me quite unaccountable. On the whole, therefore, I am inclined to believe that the elephant's trunk having been long lost, the nature of the animal was mistaken when viewed from a distance of 50 feet beneath. This is confirmed by the discrepancy in the statements of the two pilgrims regarding the capital of one of the *Srâvasti* pillars,

which Fa Hian calls an ox, and Hwen Thsang an elephant. See para. 342 of this Report.

247. Admitting, then, that this elephant capital is not improbably the same as the lion pillar described by the Chinese pilgrims, we have a clue to the site of the great monastery which would seem to have enclosed within its walls the great stone pillar as well as the three holy staircases. I infer, therefore, that the temple of *Bisâri Devi* most probably occupies the site of the three staircases, and that the three mounds which stand to the east of the *Nivi-ka-kot* may be the remains of the three *Stupas* which were erected on the three other holy spots of *Sankisa*, which have already beeu described. I made sevcral excavations about the different mounds just noticed, but without any success.

248. I made also a careful but an unsuccessful search for some trace of the base of the stone pillar. The people were unanimous that the elephant capital had been in its preseut position beyoud the memory of any one now living, and most of them added that it now stands in its original position. But therc were a few men who pointed to a spot on the west of the village, or *Kilah* mound, as the original site of the capital. Here, indeed, therc is an octagonal hole in a small mound, from which the bricks of a solid foundation have becn removed. If any dependence could be placed upon this statement, the mound ou which the village now stands would almost certainly be the site of the great monastery with its three holy staircases, and the three mounds to the east of *Nivi ka-kot* would still represent the three *Stupas*. The main objection to our accepting this statcment as correct is the appareut want of all object in the removal of the elephant capital to auy other site. It is, however, quite possible that the capital may have been stopped on its way to the temple of *Mahadeva*, near the *Nága* mound and tank. Thc temple of *Bisâri Devi* would then be the site of one of the ten ancient Brahmanical fanes which are described by Hwen Thsang. Altogether, this is perhaps a more probable solution of the case thau that first described.

249. In his description of *Sankisa*, Hwen Thsang mentions a curious fact, that the Brahmans who dwelt near the great monastery were "many tens-of-thousands" in number. As an illustration of this statement I may mention that the people have a tradition that *Sankisa* was deserted from 1800 to 1900 years ago, and that 1300 years ago,

or about A. D. 560, it was given by a *Kayath* to a body of Brahmans. They add also that the population of the village of *Paor-Kheria* is known to have been wholly Brahman until a very recent period.

X.—KANOJ.

250. Of the great city of Kanoj, which for many hundred years was the Hindu Capital of Northern India, the existing remains are few and unimportant. In A. D. 1016, when Mahmud of Ghazni approached Kanoj, the historian relates that "he there saw a city which raised its head to the skies, and which in strength and structure might justly boast to have no equal." Just one century earlier, or in A. D. 915, Kanoj is mentioned by Masudi as the Capital of one of the Kings of India, and about A. D. 900 Abu Zaid, on the authority of Ibn Wahab, calls "*Kadage*, a great city in the kingdom of *Gozar*." At a still earlier date, in A. D. 634, we have the account of the Chinese pilgrim Hwen Thsang, who describes Kanoj as being 20 *li* or 3⅓ miles, in length, and 4 or 5 *li* or ⅔ of a mile, in breadth. The city was surrounded by strong walls and deep ditches, and was washed by the Ganges along its eastern face. The last fact is corroborated by Fa Hian, who states that the city touched the River *Heng* (Ganges) when he visited it in A. D. 400. Kanoj is also mentioned by Ptolemy, about A. D. 140, as Κανογιζα. But the earliest notice of the place is undoubtedly the old familiar legend of the Puranas, which refers the Sanskrit name of *Kanya Kubja*, or the "hump-backed maiden," to the curse of the sage *Vayu* on the hundred daughters of *Kusanâba*.

251. At the time of Hwen Thsang's visit, Kanoj was the Capital of Raja *Harsha Vardhana*, the most powerful Sovereign in Northern India. The Chinese pilgrim calls him a *Fei-she*, *Vaisya*, but it seems probable that he must have mistaken the *Vaisa*, or *Bais*, Rajput, for the *Vaisya*, or *Bais*, which is the name of the mercantile class of the Hindus; otherwise Harsha Vardhana's connexion by marriage with the Rajput families of Malwa and Balabhi would have been quite impossible. Baiswâra, the country of the Bais Rajputs, extends from the neighbourhood of Lucknow to Khara Mânikpur, and thus comprizes nearly the whole of Southern Oudh. The Bais Rajputs claim descent from the famous *Sâlivâhan*, whose capital is said to have been *Daundia Khera*, on the north bank of the Ganges. Their close

proximity to Kanoj is in favour of the sovereignty which they claim for their ancestors over the whole of the Gangetic Doab from Delhi to Allahabad. But their genealogical lists are too imperfect, and most probably also too incorrect, to enable us to identify any of their recorded ancestors with the Princes of Harsha Vardhana's family.

252. The vast empire which Harsha Vardhana raised during his long reign of 44 years, between A. D. 607 and 650, is described by Hwen Thsang as extending from the foot of the Kashmir hills to Assam, and from Nepal to the Narbada River. He intimidated the Raja of Kashmir into surrendering the tooth of Buddha, and his triumphal procession from Pâtaliputra to Kanoj was attended by no less than 20 tributary Rajas from Assam and Magadha on the east, to Jâlandhar on the west. In the plenitude of his power, Harsha Vardhana invaded the countries to the south of the Narbada, where he was successfully opposed by Raja *Pulakesi*, and after many repulses was obliged to retire to his own kingdom. This account of Hwen Thsang is most singularly corroborated in every particular by several ancient inscriptions of the *Châlukya* Rajas of *Kalyân*. According to these inscriptions, Raja Vikramaditya, the grandson of *Pulakesi Vallabha*, gained the title of *Parameswara*, "by the defeat of Sri Harsha Vardhana, famous in the north countries.*" Now Vikramaditya's reign is known to have commenced in *Sake* 514, or A. D. 592, as one of his inscriptions is dated in Sake 530, or A. D. 608, which is called the 16th year of his reign ; † and as his grandson did not succeed to the throne until the *Sake* year 618, or A. D. 696, it is certain that Vikramaditya must have been a contemporary of Harsha Vardhana throughout the greater part, if not the whole, of his reign. The unusually long reigns of the earlier *Châlukya* Princes have led Mr. Walter Elliot to suspect the accuracy of the dates, although, as he points out, "the succeeding dates tally with each other in a way that affords the strongest presumption of their freedom from any material error." The question of the accuracy of these dates is now most satisfactorily confirmed by the unimpeachable testimony of the contemporary record of Hwen Thsang which I have quoted above.

* Bombay Asiatic Society's Journal, III. 206.
† Royal Asiatic Society's Journal IV. 10.

253. In determining the period of Harsha's reign, between the years 607 and 650 A. D., I have been guided by the following evidence :—1st. The date of his death is fixed by the positive statement of Hwen Thsang in the year 650 A. D.—2nd. In speaking of Harsha's career, the pilgrim records that from the time of his accession Harsha was engaged in continual war for $5\frac{1}{2}$ years, and that afterwards for about 30 years he reigned in peace. This statement is repeated by Hwen Thsang, when on his return to China, on the authority of the King himself, who informed him that he had then reigned for *upwards* of 30 years, and that the quinquennial assembly then collected was the *sixth* which he had convoked. From these different statements it is certain that at the date of Hwen Thsang's return to China, in A. D. 640, Harsha had reigned upwards of 30 years, and somewhat less than 35 years. His accession must, therefore, be placed between A. D. 605 and 610.—3rd. Now, in the middle of this very period, in A. D. 607, as we learn from Abu Rihan, was established the Sri *Harsha* era, which was still prevalent in Mathura and Kanoj in the beginning of the 11th century. Considering the exact agreement of the names and dates, it is impossible to avoid coming to the conclusion that the *Harsha* who established an era in *Kanoj* in A. D. 607 was the great King *Harsha Vardhana* who reigned at Kanoj during the first half of the seventh century.

254. Hwen Thsang adds some particulars regarding the family of Harsha Vardhana which induce me to think it probable that it may be identified with one of the dynasties whose names have been preserved in the genealogies of the Râjavali. The names differ in the various copies, but they agree generally in making *Raj Sing*, who reigned only nine years, the predecessor of *Hara* or *Hari Sing*, who is recorded to have reigned for 44 or 45 years. Now, according to Hwen Thsang, the predecessor and elder brother of *Harsha Vardhana* was *Rajya Vardhana*, who was assassinated shortly after his accession. Here both the names of these two Kings and the lengths of their reigns agree so well together as to suggest the probability of their identity. In most copies of the Râjavali this dynasty of six Kings, of which *Raja* and *Hara* are the 3rd and 4th names, is made the immediate predecessor of the Great Tomar dynasty, whose accession has already been assigned in my account of the Kings of Delhi to the year 736 A. D.

The following lists give the names of all the Kings of this dynasty according to the various authorities in my possession :—

Mritunjaya and Ward.		Punjab, M. S.		Chanderi, M. S.		Sayid Ahmad.		Hwen Thsang.
	Yrs.		Yrs.		Yrs		Yrs.	
Dipa Sinha	27	Dip S. ...	17	Dip S.	17	Dip Sing ...	17	
Rana S. ...	22½	Rân S....	14½	Ran S.	14½	Ran Sing ..	14	Prakâra Vardhana.
Râja S. ...	9½	Râj S. ..	9½	Ram S. ..	9½	Râj Sing ...	9	Rajya ditto.
Vara S. ...	46	Hari S.	45	Mitr S. ..	45	Shir Sing	45	Harsha ditto.
Nara S. ..	25	Nar S....	43	Bir S.	13	Hara Sing	13	
Jivana	20½	Jiwan ...	8	Jiwan	8	Jiwan Sing	7	
Total ...	151	.....	137	.....	107	.....	105	

According to Sayid Ahmad the accession of *Shir Sing*, who is the *Hara* or *Hari* of the other lists, took place in A. D. 611, or within four years of the date already obtained for Harsha Vardhana.

255. In my account of Delhi I have given my reasons for believing that Kanoj was the Capital of the *Tomars* down to the invasion of Mahmud in A. D. 1021, immediately after the defeat and death of *Râjâ Jai Pâl*. Shortly after that date the small town of Bâri to the north of Lucknow became the Capital, until about A. D. 1050, when the *Tomars* retired to Delhi before the growing power of the *Râhtors*. Once more Kanoj became the Capital of a powerful kingdom, and the rival of Delhi, both in extent and in magnificence. Here Jaya Chandra, the last of the *Râhtors*, celebrated the *Aswamedha*, or "Horse-sacrifice;" and here in open day did Prithi Raja, the daring chief of the Chohans, carry off the willing daughter of the *Râhtor* King, in spite of the gallant resistance of the two *Banâfar* heroes *Alha* and *Udal*. The fame of these two brothers, which is fully equal to that of Prithi Raja himself, is still preserved in the songs and traditions of the people amongst the Chandels of *Mahoba* and the *Râhtors* and Chandels of the Doab. After the fall of Delhi in January, 1193, A. D., Muhammad Ghori marched against Kanoj. Raja Jaya Chandra retired before him as far as Benares, where he made his last stand, but was defeated with great slaughter. The Raja escaped from the field, but was drowned in attempting to cross the Ganges. When his body was recovered by the conquerors it was found that he had false teeth

fixed with wires of gold. With Jaya Chandra ended the dynasty of the *Râhtors* of the Doab and the wealth and importance of the far-famed Capital of Kanoj. Only one hundred and fifty years later it is described by Ibn Batuta as a "small town," and from that time down to the present this ancient city has gradually lessened in consequence; but as it was close to the high road of the Doab, it still continued to be visited by numerous travellers who were attracted by its ancient fame. The final blow to its prosperity has now been given by the diversion of the Railroad to Etawa, which leaves Kanoj far away to the east, to be visited for the future only by the curious antiquary and the Civil Officials of the district.

256. In comparing Hwen Thsang's description of ancient Kanoj with the existing remains of the city, I am obliged to confess with regret that I have not been able to identify even one solitary site with any certainty; so completely has almost every trace of Hindu occupation been obliterated by the Musalmans. According to the traditions of the people, the ancient city extended from the shrine of *Hâji Harmâyan* on the north near the Raj Ghât, to the neighbourhood of *Miranka-Sara* on the south, a distance of exactly three miles. Towards the west it is said to have reached to *Kapatya* and *Makarandnagar*, two villages on the high road, about three miles from *Hâji Harmâyan*. On the east the boundary was the old bed of the Ganges, or *Chota Ganga* as the people call it, although it is recorded in our maps as the *Kâli Nadi*. Their account is that the *Kâli*, or *Kâlindri Nadi*, formerly joined the Ganges near *Sangirâmpur* or *Sangrâmpur;* but that several hundred years ago the great river took a more northerly course from that point, while the waters of the *Kâli Nadi* continued to flow down the deserted channel. As an open channel still exists between *Sangrâmpur* and the *Kâli Nadi*, I am satisfied that the popular account is correct, and that the stream which flows under Kanoj, from *Sangrâmpur* to *Mhendi Ghât*, although now chiefly filled with the waters of the *Kâli Nadi*, was originally the main channel of the Ganges. The accounts of Fa Hian and Hwen Thsang, who place Kanoj on the Ganges, are therefore confirmed, not only by the traditions of the people, but also by the fact that the old channel still exists under the name of the *Chota Ganga*, or Little Ganges.

257. The modern town of Kanoj occupies only the north end of

the site of the old city, including the whole of what is now called the *Kilah* or citadel. The boundaries are well defined by the shrine of *Hâji Harmâyan* on the north, the tomb of *Tâj Bâj* on the south-west, and the Masjid and tomb of *Makhdum Jahâniya* on the south-east. The houses are much scattered, especially inside the citadel, so that though the city still covers nearly one square mile, yet the population barely exceeds 16,000 in number. The citadel, which occupies all the highest ground, is triangular in shape, its northern point being the shrine of *Hâji Harmâyan*, its south-west point the temple of *Ajoy Pâl*, and its south-east point the large bastion called *Kshem Kali Bûrj*. Each of the faces is about 4,000 feet in length, that to the north-west being protected by the bed of the nameless dry Nala; that to the north-east by the *Chota Ganga;* while that to the south must have been covered by a ditch, which is now one of the main roads of the city, running along the foot of the mound from the bridge below Ajoy Pâl's temple to the *Kshem Kali* bastion. On the north-east face the mound rises to 60 and 70 feet in height above the low ground on the bank of the river; and towards the Nala on the north-west, it still maintains a height of from 40 to 50 feet. On the southern side, however, it is not more than 30 feet immediately below the temple of *Ajoy Pâl*, but it increases to 40 feet below the tomb of *Bulâ Pir*. The situation is a commanding one; and before the use of cannon the height alone must have made Kanoj a strong and important position. The people point out the sites of two gates; the first to the north, near the shrine of *Hâji Harmâyan*, and the second to the south-east, close to the *Kshem Kali Bûrj*. But as both of these gates lead to the river it is certain that there must have been a third gate on the land side towards the south-west, and the most probable position seems to be immediately under the walls of the *Rang Mahal*, and close to the temple of *Ajoy Pâl*.

258. According to tradition, the ancient city contained 84 wards, or *Mahalas*, of which 25 are still existing within the limits of the present town. If we take the area of these 25 wards at three-quarters of a square mile, the 84 wards of the ancient city would have covered just $2\frac{1}{2}$ square miles. Now, this is the very size that is assigned to the old city by Hwen Thsang, who makes its length 20 *li*, or $3\frac{1}{3}$ miles, and its breadth 4 or 5 *li*, or just three-quarters of a mile, which mul-

tiplied together give just $2\frac{1}{2}$ square miles. Almost the same limits may be determined from the sites or the existing ruins, which are also the chief *find-spots* of the old coins with which Kanoj abounds. According to the dealers, the old coins are found at *Bâla Pir* and *Rang Mahal*, inside the Fort; at *Makhdum Jahâniya*, to the south-east of the Fort; at *Makarandnagar* on the high road; and intermediately at the small villages of *Singh Bhawâni* and *Kûtlûpur*. The only other productive site is said to be *Râjgir*, an ancient mound covered with brick ruins on the bank of *Chota Ganga*, three miles to the south-east of Kanoj. Taking all these evidences into consideration, it appears to me almost certain that the ancient city of Hwen Thsang's time must have extended from *Hâji Hurmâyan* and the *Kshem Kali Bûrj*, on the bank of the Ganges (now the *Chota Ganga*), in a south-west direction, to *Makarandnagar*, on the Grand Trunk Road, a length of just three miles, with a general breadth of about one mile or somewhat less. Within these limits are found all the ruins that still exist to point out the position of the once famous city of Kanoj.

259. The only remains of any interest are, 1st, the ruins of the old palace, now called the *Rang Mahal;* 2nd, the Hindu pillars of the *Jâma Masjid;* 3rd, the Hindu pillars of the Masjid of *Makhdum Jâhaniya;* and 4th, the Hindu statues in the village of *Singh Bhawâni*. The other remains are simple mounds of all sizes, covered with broken bricks, traces of brick walls, and broken figures. These are found in several places inside the citadel, but more particularly at the temple of *Ajoy Pâl*, a modern building on an ancient site. Outside the citadel they are found chiefly about the shrine of *Makhdum Jahâniya* on the south-east, and about *Makrandnagar* on the south-west.

260. The ruins of the *Rang Mahal*, which are situated in the south-west angle of the citadel, consist of a strong brick wall faced with blocks of *kankar*, 240 feet in length, and 25 feet in height above the sloping ruins, but more than 40 feet above the level of the bazar. It is strengthened in front by four towers or buttresses, 14 feet broad and 61 feet apart. The wall itself is 7 feet thick at top, and behind it, at 10 feet distance, there is a second wall 5 feet thick, and at $9\frac{1}{2}$ feet farther back a third wall $3\frac{1}{2}$ feet thick, and a fourth wall at 21 feet. The distances between the walls most probably represent the width of

some of the rooms of the old Hindu palace, which would thus have a breadth of 56 feet. But the block *kankar* walls can be traced for a distance of 180 feet back from the south-east buttress to a wicket or small door which would appear to have formed a side entrance to the courtyard of the palace. As far as it can be now traced, the palace covered an area of 240 feet in length by 180 feet in breadth. It is said to have been built by *Ajoy Pâl*, to whom also is attributed a temple which once stood close by. *Ajoy Pál*, and *Mahi Pâl* are said to have reigned a short time before *Jay Chand ;* but the names of the intervening Princes are not known. I think it highly probable that *Ajoy Pâl* is the Tomar Prince *Joy Pâl*, who was conquered by Mahmud of Ghaznie, and afterwards defeated and killed, in A. D. 1021, by a confederate army under the leadership of the Chandal Raja of *Kajanjar*. Just outside the south-east buttress of the palace, the people point out a spot where they affirm that 29 golden ingots were discovered in 1834, of which 9 were made over to Mr. Wemyss, the Collector of Cawnpoor, and the remainder were secreted by the finders. Accounts differ as to the weight of the ingots, but the general belief is that they weighed about 1 *ser* or 2 lbs each. The coin dealers, however, affirm that the 9 ingots which were taken to the Cawnpoor Treasury weighed Rs. 13,500, that is Rs 1,500, or $18\frac{3}{4}$ *sers*, each.

261. The *Jáma*, or *Dina*, *Masjid* of Kanoj is cited by Mr. Fergusson as a specimen of Hindu cloisters, which has been re-arranged to suit the purposes of Muhammadan worship ; and in this opinion I most fully concur. The inscription over the entrance doorway is now much decayed, and several portions are quite obliterated, but a copy has been fortunately preserved by Rajab Ali, a teacher of children, in the court of the Masjid. According to this copy, the Masjid was built in the Hijira year 809, or A. D. 1406, in the reign of Ibrahim Shah (of Jonpur). It is situated on a lofty mound in the very middle of the old fort, and this commanding position alone would be sufficient to show that it must originally have been the site of some Hindu building of considerable importance. This conclusion is partly confirmed by the traditions of the people, who, however, most absurdly call the place *Sitaka Rasü*, or " Sita's kitchen." We know also that it was the usual practice of the Muhammadan Kings of Jonpur to raise their Masjids on the sites, and with the materials, of the Hindu temples which they

demolished. On comparing therefore this cloistered Masjid with those of Jonpur, which are acknowledged re-arrangements of Hindu materials, we see at once that the pillars are all Hindu, and that the domes formed of courses of overlapping stones, and decorated with Hindu symbols, are certainly not Muhammadan. When I first visited Kanoj in January, 1838, the arrangement of the pillars was somewhat different from what I found it in November, 1862. The cloisters which originally extended all round the square, are now confined to the Masjid itself, that is, to the west side only. This change is said to have been made by a Muhammadan Tahsildar shortly before 1857. The same individual is also accused of having destroyed all the remains of figures that had been built into the walls of the *Jâma* and *Makhdum Jahâniya* Masjids. It is certain that there are none visible now, although in January 1838, as recorded in my Journal, I saw "several Hindu figures placed sideways and upside down" in the walls of the *Jâma* Masjid and three broken figures lying outside the doorway of the Masjid of *Makhdum Jahâniya*. The inscription over the doorway of the last, which I saw in its place in 1838, is said to have been removed at the same time for the purpose of cutting off a Hindu figure on the back of it. I recoverd this inscription by sending to the present Tahsildar for it.

262. The *Jâma* Masjid, as it stands now, is a pillared room, 108 feet in length by 26 feet in width, supported on four rows of columns. The roof is flat, excepting the centre and ends, which are covered with domes formed by circles of stones gradually lessening until they meet. In front of the Masjid there is a courtyard 95 feet in width, the whole being surrounded by a stone wall 6 feet in thickness. The exterior dimensions are 133 feet from west to east, by 120½ feet. In 1838 there were still standing on the three sides of the courtyard portions of the original cloisters formed of two rows of pillars. The Masjid itself was then confined to the five openings in the middle of the west side, the seven openings on each flank of it being formed of only two rows of pillars the same as on the other three sides. The Masjid now consists of a single room supported on 60 pillars without any cloisters; but originally the Masjid itself was supported on 20 pillars with cloisters on each flank, and also on the other three sides of the courtyard. The whole number of pillars was then 128. To make up this number we

have the 60 pillars of the present Masjid, and no less than 58 spare capitals still lying in the courtyard, which together make up 118, or within 10 of the actual number required to complete the original design.

263. The pillars of the *Jáma* Masjid may, I think, be seen in their original Hindu form at the sides of the small doorways in the north and south walls of the court. Each pillar is formed of five pieces, viz., a base and capital, with a middle piece which divides the shaft into two equal portions, and may be called the upper and lower shafts. The shafts are 10 inches square and 3 feet 9 inches in height. The base is 1 foot high, and the middle piece and the capital are each 3 inches, thus making the whole height 9 feet 10 inches. But the pillars, as re-arranged by the Muhammadans, are 14 feet 2 inches high, the extra height having been gained by adding a piece to each portion of the shaft. These shorter pieces, which are 2 feet 1 inch in height, are always placed above the original shafts of 3 feet 8 inches. As there could have been no *difficulty* in purchasing a single shaft of the required length of 5 feet 10 inches, it seems certain that the whole of these made-up pillars must have been obtained after the usual cheap Muhammadan manner—by the demolition of some Hindu buildings, either Buddhist or Brahmanical.

264. The Masjid and tomb of *Makhdum Jahâniya* are situated on a lofty mound in the *Sikhâna Mahalla* to the south-east of the citadel, overlooking the *Chota Ganga*. The mound is 40 feet in height above the fields, and is partly occupied by weavers' houses. The tomb of the *Makhdum* is a common-looking building, 35 feet square. Beside it, there are two other plain square tombs holding the remains of his descendants, both male and female. The tomb itself, as recorded in the mutilated inscription which formerly existed over the doorway, was erected over *Sayid Jalal Makhdum Jahâniya* by his son *Râja* in the Hijira year 881, or A. D. 1476. The Masjid was built in the same year, in the reign of Husen Shah of Jonpur, to whom Kanoj still belonged, although some writers place his final defeat by Bahlol Lodi of Delhi in this very year, A. H. 881, and others in A. H. 883. The central dome of the Masjid has long ago fallen in, and all the pointed arches are seriously cracked and propped up by unsightly masses of masonry. There is nothing peculiar about the building, save the decoration of the panels of the back wall, which have the name of

Allah inscribed on a tablet suspended by a rope. The appearance of the tablet and rope is so like that of the Hindu bell and chain that one is almost tempted to believe that the Muhammadam architect must have simply chiselled away the bolder points of the Hindu ornament to suit his own design. But whether this may have been the case or not, it is impossible to miss seeing that the Hindu bell and chain must have been directly suggestive of the Muhammadan tablet and cord. The Masjid and tombs are surrounded by a wall with four small towers at the corners, and an entrance gate on the south side. In the steps leading up to this entrance I found in 1838 a broken figure of *Shasti*, the goddess of fecundity, and a pedestal with a short inscription, dated in *Samvat* 1193, or A. D. 1136. The people also affirm that a large statue formerly stood under a tree close by. All of these are now gone, but the fact that two of them were built into the entrance steps is sufficient to show that the mound on which the Masjid stands must once have been the site of some important Hindu building.

265. The two statues in the village of *Singh Bhawâni* were discovered about 100 years ago in a field close by the brick hovel in which they are now placed. The people call them *Râm* and *Lakshman*, and the attendant Brahman does so too, although the figures have eight arms each, and although the Fish, Tortoise, Boar and Lion incarnations of Vishnu are represented round the head of one of them. Each of the figures is 3 feet in height, but the whole sculpture is 6 feet. Vishnu is also known by the *discus* (*chakra*), and club (*gadâ*), from which he derives his well known titles of *chakradhar* and *gadâdhar*. Along with these sculptures there are some other figures, of which the most important is a statue of the Tântrika Buddhist goddess, *Vajrâ Vârâhi*. The figure is $2\frac{1}{2}$ feet in height and has three heads, of which one is porcine, and the usual number of seven hogs is represented on the pedestal. Outside the building there are figures of *Durga* slaying the *Maheshasur*, or buffalo demon, and of *Siva* and *Parbati* sitting on the bull *Nandi*. In the neighbouring village of *Kutlupur* I found the lintel of a temple doorway with a figure of Vishnu in the middle, showing that the temple had been dedicated to that god. He is represented sitting on the *Garuda*, or eagle, and holding the club and *discus*.

266. The remaining place of any note is the *Suraj-kund*, or "Tank of the Sun," to the south-east of *Makarandnagar*. It is now

nearly dried up, and at the time of my visit its bed was planted with potatoes. But it is one of the oldest places of worship in Kanoj, and an annual fair is still held on its bank in the month of *Bhadur*, (August-September). Close beside it there is a modern temple of *Mahadeva*, which is said to have replaced a ruined one of some antiquity. To the south-west of *Makarandnagar* there are three mounds covered with broken bricks and pottery; and under a tree, on the south mound, are collected a number of fragments of sculpture at a spot dedicated to *Maorâri* Devi.

267. Most of the ancient monuments of Kanoj that are noticed by the Chinese pilgrims are of course Buddhist; but numerous as they were, I am unable to do more than offer conjectures more or less probable regarding their sites, as Muhammadan spoliation has not left a single place standing to give even a faint clue towards identification. The position of one of the most remarkable of the monuments is rendered more than usually doubtful by the conflicting evidence of the two pilgrims. According to Fa Hian, the great *Stupa* of *Asoka*, 200 feet in height, which was built on the spot where Buddha had preached on the instability of human existence, was situated at 6 or 7 *li* to the west of the town, and on the north bank of the Ganges. But according to Hwen Thsang, this great *Stupa* was situated at 6 or 7 *li* to the south-east of the capital, and on the south bank of the Ganges. Now, as the ground to the north of the Ganges, as it existed during the first centuries of the Christian era, was very low and therefore liable to inundation, it seems highly improbable that any monument would have been erected in such an insecure position. I conclude therefore that Hwen Thsang's account is most likely right, but I failed in my search for any remains of this vast monument in the position indicated, that is, at rather more than one mile to the south-east of the capital, and on the south bank of the *Chota Ganga*.

268. To the north-west of the town Hwen Thsang places another *Stupa* of Asoka, but as he gives no distance, the mere bearing is too vague to enable us to fix upon the site with any probability. Perhaps the small village of *Kapatya*, or *Kapteswari*, nearly opposite the burnt dâk bungalow, is the most probable site; but although there are the remains of brick buildings in its vicinity, there is nothing to indicate the previous existence of any large *Stupa*. A smaller *Stupa*

containing the hair and nails of Buddha has also disappeared, as well as the memorial monument to the four Buddhas.

269. To the south of the town, and close to the Ganges, there were three monasteries, with similar looking walls, but differing gateways. In one of these monasteries there was a *Vihâra*, or chapel, which possessed a tooth of Buddha preserved in a casket adorned with precious stones raised on a high pedestal. This tooth was shown daily to crowds of people, although the tax charged for its exhibition was "a large piece of gold." Perfumes were burned before it by thousands of votaries, and flowers which were strewn in profusion over it were devoutly believed never to conceal the casket. Right and left in front of the monasteries there were two *Vihâras*, each about 100 feet in height. Their foundations were of stone, but their walls of brick. In front of each *Vihâra* there was a small monastery. The most probable site of the three monasteries and the *Vihâra* with the tooth of Buddha, seems to me to be the large mound immediately to the south of the *Kshem Kali Bûrj*, to the south-east of the town, and on the immediate bank of the river. This is now called the *Mahalla* of *Lâla Misr Tola*. The mound is covered with broken bricks, but no remains of any extensive buildings are now visible.

270. At a short distance to the south-east of the three monasteries there was a lofty *Vihâra*, 200 feet in height, which enshrined a statue of Buddha 30 feet high. The foundations of the building were of stone, but the walls of brick. On the surrounding walls of the *Vihâra*, which were of stone, were sculptured all the acts of Buddha's life until he became a *Bodhisatwa*. The position of this lofty *Vihâra* was most probably on the large mound in the midst of the present *Bhatpuri Mahalla*, which stands about 800 feet to the south-east of the mound in the *Mahalla* of *Lâla Misr Tola*. There are no remains now to be seen on this mound, but it is probable that excavations would be attended with success, as there can be little doubt that this was once the site of some important buildings. At a little distance from the *Vihâra* towards the south there was a temple; and a little farther to the south there was a second temple dedicated to *Siva*. Both of these temples were of the same form and size as the *Vihâras* of Buddha. They were built of a blue stone which was highly polished, and adorned with admirable sculptures. The probable position of these Brahmanical temples was on the high

mound of *Makhdum Jahâniya*, in the *Sikhâna* Mahalla, which is about 700 feet to the south of the last mentioned mound in the *Bhatpuri* Mahalla. That this mound was the site of one or more Brahmanical temples seems almost certain from my discovery of a figure of *Shasti*, the goddess of fecundity, and of a pedestal bearing the date of *Samvat* 1193, or A. D. 1136, which is posterior to the extinction of Buddhism in Kanoj. I think it probable that excavations in this mound would be attended with success, as the two temples are said to have been built of stone, which no doubt furnished the whole of the materials for the Masjid and tomb of *Makhdum Jahâniya*.

XI.—A-YU-TO, OR AYODHYA.

271. From Kanoj the two Chinese pilgrims followed different routes, Fa Hian having proceeded direct to *Sha-chi* (the modern Ajudhya, near Fyzabad on the Ghâghra), while Hwen Thsang followed the course of the Ganges to Prayâg, or Allahabad. The first stage of both pilgrims would, however, appear to be the same. Fa Hian states that he crossed the Ganges and proceeded 3 yojans, or 21 miles, to the forest of *Holi*, where there were several *Stupas* erected on spots where Buddda had "passed, or walked, or sat." Hwen Thsang records that he marched 100 *li*, nearly 17 miles, to the town of *Nava-deva-kula*, which was on the eastern bank of the Ganges, and that at 5 *li*, or nearly 1 mile, to the south-east of the town there was a *Stupa* of Asoka, which was still 100 feet in height, besides some other monuments dedicated to the four previous Buddhas. I think it probable that the two places are the same, and that the site wss somewhere near Nobatganj, just above the junction of the *Isan River* and opposite *Nanamow* Ghat. But as there are no existing remains anywhere in that neighbourhood, the place has been most likely swept away by the river. This is rendered almost certain by an examination of the Ganges below the junction of the *Isan*. Formerly the river continued its course almost due south from Nanamow for many miles, but some centuries ago it changed its course first to the south-east for 4 or 5 miles, and then to the south-west for about the same distance, where it rejoined its old bed, leaving an island, some 6 miles in length by 4 in breadth, between the two channels. As Hwen Thsang's account places *Nava-deva-kula* on the very site of this island, I conclude

that the town as well as the Buddhist monuments must all have been swept away by the change in the river's course.

272. On leaving *Nava-deva-kula*, Hwen Thsang proceeded 600 *li*, or 100 miles, to the south-east, and recrossing the Ganges he reached the capital city of *A-yu-to*, which was 20 *li*, or upwards of 3 miles, in circuit Both M. Julien and M. St. Martin have identified this place with *Ayodhya*, the once celebrated capital of Rama. But though I agree with them as to the probable identification of the name as that of the country, I differ with them altogether in looking for the capital along the line of the *Ghâghra River*, which is due east from Kanoj, whereas Hwen Thsang states that his route was to the south-east. It is of course quite possible that the pilgrim may occasionally use the generic name of Ganges as the appellation of any large river, such for instance as the *Ghâghra*, but in the present case, where the recorded bearing of south-east agrees with the course of the Ganges, I think it is almost certain that the Ganges itself was the river intended by the pilgrim. But by adopting the line of the Ganges we encounter a difficulty of a different kind in the great excess of the distance between two such well-known places as Kanoj and Prayâg. According to Hwen Thsang's route, he first made 100 *li* to *Nava-deva-kula*, then 600 *li* to *Ayutho*, then 300 *li* by water to *Hayamukha*, and lastly 700 *li* to *Prayâga*. All these distances added together make a total of 1,700 *li*, or 283 miles, which is just 100 miles, or 600 *li*, in excess of the true distance. But as a part of the journey, viz., 300 *li*, or 50 miles, was performed by water, the actual excess may perhaps not be more than 85 or 90 miles; although it is doubtful whether the distance of 300 *li* may not have been the road measurement and not the river distance. It is sufficient for our purpose to know that Hwen Thsang's recorded measurement is somewhere about 100 miles in excess of the truth. The only explanation of this error that suggests itself to me is, that there may have been an accidental alteration of one set of figures, such as 60 *li* for 600 *li*, or 700 *li* for 70 *li*. Supposing that the former was the case, the distance would be shortened by 540 *li*, or 90 miles, and if the latter, by 630 *li*, or 105 miles. This mode of correction brings the pilgrim's account into fair accordance with the actual distance of 180 miles between Kanoj and Prayâg.

273. By adopting the first supposition, Hwen Thsang's distance from *Nava-deva-kula* to the Capital of *Ayutho* will be only 60 *li*, or 10 miles, to the south-east, which would bring him to the site of an ancient city named *Kâkûpur*, just 1 mile to the north of Seorâjpoor, and 20 miles to the north-west of Cawnpoor. If we adopt the latter correction, the pilgrim's distance to *Ayutho* of 600 *li*, or 100 miles, will remain unchanged, and this would bring him viâ *Mânikpur*, which is also an ancient place. By the first supposition the subsequent route would have been from *Kâkûpur* to *Daundiakhera* by boat, a distance of exactly 50 miles, or 300 *li*, and from thence to *Prayâg*, a distance of more than 100 miles, which agrees with the 700 *li*, or 116 miles, of the pilgrim. By the second supposition the subsequent route would have been from *Khara* to *Papamow* by water, about 50 miles, and thence to Prayâg, about 8 miles of land, which agrees with the 70 *li* of the proposed correction. In favour of this last supposition is the fact that the bearing from *Khara* to *Papamow* of east by south is more in accordance with Hwen Thsang's recorded east direction than the south-east bearing of Daundiakhera from Kâkûpur. I confess, however, that I am more inclined to adopt the former correction, which places the chief city of *Ayutho* at Kâkûpur, and the town of *Hayamukha* at Daundiakhera, as we know that the last was the capital of the *Bais Rajputs* for a considerable period. I am partly inclined to this opinion by a suspicion that the name of *Kâkûpur* may be connected with that of *Bagud*, or *Vagud*, of the Tibetan books. According to this authority a *Sâkya*, named *Shâmpaka*, on being banished from Kapila retired to *Bagud*, carrying with him some of Buddha's hairs and nail-parings, over which he built a *chaitya*. He was made King of *Bagud*, and the monument was named after himself *(? Shâmpaka Stupa)*. No clue is given as to the position of *Bagud*, but as I know of no other name that resembles it, I am induced to think that it is probably the same place as the *Ayutho* of Hwen Thsang, which was also possessed of a *Stupa* containing some hairs and nail-parings of Buddha. *Kâkûpur* is well known to the people of Kanoj, who affirm that it was once a large city with a Raja of its own. The existing remains of *Kâkûpur* consist of numerous foundations formed of large bricks, and more particularly of a connected set of walls of some large building which the people call "the palace."

I have not yet visited this place, which lay out of my line of route, but I hope to have an opportunity of examining it hereafter.

XII.—HAYAMUKHA OR AYOMUKHA.

274. From *Ayutho* the Chinese pilgrim proceeded a distance of 300 *li*, or 50 miles, down the Ganges by boat to *O-ye-mu-khi*, which was situated on the north bank of the river, M. Julien reads this name as *Hayamukha*, equivalent to "Horse face," or "Iron face," which was the name of one of the *Dânavas* or Titans. Neither of these names, however, gives any clue to the site of the old city; but if I am right in my identification of *Ayutho* with *Kâkâpur*, it is almost certain that *Ayomukha* must be the same as Daundiakhera. Hwen Thsang makes the circuit of the town 20 *li*, or upwards of 3 miles, but *Daundiakhera* presents no appearance of having ever been so large. There still exist the ruins of an old fort or citadel, 385 feet square, with the walls of two buildings which are called the Raja's and Rani's palaces. The foundation of this citadel is attributed to Raja Raghunâth Singh, but he was apparently some comparatively modern *Thâkur*, or petty Chief, as Daundiakhera is universally allowed to have been the capital of the *Bais* Rajputs, who claim descent from the famous Sâlivâhan. As there are no remains of any buildings which can be identified with the monuments described by Hwen Thsang, the actual site of Ayomukha must still remain doubtful.

XIII.—PRAYAGA, OR ALLAHABAD.

275. From Ayomukha the pilgrim proceeded 700 *li*, or 116 miles, to the south-east, to *Prayâga*, the well-known place of pilgrimage at the junction of the Ganges and Jumna, where Akbar some centuries later built his fort of *Ilâhabâs*, or *Allâhâbâd*, as it was afterwards called by Shahjahan. The distance and bearing given by Hwen Thsang agree almost exactly with those of Prayâga from Daundiakhera. The distance is 104 miles by the nearest road to the south of the Ganges; but as the pilgrim followed the north road, the distance must have been increased to about 115 or 120 miles. According to him the city was situated at the confluence of the two rivers, but to the west of a large sandy plain. In the midst of the city there was a Brahmanical temple, to which the presentation of a single piece of money procured as much merit as that of one thousand pieces elsewhere. Before the

principal room of the temple there was a large tree with wide-spreading branches, which was said to be the dwelling of an anthropophagous demon. The tree was surrounded with human bones, the remains of pilgrims who had sacrificed their lives before the temple,—a custom which had been observed from time immemorial.

276. I think there can be little doubt that the famous tree here described by the Chinese pilgrim is the well-known *Akshay Bat*, or "shadowless Banian tree," which is still an object of worship at Allahabad. This tree is now situated underground at one side of a pillared court, which would appear to have been open formerly, and which is, I believe, the remains of the temple described by Hwen Thsang. The temple is situated inside the fort of Allahabad, to the east of the Ellenborough Barracks, and due north from the stone pillar of Asoka and Samudra Gupta. Originally both tree and temple must have been on the natural ground level, but from the constant accumulation of rubbish they have been gradually earthed up, until the whole of the lower portion of the temple has disappeared underground. The upper portion has long ago been removed, and the only access to the *Akshay Bat* now available is by a flight of steps which leads down to a square pillared court-yard. This court has apparently once been open to the sky, but it is now closed in, to secure darkness and mystery for the holy Fig tree.

277. The *Akshay Bat* is next mentioned by Rashid-ud-din in the *Jâmiut-tawârikh*, in which he states that the "tree of *Prâg*" is situated at the confluence of the Jumna and Ganges. As most of his information was derived from *Abu Rihân*, the date of this notice may with great probability be referred to the time of Mahmud of Ghazni. In the 7th century a great sandy plain, 2 miles in circuit, lay between the city and the confluence of the rivers, and as the tree was in the midst of the city, it must have been at least one mile from the confluence. But nine centuries later, in the beginning of Akbar's reign, Abdul Kâdir speaks of the "tree from which people cast themselves into the rivers." From this statement, I infer that, during the long period that intervened between the time of Hwen Thsang and that of Akbar, the two rivers had gradually carried away the whole of the great sandy plain, and had so far encroached upon the city as to place the holy tree on the very brink of the water. Long before this time the old city had no doubt been deserted, for we know that the fort of

Iláhábás was founded on its site in the 21st year of Akbar's reign, that is in A. H. 982, or A. D. 1572. Indeed the way in which Abu Rihân speaks of the "tree" instead of the city of Prâg, leads me to believe that the city itself had already been deserted before his time. As far as I am aware, it is not once mentioned in any Muhammadan history, until it was refounded by Akbar.

278. As the old city of *Prayág* has totally disappeared, we can scarcely expect to find any traces of the various Buddhist monuments which were seen and described by the Chinese pilgrim in the 7th century. Indeed from their position to the south-west of the city, it seems very probable that they may have been washed away by the Jumna even before the final abandonment of the city, as the course of that river for 3 miles above the confluence has been due west and east for many centuries past. At any rate, it is quite certain that no remains of these buildings are now to be seen; the only existing Hindu monument being the well known stone pillar which bears the inscriptions of Asoka, Samudra Gupta and Jahângir. As Hwen Thsang makes no mention of this pillar, it is probable that it was not standing in his day. Even its original position is not exactly known, but it was probably not far from its present site. It was first erected by King Asoka about B. C. 240 for the purpose of inscribing his edicts regarding the propagation of Buddhism. It was next made use of by Samudra Gupta, about the second century of the Christian era, for the record of his extensive sovereignty over the various nations of India from Nepâl to the Dakhan, and from Gujarât to Assam. Lastly, it was re-erected by the Mogal Emperor Jahângir to commemorate his accession to the throne in the year 1605 A. D. These are the three principal inscriptions on the Allahabad Pillar, but there are also a number of minor records of the names of travellers and pilgrims of various dates, from about the beginning of the Christian era down to the present century. Regarding these minor inscriptions, James Prinsep remarks that "it is a singular fact that the periods at which the pillar has been overthrown can be thus determined with nearly as much certainty from this desultory writing, as can the epochs of its being re-erected from the more formal inscriptions recording the latter event. Thus, that it was overthrown some time after its first erection by the great Asoka in the middle of the third century before Christ, is proved by the longitudinal or random insertion of several names in a character intermediate between No. 1 and No. 2, in

which the *m*, *b*, &c., retain the old form." Of one of these names he remarks "Now it would have been exceedingly difficult, if not impossible, to have cut the name No. 10 up and down at right angles to the other writing, *while the pillar was erect*, to say nothing of the place being out of reach, unless a scaffold were erected on purpose, which would hardly be the case, since the object of an ambitious visitor would be defeated by placing his name out of sight and in an unreadable position." The pillar "was erected as Samudra Gupta's arm, and there it probably remained until overthrown again by the idol-breaking zeal of the Musalmans; for we find no writings on it of the *Pála*, or Sârnâth type (*i. e.*, of the tenth century), but a quantity appears with plain legible dates from the *Samvat* year 1420, or A. D. 1363, down to 1660 odd, and it is remarkable that these occupy one side of the shaft, or that which was uppermost when the pillar was in a prostrate position. A few detached and ill executed Nâgari names with *Samvat* dates of 1800 odd, show that even since it was laid on the ground again by General Garstin, the passion for recording visits of piety or curiosity has been at work." In this last passage James Prinsep has made a mistake in the name of the Vandal Engineer who overthrew the stone pillar, because it stood in the way of his new line of rampart near the gateway. It was General Kyd, and not General Garstin, who was employed to strengthen the Fort of Allahabad, and his name is still preserved in the suburb of Kydganj, on the Jumna, immediately below the city.

279. The pillar was again set up in 1838 by Captain Edward Smith, of the Engineers, to whom the design of the present capital is entirely due. At first it was intended to have placed a fancy flower as an appropriate finish to the pillar, but as the people had a tradition that the column was originally surmounted by the figure of a lion, it was suggested by a Committee of the Asiatic Society that the design of the new capital should be made as nearly as possible the same as the original, of which the Bakra and Navandgarh or (Mathiya) pillars, were cited as examples. The lion statues which crown the bell capitals of these two pillars I have seen and admired, and I can affirm that they are the figures of veritable lions. Both of them are represented half couchant, with the head raised and the mouth open. The bell capital swells out boldly towards the top to receive a massive abacus, which forms the plinth of the statue. In these examples the broad

swelling capital is in harmony with the stout and massive column. But the new capital designed by Captain Smith, is, in my opinion, a signal failure. The capital lessens towards the top, and is surmounted by an abacus of less diameter than that of the pillar itself. The animal on the top is small and recumbent, and altogether the design is insignificant. Indeed it looks to me not unlike a stuffed poodle stuck on the top of an inverted flower pot.

280. According to the common tradition of the people, the name of Prayâga was derived from a Brahman, who lived during the reign of Akbar. The story is that when the Emperor was building the fort, the walls on the river face repeatedly fell down in spite of all the precautions taken by the architect. On consulting some wise men, Akbar was informed that the foundations could only be secured by being laid in human blood. A proclamation was then made, when a Brahman, called Prayâga, voluntarily offered his life, on the condition that the fort should bear his name. This idle story, which is diligently related to the pilgrims who visit the *Akshay Bat*, may at least serve one useful purpose, in warning us not to place too much faith in these local traditions. The name of *Prayâga* is recorded by Hwen Thsang in the 7th century, and is in all probability as old as the reign of Asoka, who set up the stone pillar about B. C. 240, while the fort was not built until the end of the 16th century.

XIV.—KOSAM, OR KOSAMBI.

281. The city of *Kosâmbi* was one of the most celebrated places in ancient India, and its name was famous amongst Brahmans as well as Buddhists. The city is said to have been founded by *Kusamba*, the tenth in descent from Pururavas; but its fame begins only with the reign of *Chakra*, the eighth in descent from *Arjun Pandu*, who made Kosâmbi his capital after Hastinapura had been swept away by the Ganges. If the date of the great war (*Mahâbhârata*) be fixed at 1426 B. C., which, as I have already shown in my account of Dilli, is the most probable period, then the date of Chakra will be about 1200 or 1150 B. C. Twenty-two of his descendants are said to have reigned in the Kosâmbi down to Kshemaka, the last of the dynasty, but it seems almost certain that some names must have been omitted, as the very longest period of 30 years which can be assigned to a generation of eastern Kings will place the close of the dynasty about B. C. 500, and make the

period of *Udâyana* about 630 to 600 B. C. If we take all the recorded names of the different authorities, then the number of generations will be 24, which will place the close of the dynasty in B. C. 440, and fix the reign of *Udâyana* in 570 to 540 B. C. As Udâyana is represented by the Buddhists to have been a contemporary of Buddha, this date may be accepted as wonderfully accurate for so remote a period of Indian History.

282. Kosâmbi is mentioned in the Râmâyana, the earliest of the Hindu Poems, which is generally allowed to have been composed before the Christian era. The story of *Udâyana*, King of Kosâmbi, is referred to by the poet Kâli Dâsa in his *Megha-duta*, or " Cloud messenger," when he says that *Avanti* (or Ujain) is great with the number of those versed in the tale of Udâyana." Now Kâli Dâsa flourished shortly after A. D. 500. In the Vrihat Katha, of Somadeva, the story of Udâyana is given at full length, but the author has made a mistake in the genealogy between the two *Satânikas*. Lastly, the kingdom of *Kosâmbi*, or *Kosâmba Mandala*, is mentioned in an inscription taken from the gateway of the fort of *Khara* which is dated in *Samvat* 1092, or A. D. 1035, at which period it would appear to have been independent of Kanoj. Kosâmbi, the capital of Vatsa Rajah, is the scene of the pleasing drama of *Ratnâvali*, or the " Necklace," which was composed in the reign of King Harsha Deva, who is most probably the same as Harsha Vardhana of Kanoj, as the opening prelude describes amongst the assembled audience " princes from various realms recumbent at his feet." This we know from Hwen Thsang to have been true of the Kanoj Prince, but which even a Brahman could scarcely have asserted of Harsha Deva of Kashmir. The date of this notice will therefore lie between 607 and 650 A. D.

283. But the name of *Udâyana*, King of Kosâmbi, was perhaps even more famous amongst the Buddhists. In the Mahâwanso, which was composed in the 5th century A. D., the venerable Yasa is said to have fled from " *Vaisâli* to Kosâmbi just before the assembly of the second Buddhist Synod. In the Lalita Vistara, which was translated into Chinese between 70 and 76 A. D., and which must therefore have been composed not later than the beginning of the Christian era, Udâyana Vatsa, son of Satanika, King of Kosâmbi, is said to have been born on the same day as Buddha. In other Ceylonese books, Kosâmbi is named as one of the 19 capital cities of ancient

India. Udâyana Vatsa, the son of Satanika, is also known to the Tibetans as the King of Kosâmbi. In the Ratnâvali he is called Vatsa Raja, or King of the Vatsas, and his capital *Vatsa pattana*, which is therefore only another name for Kosâmbi. In this celebrated city, Buddha is said to have spent the 6th and 9th years of his Buddhahood. Lastly, Hwen Thsang relates that the famous statue of Buddha in red sandal wood, which was made by King Udâyana during the life time of the Teacher, still existed under a stone dome in the ancient palace of King Udâyana.

284. The site of this great city, the capital of the later Pandu Princes, and the shrine of the most sacred of all the statues of Buddha, has long been sought in vain. The Brahmans generally asserted that it stood either on the Ganges, or close to it, and the discovery of the name of *Kosâmbi mandala*, or "Kingdom of Kosâmbi," in an inscription over the gateway of the fort of *Khara*, seems to confirm the general belief, although the south-west bearing from Prayâga, or Allahabad, as recorded by Hwen Thsang, points unmistakably to the line of the Jumna. In January 1861, Mr. Bayley informed me that he believed the ancient Kosâmbi would be found in the old village of Kosam, on the Jumna, about 30 miles above Allahabad. In the following month I met Bâbu Siva Prasâd, of the Educational Department, who takes a deep and intelligent interest in all archæological subjects, and from him I learned that *Kosam* is still known as *Kosâmbi-nagar*, that it is even now a great resort of the Jains, and that only one century ago it was a large and flourishing town. This information was quite sufficient to satisfy me that *Kosam* was the actual site of the once famous Kosâmbi. Still, however, there was no direct evidence to show that the city was situated on the Jumna; but this missing link in the chain of evidence I shortly afterwards found in the curious legend of Bakkula, which is related at length in Hardy's Manual of Buddhism. The infant Bakkula was born at Kosâmbi, and while his mother was bathing in the *Jumna*, he accidentally fell into the river, and being swallowed by a fish was carried to Benares. There the fish was caught and sold to the wife of a nobleman, who on opening it found the young child still alive inside, and at once adopted it as her own. The true mother hearing of this wonderful escape of the infant, proceeded to Benares, and demanded the return of the child, which was of course refused. The matter was then referred to the King, who decided that

both of the claimants were mothers of the child—the one by *maternity*, the other by *purchase*. The child was accordingly named *Bakula*; that is, of "two *kulas*, or races." He reached the age of 90 years without once having been ill, when he was converted by the preaching of Buddha, who declared him to be "the chief of that class of his disciples who were free from disease." After this he is said to have lived 90 years more, when he became an *arhat*, or Buddhist saint.

285. But the negative kind of merit which Bakkula acquired, by his freedom from disease, was not appreciated by Asoka, as we learn from a very curious legend which is preserved in the Divya Avadâna. In the first ardour of his conversion to Buddhism the zealous Asoka wished to do honour to all the places which the life and teaching of Buddha had rendered famous, by the erection of *stupas*, and the holy Upagupta volunteered to point out the sacred spots. Accordingly the goddess of the Sâl tree, who witnessed Buddha's birth, appeared to Asoka and vouched for the authenticity of the venerated tree, which had given support to Mâyâ-Devi, at the birth of the infant Sakya. Other holy sites are also indicated, such as the *Bodhi-drûm*, or sacred Pipal tree at Buddha Gaya, under which Buddha sat for four years in meditation; and the Sâl trees at Kusinagara, beneath which he obtained *Nirvâna*,—besides various spots rendered famous by the acts of his principal disciples, Sâriputra, Maudgalyâyana, Kâsyapa, Ananda. To all these holy places the pious King allotted large sums of money for the erection of *Stupas*. Upagupta then pointed out the holy place of Bakkula at Kosâmbi. "And what was the merit of this sage?" asked Asoka. "He lived," answered Upagupta, "to a great age without once having known disease." "On him," said the King, "I bestow one farthing *(Kâkani)*."* In Burnouf's version of this story, Bakula is said to be the disciple who had encountered the fewest obstacles, from which Asoka rightly argued that the fewer the obstacles the less the merit. The same idea is even more tersely expressed by the old author of the "Land of Cockaigne" in describing the sinlessness of its inhabitants:—

> "Very virtuous may they be
> "Who temptation never see."

* The *Kâkani* was the fourth part of the copper *pana*, and was therefore worth only 20 cowrees. Its weight was 20 *raktikas*, or *ratis* of copper, or $1{\cdot}8229 \times 20 = 37\frac{1}{2}$ grains nearly.

286. As this legend of Bakula is sufficient to prove that the famous city of Kausâmbi was situated on the Jumna, it now only remains to show that the distance of Kosam from Allahabad corresponds with that between Prayâg and Kosâmbi, as recorded by Hwen Thsang. Unfortunately this distance is differently stated in the life and in the travels of the Chinese pilgrim. In the former, the distance is given as 50 *li*, and in the latter as 500 *li*, whilst in the return journey to China, the pilgrim states that between Prayâg and Kosâmbi he travelled for *seven* days through a vast forest and over bare plains. Now, as the village of Kosam is only 31 miles from the fort of Allahabad, the last statement would seem to preclude all possibility of its identification with the ancient Kosâmbi. But strange to say, it affords the most satisfactory proof of their identity; for the subsequent route of the pilgrim to Sankissa is said to have occupied one month, and as the whole distance from Prayâg to Sankissa is only 200 miles, the average length of the pilgrim's daily march was not more than $5\frac{1}{2}$ miles. This slow progress is most satisfactorily accounted for, by the fact that the march from Prayâg to Sankissa was a religious procession, headed by the great King Harsha Vardhana of Kanoj, with a train of no less than 18 tributary Kings, besides many thousands of Buddhist monks, and all the crowd of an Indian camp. According to this reckoning, the distance from Prayâg to Kosâmbi would be 38 miles, which corresponds very closely with the actual road distance as I found it. By one route on going to Kosam, I made the distance 37 miles, and by the return route 35 miles. The only probable explanation of Hwen Thsang's varying distances of 50 *li* and 500 *li* that occurs to me is, that as he converted the Indian *Yojanas* into Chinese *li* at the rate of 40 *li* per *Yojana*, or of 10 *li* per kos, he must have written 150 *li*, the equivalent to 15 *kos*, which is the actual distance across the fields for foot passengers from Kosam to the fort of Allahabad, according to the reckoning of the people of Kosam itself. But whether this explanation be correct or not, it is quite certain that the present Kosam stands on the actual site of the ancient *Kosâmbi;* for not only do the people themselves put forward this claim, but it is also distinctly stated in an inscription of the time of Akbar, which is recorded on the great stone pillar, still standing in the midst of the ruins, that this is *Kausâmbi pura.*

287. The present ruins of Kosâmbi consist of an immense fortress

formed of earthen ramparts and bastions, with a circuit of 23,100 feet, or exactly 4 miles and 3 furlongs. The ramparts have a general height of from 30 to 35 feet above the fields, but the bastions are considerably higher; those on the north face rising to upwards of 50 feet, while those at the south-west and south-east angles are more than 60 feet. Originally there were ditches all round the fortress, but at present there are only a few shallow hollows at the foot of the rampart. The parapets were of brick and stone, but although the remains of these defences can be traced nearly all round, I could not find any portion of the old wall with a facing sufficiently perfect to enable me to determine its thickness. The large size of the bricks, which are 19 inches long by $12\frac{1}{2}$ by $2\frac{1}{2}$, shows that these are the ruins of very old walls. In shape the fortress may be described as an irregular rectangle, with its longer sides running almost due north and south. The length of the different faces is as follows:—

North front	4,500 feet
South	6,000 „
East	7,500 „
West	5,100 „
Total	23,100 feet

The difference in length between the north and south fronts is due to the original extension of the fortress on the river face; but the difference between the east and west fronts is, I believe, chiefly, if not wholly, due to the loss of the south-west angle of the ramparts by the gradual encroachments of the Jumna. There are no traces now left of the western half of the ramparts on the southern face, and the houses of the village of *Garhawâ* are standing on the very edge of the cliff overhanging the river. The reach of the river also from the *Pakka Burj* at the south-west angle of the fortress up to the hill of *Prabhâsa*, a clear straight run of 4 miles, bears 12 degrees to the north of east, whereas in the time of Hwen Thsang there were two *stupas* and a cave at a distance of $1\frac{1}{2}$ miles to the south-west of *Kosâmbi*. From all these concurring circumstances, I conclude that the west front of the fortress was originally as nearly as possible of the same length as the east front. This would add 2,400 feet, or nearly half a mile to the length of the west front, and would increase the whole circuit

of the ramparts to 4 miles and 7 furlongs, which is within one furlong of the measurement of 5 miles, or 30 *li* recorded by Hwen Thsang. In the three main points therefore of name, size, and position, the present Kosam corresponds most exactly with the ancient Kosâmbi as it is described by the Chinese pilgrim in the 7th century.

288. Viewed from the outside, the ruins of Kosâmbi present a most striking appearance. My previous enquiries had led me to expect only a ruined mound some 20 or 30 feet in height covered with broken bricks. What was my surprise therefore, when still at some distance from the place on the north-east side, to behold extending for about 2 miles a long line of lofty earthen mounds as high as most of the trees. I felt at once that this was the celebrated Kosâmbi, the capital of the far-famed Raja Udâyana. On reaching the place, I mounted one of the huge earthen bastions, from whence I had a clear view of the interior. This was very uneven, but free from jungle, the whole surface being thickly covered with broken bricks. In many places the bricks were partially cleared away to form fields, but in others the broken bricks were so thickly strewn that the earth beneath was scarcely discernable. But I was disappointed to find that there were no prominent masses of ruin; the only object that caught the eye being a modern Jain temple. I recognized the positions of six gates by the deep depressions in the lines of rampart. There are two of these openings on each of the three land faces of the fortress.

289. The present village of Kosam consists of two distinct portions, named *Kosam Inâm* and *Kosam Khirâj*, or "Rent-free" and "Rent-paying" Kosam, the former being on the west, and the latter on the east side of the old fortress. Inside the ramparts, and on the bank of the Jumna, there are two small villages called *Garhawá Barâ* and *Garhawâ Chota*, their names being no doubt derived from their position within the fort or *garh*. Beyond Kosam Inâm is the large village of Pâli, containing 100 houses, and beyond Kosam Khirâj on the bank of the Jumna stands the hamlet of *Gop-Sahasa*. To the north there is another hamlet called *Ambâ-Kua*, because it possesses a large old well surrounded by a grove of Mango trees. All these villages together do not contain more than 350 or 400 houses, with about 2,000 inhabitants.

290. The great object of veneration at Kosâmbi was the celebrated statue of Buddha in red sandal wood, which was devoutly believed to have been made during the lifetime of Buddha by a sculptor whom

King Udâyana was permitted to send up to the *Trayastrinsa* heaven, while the great Teacher was explaining his law to his mother Mâyâ. The statue was placed under a stone dome, within the precincts of the palace of Udâyana, which is described by Hwen Thsang as being situated in the very middle of Kosâmbi. This description shows that the place must have occupied the position of the great central mass of ruin, which is now covered by a small Jain temple. The temple is said to have been built in 1834, and is dedicated to *Pârasnâth*. By the people, however, it is generally called *Deora*, or the Temple, which was the old name of the mound, and which, therefore, points unmistakably to the position of the ancient temple that once held the famous statue of Buddha. The foundations of a large building are still traceable both to the east and west of the temple; but there are no remains either of sculpture or of architectural ornament. But in the village of Bara Garhawâ, distant 1,500 feet to the south-west, I found two sculptured pillars of a Buddhist railing, and the pedestal of a statue inscribed with the well-known Buddhist profession of faith, beginning with *Ye dharmma hetu prabhavâ*, &c., in characters of the 8th or 9th century. In the village of Chota Garhawâ, distant half a mile to the south-east, I found a small square pillar sculptured on three faces with representations of *stupas*. The discovery of these undoubted Buddhist remains is alone sufficient to prove that some large Buddhist establishment must once have existed inside the walls of Kosâmbi. I would therefore assign the two pillars of the Buddhist railing and the inscribed statue to the great *Vihar* in the palace, which contained the famous sandal wood statue of Buddha. The third pillar I would assign to the *stupa* which contained the hair and nails of Buddha, as it was situated inside the south-east corner of the city, on the very site of Chota Garhawâ, where the pillar itself was found. The two railing pillars found at Barâ Garhawâ are sculptured with figures of a male and female, and as both of these figures exhibit the very same scanty clothing as is seen in those of the bas-reliefs of the Sânchi Tope, near Bhilsa, I would refer the Kosâmbi pillars to the same age, or somewhere about the beginning of the Christian era.

291. The only other existing relic of Buddhism inside the fort is a large stone monolith similar to those of Allahabad and Delhi, excepting only that it bears no ancient inscription. This column is now standing at an angle of 52°, about one-half of the shaft being buried in a

mound of brick ruins. The portion of the shaft above ground is 14 feet in length, and close by there are two broken pieces, measuring respectively 4 feet 6 inches and 2 feet 3 inches. I made an excavation completely round the pillar, to a depth of 7 feet 4 inches, without reaching the end of the polished portion of the shaft. All these figures added together give a total length of 28 feet; but the pillar was no doubt several feet longer, as the shafts of all the five known monoliths exceed 30 feet. The smallest diameter is 29½ inches, or nearly the same as that of the *Lauriya-Ara-Raj* pillar, and as the diameter increases in nearly the same proportion, I presume that the Kosâmbi pillar most probably had about the same height of 36 feet. According to the villagers, this pillar was in one piece as late as 50 years ago; but it was leaning against a large *Nimb* tree. The tree was old and hollow, and some cowherds having accidentally set fire to it, the top of the pillar was broken by the heat. Several different persons affirmed that the shaft was originally nearly double its present height. This would make the height above ground somewhat less than twice 14 feet, or say about 27 feet; which added to the ascertained smooth portion of 7 feet 4 inches under ground, would make the original height of the smooth shaft upwards of 34 feet. I found numerous roots of the old tree in my excavation round the pillar. The statement of the people that the Kosâmbi pillar has been leaning in its present position as long as they can remember, is curiously corroborated by the fact that an inscription dated in the reign of Akbar is cut across the face of the shaft at an angle of about 50° but parallel to the horizon. It seems certain therefore that the pillar was in its present leaning position as early as the reign of Akbar; and further, as this inscription is within reach of the hand, and as there are also others engraved beneath the present surface of the soil, I conclude that the pillar must have been buried as we now see it for a long time previous to the reign of Akbar.

292. The inscriptions recorded on the Kosâmbi pillar range from the age of the Guptas down to the present day. The only record of the earliest period is the name of a pilgrim in six letters which I have not succeeded in reading. At the top of the broken shaft there is an incomplete record of three letters ending in *prabhâra*, which I would ascribe to the 4th or 5th century. The letters, which are three inches in length, are boldly cut, but the line which they form is not parallel

to the sides of the pillar. The next inscription in point of time consists of six lines in characters of the 6th or 7th century. As this record is placed on the lower part of the shaft, from 3 to 4 feet beneath the present ground level, and as the lines are perpendicular to the sides of the shaft, I infer that at the time when it was inscribed, the pillar was still standing upright in its original position, and that the surrounding buildings were still in perfect order. This inference is fully borne out by Hwen Thsang's account of the ancient palace of Udâyana with its great Vihâra, 60 feet in height, and its stone dome forming a canopy over the statue of Buddha, all of which would seem to have been in good order at the date of his visit, as he carefully mentions that the two different bath-houses of Buddha, as well as the dwelling house of Asanga Bodhisatwa were in ruins. Just above this inscription there are several records in the peculiar shell-shaped letters which James Prinsep noticed on the Allahabad pillar, and which I have found on most of the other pillars throughout northern India. The remaining inscriptions, which are comparatively modern, are all recorded on the upper part of the shaft. That of Akbar's time, which has already been referred to, is in Nagari as follows:—

Mogal Pâtisâh Akbar Patisâh Gaji; or
Mogal Padshâh Akbar Padshâh Ghazi.

This is followed by a short record of a *soni*, or goldsmith, in three lines, below which is a long inscription dated in Samvat 1621, or A. D. 1564, in the early part of Akbar's reign, detailing the genealogy of a whole family of goldsmiths. It is in this inscription that the name of *Kosâmbipura* occurs, the founder of the family named Anand Râm Das, having died at Kosam. The monolith is called *Râm-ka-charri*, "Ram's walking stick," by some, and by others *Bhim-sen-ka-Gada* or "Bhim-sen's club." Inside the fort also, about midway between the two villages of *Garhawa*, I found a large *lingam*, bearing four heads, with three eyes each, and with the hair massed on the top of each head. The discovery of this costly symbol of Mahadeva shows that the worship of *Siva* must have been firmly established at Kosâmbi at some former period; and as Hwen Thsang mentions the existence of no less than 50 heretical (that is Brahmanical) temples at the time of his visit, I think it probable that the large *lingam* may have belonged to one of those early temples.

294. To the south-west of *Kosambi*, distant 8 or 9 *li*, or $1\frac{1}{2}$ miles,

Hwen Thsang describes a lofty *stupa* of Asoka, 200 feet in height, and a stone cavern of a venomous dragon, in which it was devoutly believed that Buddha had left his shadow. But the truthful pilgrim candidly says that this shadow was not to be seen in his time. If Hwen Thsang's south-west bearing is correct, the holy cave must have been carried away long ago by the encroachment of the Jumna, as the clear reach of the river above Kosâmbi, as far as the hill of Prabhâsa, a distance of 4 miles, now bears 282° from the south-west of the old city, or 12° to the north of west. The hill of Prabhâsa, which is on the left bank of the Jumna, is the only rock in the *Antarved* or Doab of the Ganges and Jumna. In a hollow between its two peaks stands a modern Jain temple, but there is no cavern, and no trace of any ancient buildings.

295. At a short distance to the south-east of *Kosambi*, there was an ancient monastery containing a *stupa* of Asoka, 200 feet in height, which was built on the spot where Buddha had explained the law for many years. Beside the monastery, a householder named *Kiu-shi-lo*, formerly had a garden. Fa Hian calls it the garden of *Kiu-sse-lo ;* but by the Buddhists of Ceylon it is called the *Ghosika* garden. M. Julien renders the name doubtfully by *Goshira*, but it appears to me that the true name was most probably the Sanskrit Gosirsha, and the Pali *Gosisa*, which I believe to be still preserved in *Gopsahsa*, the name of a small village close to *Chota Garhawá*. This name is now written गोपस-हसा *Gop-sahasa*, but as the well known name of Janamejaya is written जगमेदो *Jag-medau*, and also जलमेदर *Jalmedar*, by the half educated people of Kosam, I do not think that the slight difference of spelling between the ancient *Gosisa* and the present Gopsahasa, forms any very strong objection to their identification, more especially as the position of the Gosisa garden must have been as nearly as possible on the site of the *Gopsahasa* village. There are no ancient remains about this village; nor indeed could we expect to find many traces of the garden. But in the neighbouring village of Kosam *Khirâj*, or *Hisâmâbâd*, the vestiges of ancient occupation are found everywhere, and this village I believe to have been the site of the monastery with its lofty *stupa* of 200 feet, built by *Asoka*, and its smaller *stupa* containing the hair and nails of Buddha. The position of this village, within one quarter of a mile of the south-east corner of the ancient fort, agrees precisely with the site of the monastery as described by Hwen Thsang, " *à une petite distance*

au sud-est de la ville." In this village squared stones of all sizes may be seen in the walls of most of the houses, and after a little search I succeeded in finding four plain pillars of two different sizes which had once belonged to two different Buddhist railings. Two of these pillars are 4 feet 9 inches in height, with a section of $12\frac{1}{2}$ by 7 inches, which are also the exact dimensions of the largest railing pillars that have been found at Mathura. The other two pillars are 2 feet 9 inches in height, with a section of 7 by $3\frac{1}{2}$ inches, which are the exact dimensions of the smallest sized railing pillars that have been found at Mathura. The larger pillars I would assign to the Buddhist railing, which in all probability once surrounded the lofty *stupa* of Asoka, and the smaller pillars I would assign to the smaller *stupa*, which contained the hair and nails of Buddha.

296. I found also the fragment of a corner pillar with the mortice holes for the reception of the rails on two adjacent sides at right angles to each other. I conclude, therefore, that this pillar must have belonged to the entrance doorway of one of the railings, although its face of 9 inches does not agree with the dimensions of either of the other pillars.

XV.—KUSAPURA.

297. From Kosâmbi the Chinese pilgrim travelled to the north east, through a vast forest as far as the Ganges, after crossing which his route lay to the north for a distance of 700 *li*, or 117 miles, to the town of *Kia-she-pu-lo*, which M. Julien correctly renders by *Kasapura*. In searching for the site of this place, the subsequent route of the pilgrim to *Visâkhâ*, a distance of 170 to 180 *li*, or from 28 to 30 miles, to the north is of equal importance with the bearing and distance from Kosâmbi. For as the Visâkhâ, of Hwen Thsang, as I will presently show, is the same place as the *Sha-chi* of Fa Hian, and the *Sâketa* or Ayodhya of the Hindus, we thus obtain two such well fixed points as Kosâmbi and Ayodhya to guide us in our search. A single glance at the map will be sufficient to show that the old town of *Sultânpur* on the *Gomati* (or Gumti) River is as nearly as possible in the position indicated. Now the Hindu name of this town was *Kusabhavanapura*, or simply *Kusapura*, which is almost the same name as that of Hwen Thsang. Remembering Mr. Bayley's note of information derived from Raja Mân Sinh that there was "a *tope* near Sultânpur," I pitched my tent on one side of the now utterly desolate city,

and searched the whole place through most carefully, but all in vain: I could neither find the trace of any tope, nor could I even hear of ancient remains of any kind. On the following day, however, after I had left Sultânpur, I heard that the village of Mahmudpur, about 5 miles to the north-west, was situated on an ancient mound of somewhat larger size than that of Sultânpur, and on my arrival at Faizabad, I learned from Lieutenant Swetenham, of the Royal Engineers, that there is an old tope to the north-west of Sultânpur, not far from this village. I conclude, therefore, that Sultânpur, the ancient Kusapura, is the same place as the Kasapura of Hwen Thsang; and this identification will be made even more certain on examination of the recorded distances.

298. On leaving Kosâmbi, the pilgrim proceeded first in a north-east direction to the Ganges, after crossing which he turned to the north to Kasapura, the whole distance being 117 miles. Now, the two great ghats on the Ganges to the north-east of Kosam are at Mau-Saraya and *Pâpa-mau*, the former being 40 miles, and the latter 43 miles distant. But as these two ghats are close together, and almost immediately to the north of Allahabad, the total distance to Kasapura will be the same, whichever place of crossing be taken. From Pâpamau to Sultânpur the direction is due north, and the distance 66 miles; the whole line from Kosam to Sultânpur being 109 miles, which is within 8 miles of the round number of 700 *li*, or 116⅔ miles, as given by Hwen Thsang; while both of the bearings are in exact accordance with his statements. From Kasapura to *Visâkha* the direction followed by the pilgrim was to the north, and the distance was from 170 to 180 *li*, or from 28 to 38 miles. Now the present city of *Ajudhya*, the ancient *Ayodhya* or Sâketa, is almost due north from *Sultânpur*, the distance being 30 miles to the nearest point, or just six miles in excess of the distance given by Hwen Thsang. As the former of these distances is in default, while the latter is in excess, I would suggest, as a possible alternative, that our measurements should be taken from the village of *Mahmûdpur*, which would make the route from Kosam to the Buddhist establishment near Kasapura up to 114 miles, or within three miles of the number stated by Hwen Thsang, and lessen the subsequent route to Ayodhya from 36 to 31 miles, which is within one mile of the number given by the Chinese pilgrim. As all the bear-

ings are in perfect accordance, and as the names of the two places agree almost exactly, I think that there can be little hesitation in accepting the identification of *Sultânpur* or *Kusapura*, with the Kasapura of Hwen Thsang.

299. *Kusapura* or *Kusa-bhavana-pura*, is said to have been named after Rama's son, Kusa. Shortly after the Muhammadan invasion it belonged to a *Bhar* Raja Naud Kunwar, who was expelled by Sultan Alauddin *Ghori* (read Khilji). The defences of the town were strengthened by the conqueror, who built a mosque and changed the name of the place to Sultânpur. The site of *Kusapura* was, no doubt, selected by its founder as a good military position, on account of its being surrounded on three sides by the River Gomati or Gumti. The place is now utterly desolate; the whole population having been removed to the new civil station on the opposite or south bank of the river. The ruined fort of Sultânpur now forms a large mound, 750 feet square, with brick towers at the four corners. On all sides it is surrounded by the huts of the ruined town, the whole together covering a space of about half a mile square, or about two miles in circuit. This estimate of the size of Sultânpur agrees vey closely with that of Kusapura given by Hwen Thsang, who describes the place as being 10 *li*, or $1\frac{2}{3}$ miles, in circuit.

XVI.—DHOPAPAPURA.

300. Before accompanying the pilgrim to the ancient city of *Sâketa* or *Ayodhya*, I will take the opportunity of describing the famous place of Hindu pilgrimage called *Dhopâpapura*, which is situated on the right or west bank of the Gomati River, 18 miles to the south-east of Sultânpur, and immediately under the walls of the fort of *Garhâ*, or *Shirka-Garhi*. The legend of the place is as follows:—After Rama Chandra had killed the giant Râvana, he wandered about trying to obtain purification for his guilt in having thus extinguished a portion of the spirit of Brahma *(Brahma-ka-ans)*; but all his efforts were ineffectual, until he met with a white crow, when he was informed by the Muni Vasishtha that the crow had become white from having bathed in the Gomati River at a particular spot. Rama proceeded to bathe at the same spot, and was immediately purified or "cleansed" from his sin. The place was accordingly named *Dho-pâpa*, or "cleanser of sins," and the town which soon sprang up beside it was called *Dhopâpapura*. In Sanskrit the form is *Dhûtapâpa*, which is given in the list of the Vishnu

Purana as the name of a river distinct from the Gomati; but as the name immediately follows that of the Gomati, I think it probable that the term may have been intended only as in epithet of the *Gomati*, as the *Dhutapâpa*, or "Sin-cleanser" in allusion to the legend of Rama's purification. An annual fair is held here on the 10th day on the waxing moon of *Jyesth*, at which time it is said that about fifty thousand people assemble to bathe in the far-renowned pool of *Dhopâpa*.

301. The site of *Dhopâp* is evidently one of very considerable antiquity, as the whole country for more than half a mile around it is covered with broken bricks and pottery. The place is said to have belonged to the *Bhar* Rajas of *Kusabhavanapura* or Sultânpur, but the only name that I could hear of as specially connected with *Dhopâp*, was that of Raja *Hel* or *Hela*. The village of *Dhopâp-pur* is now a very small one, containing less than 200 houses, but they are all built of burnt brick, and numerous foundations are visible on all sides near the Gomati River. Several carved stones have been collected by the people from the ruined walls of the fort of *Garhâ*. Amongst them I observed the following:—1*st*, a broken pilaster with two human figures; 2*nd*, a stone bracket; 3*rd*, a square capital of pillar; 4*th*, a four-bracket capital of a pillar; 5*th*, two stones with socket holes for iron cramps. All of these stones point unmistakably to the existence, at some former period, of a large temple at Dhopâp, which was probably situated immediately above the bathing ghat. It seems almost certain, however, that there must once have been a considerable number of temples at this place, for the whole of the eastern wall or river front of the fort of *Garhâ* has been built or faced with square stones, which, by their carvings and cramp-holes, show that they belonged to Hindu temples.

302. The fort of *Garhâ* is situated to the north of the village, on a lofty natural mound overhanging the river Gomati on the east. To the north and south the place is defended by two deep ravines supplied with running water, and to the west by a deep dry ravine. The position is, therefore, a strong one; for, although the neighbouring mounds to the north and west rise to nearly the same height, yet they once formed part of the city, which can only be approached over much low and broken ground. The strength of the position would seem to have early attracted the notice of the Muhammadan Kings of Delhi,

as the fort is stated to have been *repaired* by Salim Shah, whilst a very old ruinous masjid stands on the west mound. The fort itself is a small place, its northern face being only 550 feet long, its eastern and western faces 550 feet each, whilst its south face is but 250 feet. The greater part of the stone work of the south-east tower has fallen into the river, where many of the stones are now lying, and much of the eastern wall has also disappeared, the stones being very valuable, in a stoneless country, for the sharpening of tools of all kinds. The entrance gate was on the south side, near the river bastion just mentioned. I obtained coins of many of the early Muhammadan Kings, from Nasir-uddin Mahmud Ghori down to Akbar, but not a single specimen of any Hindu coinage, although I was informed that coins bearing figures are found every year during the rainy season.

303. I may here mention that I heard of another place of Hindu pilgrimage on the north bank of the Gomati River, at a spot called *Set-Barâh* that is *Sweta-Varâha*, or "the white Boar," 15 kos, or 30 miles, from Sultânpur towards Lucknow. Two annual fairs are held there—the first on the 9th day of the waxing moon of Chaitra, and the second on the 15th day of the waxing moon of Kartik, when it is said that about fifty thousand people assemble to bathe. The former period is connected with the history of Rama Chandra, as it is commonly known as the *Râm-navami Tirath* or "Rama's ninth (day) place of pilgrimage." I could not learn anything regarding the origin of the name of *Set Barâh*.

XVIII.—SAKETA, OR AJUDHYA.

304. Much difficulty has been felt regarding the position of Fa Hian's "great kingdom of *Sha-chi*, and of Hwen Thsang's *Visâkhâ*, with its enormous number of heretics," or Brahmanists; but I hope to show in the most satisfactory manner that these two places are identical, and that they are also the same as the *Sâketa* and *Ajudhya* of the Hindus. The difficulty has arisen chiefly from an erroneous bearing recorded by Fa Hian, who places *Shewei*, or *Srâvasti*, to the south of *Sha-chi*, while Hwen Thsang locates it to the north-east, and partly from his erroneous distance of $7 + 3 + 10 = 20$ *Yojans*, instead of 30, from the well-known city of Sankisa. The bearing is shown to be erroneous by the route of a Hindu pilgrim from the banks of

the Godavery to *Sewet*, or *Srâvasti*, as recorded in the Ceylonese Buddhist works. This pilgrim, after passing through Mahissati and Ujani, or Maheshmati and Ujain, reaches Kosâmbi, and from thence passes through *Sâketa* to *Sewet;* that is, along the very route followed by Hwen Thsang. We have, therefore, two authorities in favour of *Sewet* being to the north of Sâket. With regard to the distance, I refer again to the Buddhist books of Ceylon, in which it is recorded that from *Sakespura* (or *Sangkasyapura*, now Sankisa) to *Sewet* was a journey of 30 *Yojans*. Now, Fa Hian makes the distance from Sankisa to Kanoj 7 *Yojans*, thence to the forest of *Holi*, on the Ganges, 3 *Yojans*, and thence to *Shachi* 10 *Yojans*, or altogether only 20 *Yojans*, or 10 less than the Ceylonese books. That Fa Hian's statement is erroneous, is quite clear from the fact that his distance would place Shachi in the neighbourhood of Lucknow; whereas the other distance would place it close to Ajudhya, or Faizabad, or in the very position indicated by Hwen Thsang's itinerary. Here, again, we have two authorities in favour of the longer distance. I have no hesitation, therefore, in declaring that Fa Hian's recorded bearing of *She-wei* from *Sha-chi* is wrong, and that "north" should be read instead of "south."

305. I have now to show that Fa Hian's *Sha-chi* is the same as Hwen Thsang's *Visâkha*, and that both are identical with *Sâketa* or *Ajudhya*. With respect to *Sha-chi*, Fa Hian relates that "on leaving the town by the *southern gate* you find to the *east* of the road the place where Buddha bit a branch of the nettle tree and planted it in the ground, where it grew to the height of seven feet, and never increased or diminished in size." Now, this is precisely the same legend that is related of *Visâkha* by Hwen Thsang, who says that "to the *south* of the capital, and to the left of the road (that is to the east as stated by Fa Hian), there was, amongst other holy objects, an extraordinary tree 6 or 7 feet high, which always remained the same, neither growing nor decreasing. This is the celebrated tooth-brush tree of Buddha, to which I shall have occasion to refer presently. Here I need only notice the very precise agreement in the two descriptions of this famous tree, as to its origin, its height, and its position. The perfect correspondence of these details appears to me to leave no doubt of the identity of Fa Hian's *Sha-chi* with the Visâkha of Hwen Thsang.

306. With respect to the identification of Visâkha with the Sâketa of the Hindus, I rest my proofs chiefly on the following points: 1st, that *Visâkha*, the most celebrated of all females in Buddhist history, was a resident of Sâketa before her marriage with *Puruna Varddhana*, son of *Mrigara*, the rich merchant of *Srâvasti*;—and 2nd, that Buddha is recorded by Hwen Thsang to have spent 6 years at *Visâkha*, while by the Pali annals of Turnour he is stated to have lived 16 years at *Sâketa*.

307. The story of the noble maiden Visâkhâ is related at great length in the Ceylonese books. According to Hardy, she erected a *Purvvârâma* at *Srâvasti*, which is also mentioned by Hwen Thsang. Now, there was also a *Purvvârâma* at Sâketa, and it can hardly be doubted that this monastery was likewise built by her. She was the daughter of *Dhananja*, a rich merchant, who had emigrated from *Rajagriha* to *Sâketa*. Now, amongst the oldest inscribed coins which have been discovered only at Ajudhya, we find some bearing the names of *Dhana Deva* and *Visâkha-Datta*. I mention this because it seems to me to show the probability that the family of *Dhananja* and *Visâkhâ* was of great eminence in Sâketa or Ayodhya; and I infer from the recurrence of their names, as well as from the great celebrity of the lady, that the city may possibly have been called *Visâkhâ* after her name.

308. The other proof which I derive from the years of Buddha's residence is direct and convincing. According to the Ceylonese annals, Buddha was 35 years of age when he attained Buddhahood; he then led a houseless life for 20 years, preaching in various places in Northern India, all of which are detailed; and of the remaining 25 years of his life he spent 9 in the *Jetavana* monastery at Srâvasti, and 16 in the *Pubhârâmo* monastery at Sâketapura. Now, in the Burmese annals these numbers are given as 19 years and 6 years, and in the last figure we have the exact number recorded by Hwen Thsang. Nothing can be more complete than this proof. There were only two places at which Buddha resided for any length of time, namely, *Srâvasti*, at which he lived either 9 or 19 years, and *Sâketa*, at which he lived either 6 or 16 years; and as according to Hwen Thsang he lived for 6 years at Visâkhâ, which is described as being at some distance to the south of Srâvasti, it follows of necessity that Visâkhâ and Sâketa were one and the same place.

309. The identity of *Sâketa* and *Ayodhya* has, I believe, always been admitted; but I am not aware that any proof has yet been offered to establish the fact. Csoma-de-Koros in speaking of the place merely says "*Saketana* or Ayodhya," and H. H. Wilson, in his Sanskrit Dictionary, calls *Sâketa* "the city Ayodhya." But the question would appear to be set at rest by several passages of the Râmâyana and Raghuvansa, in which *Sâketnagara* is distinctly called the Capital of Raja *Dasaratha* and his sons. But the following verse of the Râmâyana, which was pointed out to me by a Brahman of Lucknow, will be sufficient to establish the identity. *Aswajita*, father of *Kaikeyi*, offers to give his daughter to Dasaratha, Rajah of *Sâketanagara* :—

Sâketâm Nagaram Raja Namna Dasaratho bali.
Tasmai deyâ Kayâ Manyâ Kaikeyi Nâmato janâ.

310. The ancient city of Ayodhya or Sâketa is described in the Râmâyana as situated on the bank of the *Sarayu* or *Sarju* River. It is said to have been 12 *Yojans*, or nearly 100 miles in circumference, for which we should probably read 12 *kos*, or 24 miles—an extent which the old city, with all its gardens, might once possibly have covered. The distance from the *Guptâr* Ghat on the west, to the Ram Ghat on the east, is just 6 miles in a direct line, and if we suppose that the city with its suburbs and gardens formerly occupied the whole intervening space to a depth of two miles, its circuit would have agreed exactly with the smaller measurement of 12 kos. At the present day the people point to Ram Ghât and Guptâr Ghât as the eastern and western boundaries of the old city, and the southern boundary they extend to *Bharat-Kund*, near *Bhadarsâ*, a distance of 6 kos. But as these limits include all the places of pilgrimage, it would seem that the people consider them to have been formerly inside the city, which was certainly not the case. In the Ayin Akbari, the old city is said to have measured 148 *kos* in length by 36 *kos* in breadth, or in other words it covered the whole of the Province of Oudh to the south of the Ghâghra River. The origin of the larger number is obvious. The 12 *Yojans* of the Râmâyana, which are equal to 48 kos, being considered too small for the great city of Rama, the Brahmans simply added 100 kos to make the size tally with their own extravagant notions. The present city of Ajudhya, which is confined to the north-east corner of the old site, is just two miles in length by about three-quarters of a

mile in breadth ; but not one-half of this extent is occupied by buildings, and the whole place wears a look of decay. There are no high mounds of ruins, covered with broken statues and sculptured pillars, such as mark the sites of other ancient cities, but only a low irregular mass of rubbish heaps, from which all the bricks have been excavated for the houses of the neighbouring city of Faizabad. This Muhammadan city, which is two miles and a half in length, by one mile in breadth, is built chiefly of materials extracted from the ruins of Ajudhya. The two cities together occupy an area of nearly six square miles, or just about one-half of the probable size of the ancient Capital of Rama. In Faizabad the only building of any consequence is the stuccoed brick tomb of the old Bhao Begam, whose story was dragged before the public during the famous trial of Warren Hastings. Faizabad was the capital of the first Nawabs of Oudh, but it was deserted by Asaf-ud-daolah in A. D. 1775.

311. According to the Râmâyana, the city of Ayodhya was founded by Manu, the progenitor of all mankind. In the time of Dasaratha, the father of Râma, it was fortified with towers and gates, and surrounded by a deep ditch. No traces of these works now remain, nor is it likely indeed that any portion of the old city should still exist, as the *Ayodhya* of Râma is said to have been destroyed after the death of *Vrihadbala* in the great war about B. C. 1426, after which it lay deserted until the time of Vikramâditya. According to popular tradition this Vikramâditya was the famous Sâkâri Prince of Ujain, but as the Hindus of the present day attribute the acts of all Vikramas to this one only, their opinion on the subject is utterly worthless. We learn, however, from Hwen Thsang that a powerful Prince of this name was reigning in the neighbouring city of Srâvasti, just one hundred years after Kanishka, or close to 79 A. D., which was the initial year of the *Sáka era* of *Sâlivâhana*. As this Vikramâditya is represented as hostile to the Buddhists, he must have been a zealous Brahmanist, and to him therefore I would ascribe the rebuilding of Ayodhya and the restoration of all the holy places referring to the history of Râma. Tradition says that when Vikramâditya came to Ayodhya, he found it utterly desolate and overgrown with jungle, but he was able to discover all the famous spots of Râma's history by measurements made from Lakshman Ghat on the *Sarju*, according to the statements of

ancient records. He is said to have erected 360 temples, on as many different spots, sacred to *Râma* and *Sitâ* his wife, to his brothers *Lakshmana*, *Bharata*, and *Satrughna*, and to the monkey god *Hanumân*. The number of 360 is also connected with *Sâlivâhana*, as his clansmen the *Bais Rajputs* assert that he had 360 wives.

312. There are several very holy Brahmanical temples about Ajudhya, but they are all of modern date, and without any architectural pretensions whatever. But there can be no doubt that most of them occupy the sites of more ancient temples that were destroyed by the Musalmans. Thus *Râmkot*, or *Hanumân Garhi*, on the east side of the city, is a small walled fort, surrounding a modern temple on the top of an ancient mound. The name of Râmkot is certainly old, as it is connected with the traditions of the *Mani Parbat*, which will be hereafter mentioned; but the temple of Hanumân is not older than the time of Aurangzib. Ram Ghat, at the north-east corner of the city, is said to be the spot where Râma bathed; and *Sargdwâri*, or *Swargadwâri*, the "gate of Paradise," on the north-west, is believed to be the place where his body was burned. Within a few years ago there was still standing here a very holy Banyan tree called *Asok Bat*, or the "griefless Banyan," a name which was probably connected with that of *Swargadwâri*, in the belief that people who died or were burned at this spot were at once relieved from the necessity of future births. Close by is the *Lakshman* Ghat, where his brother Lakshman bathed, and about one-quarter of a mile distant, in the very heart of the city, stands the *Janam Asthân*, or "Birth-place temple" of Râma. Almost due west, and upwards of five miles distant is the *Guptar* Ghat, with its group of modern white-washed temples. This is the place where Lakshman is said to have disappeared, and hence its name of *Guptâr* from *Gupta*, which means "hidden or concealed." Some say that it was Râma who disappeared at this place, but this is at variance with the story of his cremation at *Swargadwâri*.

313. The only remains at Ajudhya that appear to be of any antiquity, are three earthen mounds to the south of the city, and about a quarter of a mile distant. These are called *Mani-Parbat*, *Kuber-Parbat* and *Sugrib-Parbat*. The first, which is nearest to the city, is an artificial mound, 65 feet in height, covered with broken bricks and blocks of *kankar*. The old bricks are eleven inches square and three inches thick.

At 46 feet above the ground on the west side, there are the remains of a curved wall faced with *kankar* blocks. The mass at this point is about 40 feet thick, and this was probably somewhat less than the size of the building which once crowned this lofty mound. According to the Brahmans the *Mani-Parbat* is one of the hills which the monkeys made use of when assisting Râma. It was dropped here by Sugriva, the monkey-king of *Kishkindhya*. But the common people, who know nothing of this story, say that the mound was formed by the labourers shaking their baskets on this spot every evening, on their return home from the building of Ramkot. It is therefore best known by the name of *Jhowa-Jhâr* or *Ora Jhâr*, both of which mean "basket-shakings." A similar story is told of the large mounds near Benares, Nimsar, and other places.

314. Five hundred feet due south from the large mound stands the second mound called *Kuber-Parbat*, which is only 28 feet in height. The surface is an irregular heap of brick rubbish, with numerous holes made by the people in digging for bricks, which are of large size, 11 inches by $7\frac{1}{4}$ by 2. It is crowned by two old tamarind trees, and is covered with jungle. Close by on the south-west there is a small tank, called *Ganes-Kund* by the Hindus, and *Husen Kund*, or *Imâm Talao*, by the Musalmans, because their *Tazias* are annually deposited in it. Still nearer on the south-east there is a large oblong mound called *Sugrib-Parbat*, which is not more than 8 or 10 feet above the ground level. It is divided into two distinct portions; that to the north being upwards of 300 feet square at top, and the other to the south upwards of 200 feet. In the centre of the larger enclosure there is a ruined mound containing bricks $8\frac{1}{2}$ inches square, and in the centre of the smaller mound there is a well.

315. Between the *Mani* and *Kuber* mounds there is a small Muhammadan enclosure, 64 feet long from east to west and 47 feet broad, containing two brick tombs, which are attributed to *Sis Paighambar* and *Ayub Paighambar*, or the "prophets Seth and Job." The first is 17 feet long, and the other 12 feet. These tombs are mentioned by Abul Fazl, who says, "Near this city are two sepulchral monuments, one 7 and the other 6 cubits in length. The vulgar pretend that they are the tombs of Seth and Job, and they relate wonderful stories of them." This account shows that since the time

of Akbar, the tomb of Seth must have increased in length from 7 cubits, or $10\frac{1}{2}$ feet, to 17 feet through the frequent repairs of pious Musalmans.

316. The mounds are surrounded by Musalman tombs, and as it is the Muhammadan practice to bury the dead along the sides of the high roads close to their cities, I infer that the road which now runs close to the westward of the mounds, is one of the ancient highways of the district. This is confirmed by the existence of an old masonry bridge of three arches over the *Tilahi nala*, to the north-west of the Mani-Parbat, as well as by the direction of the road itself, which leads from the south-end of the city straight to the Bharat-kund, and onwards to Sultânpur or *Kusapura*, and Allahabad or Prâyâga. I notice this road thus minutely, because the identifications which I am about to propose are based partly on its position and direction, as well as on the general agreement of the existing remains with the holy places described by the Chinese pilgrims.

317. According to Fa Hian, the place where Buddha planted the holy tree was to the *east* of the road, on issuing from the town by the southern gate. Hwen Thsang's account agrees with this exactly, in placing the "extraordinary tree" to the south of the Capital and to the left of the route. This tree was the celebrated "tooth-brush" or twig used in cleaning the teeth, which having been cast away by Buddha, took root and grew to between 6 and 7 feet in height. Now, it will be observed that the ruined mounds that still exist, as well as the tombs of Seth and Job, are to the south of the city and to the east or left of the road. The position therefore is unmistakably the same as that described by the Chinese pilgrims, and as the actual state of the ruins agrees well with the details given by Hwen Thsang, I think that there can be no reasonable doubt of their identity.

318. Hwen Thsang describes the city of *Visákha* as being 16 *li*, or $2\frac{2}{3}$ miles in circuit. In his time therefore the capital of Râma was not more than half of its present size, although it probably contained a greater population, as not above one-third, or even perhaps less, of the present town is inhabited. The old city then possessed no less than twenty monasteries, with three thousand monks, and about fifty Brahmanical temples, with a very large Brahmanical population. From this account we learn that, so early as the 7th century, more than

three hundred of the original temples of Vikramâditya had already disappeared, and we may therefore reasonably infer that the city had been gradually declining for some time previously. The Buddhist monuments, however, would appear to have been in good order, and the monks were just as numerous as in the eminently Buddhist city of Benares.

319. The first monument described by Hwen Thsang is a great monastery without name, but as it was the only notable monastery, it was most probably either the *Kâlakârâma* of Sâketa, or the *Purvvârâma*, both of which are mentioned in the Ceyloncse Mahawanso. The monks were of the school of the *Sammateyas*, and their monastery was famous for having produced three of the most eminent Buddhist controversialists. This monastery I would identify with the *Sugrîb Parbat*, which I have already described as being about 500 feet long by 300 feet broad. The great size and rectangular form of this ruin are sufficient to show that it must have been a monastery, but this is placed beyond all doubt by the existence of an interior well and by the remains of cloistered rooms forming the four sides of the enclosure. Its position to the south of the city, and to the east or left of the road, has already been specially noticed as agreeing with the recorded position of the monastery.

320. Beside the monastery there was a *stupa* of Asoka, 200 feet in height, built on the spot where Buddha preached the law during his six years' residence at Sâketa. This monument I would identify with the *Mani-Parbat*, which is still 65 feet in height, and which with its masonry facing must once have been at least as high again, and with the usual lofty pinnacle of metal may easily have reached a height of 200 feet. Hwen Thsang ascribes the erection of this monument to Asoka, and I see no reason to question the accuracy of his statement, as the mixed structure of half earth and half masonry must undoubtedly be very ancient. The earliest *stupas*, or topes, were simple earthen mounds or barrows, similar to those that still exist in England. There are many of these barrows still standing at *Lauriya-Navandgarh* to the north of Bettiya, but this is the only place where I have yet seen them. They are undoubtedly the most ancient monuments of the Indian population, and I firmly believe that even the very latest of them cannot be assigned to a lower date than the fifth

century before Christ. I base this belief on the known fact that all the monuments of Asoka's age, whether described by Hwen Thsang, or actually opened by myself near Bhilsa, are either of stone or brick. The earthen barrows are therefore of an earlier age; but such as are Buddhist cannot possibly be earlier than the beginning of the fifth century before Christ. In the case of the *Mani-Parbat* at Ajudhya I infer that the earthen barrow, or lower portion, may belong to the earlier ages of Buddhism, and that the masonry or upper portion was added by Asoka. At the foot of the mound I picked up a broken brick with the letter *sh*, of the oldest form, stamped upon it; but as this is almost certainly of later date than Asoka, it most probably did not belong to the *Mani-Parbat* building.

321. Hwen Thsang next describes the sites of the tooth-brush tree and of the monument where the four previous Buddhas used to sit and to take exercise, as being close to the great *stupa*. These places I would identify with the court-yard containing the tombs of Seth and Job, which touches the south side of the *Mani-Parbat*. The two tombs I take to be the remains of the seats of the four previous Buddhas, and the paved court-yard to be the scene of their daily walks, although I was unable to trace their foot-marks, which were seen by the Chinese pilgrim.

322. The last monument described by Hwen Thsang is a *stupa* containing the hair and nails of Buddha. This was surrounded by a number of smaller monuments which seemed to touch one another, and by several tanks which reflected the sacred buildings in their limpid waters. The *stupa* I would identify with the *Kuber-Parbat*, which touches the south side of the enclosure round the tombs of Seth and Job, and is close to the west side of the ruined monastery. One of the tanks described by the pilgrim may be the *Ganes-Kund*, which has already been noticed; but all the smaller monuments have disappeared long ago, as they afforded cheap and ready materials for the construction of the numerous Muhammadan tombs, as well as of the neighbouring bridge and mosque. If I am right in my identification of this mound as the remains of the *stupa* containing the hair and nails of Buddha, I think that an excavation in the centre of the mound might perhaps verify the accuracy of my conclusions.

323. The people are unanimous in their assertion that the old city

to the north of these mounds was called *Bareta*. Ayodhya, or Ajudhya, they say, was the capital of Rama, but the later city was called *Bareta*. As this name has no similarity either to *Sâketa* or *Visâkha*, I can only set it down as another appellation of the old town, for which we have no authority but tradition. I was disappointed, when at Ajudhya, in not hearing even the most distant allusion to the legend of the tooth-brush tree of Buddha, but the tradition still exists, as I heard of it quite unexpectedly at two different places immediately afterwards, first at *Hâtila*, distant 15 miles, and next at Gonda, 29 miles to the north of Ajudhya.

XIX.—HATILA, OR ASOKPUR.

324. The ancient territory of Ayodhya was divided by the Sarju or *Ghâghra* River into two great provinces; that to the north being called *Uttara Kosala*, and that to the south *Banaodha*. Each of these was again subdivided into two districts. In Banaodha these are called *Pachham-rât* and *Purab-rât*, or the western and eastern districts, with reference to their bearing from Ajudhya; and in Uttara Kosala they are *Gauda* (vulgarly Gonda) to the south of the Rapti, and Kosala to the north of the Rapti, or Râwati, as it is universally called in Oudh. Some of these names are found in the Purânas; thus in the Vâyu Purâna, Lava, the son of Râma, is said to have reigned in Uttara Kosala; but in the Matsya, Singa, and Kurma Purâns, *Srâvasti* is stated to be in *Gauda*. These apparent discrepancies are satisfactorily explained when we learn that *Gauda* is only a sub-division of Uttara Kosala, and that the ruins of Srâvasti have actually been discovered in the district of *Gauda*, which is the Gonda of the maps. The extent of *Gauda* is also proved by the old name of Balrâmpur on the Rapti, which was formerly *Ramgarh Gauda*. I presume therefore that both the *Gauda Brahmans* and the *Gauda Tagas* must have belonged to this district originally, and not to the mediæval city of *Gauda* in Bengal. Brahmans of this name are still numerous in Ajudhya and Jahangirabad, on the right bank of the Ghâghra River in Gonda, Pâkhapur, and Jaisni of the Gonda district, and in many parts of the neighbouring province of Gorakhpur.

325. The small village of *Hâtila* derives its name from the sister's son of Sayid Sâlâr. The old Hindu name was *Asokpur*, so called

from a large temple of *Asoknath Mahadeo*. Hâtila was killed in an assault on the temple, and his tomb, a low domed building only 20 feet square, is still much frequented as the shrine of a *Ghazi*, or martyr for the faith. It is built entirely of large bricks from the ruins of the old temple of *Asoknâth*. The remains consist of a low mound, 700 feet long by 500 feet broad, with three prominent masses of ruin on the north side. I made an excavation in the north-west ruin near the base of a large *Mahwa* tree, but without any result, as a small Muhammadan tomb on the top prevented me from digging in the centre. But the coolies employed on the work voluntarily informed me that the *Mahwa* tree had been the "tooth-brush" of a Raja who stuck it in the ground and it grew to be a tree. From this tradition, which also exists at Gonda, I infer that it was usual to make cuttings and to take seeds from the famous *danta-dhâwan* or "tooth-brush tree" of *Saketa* for distribution to religious establishments, just as cuttings from the Bodhi tree at Gaya were made for the same purpose. Both Fa Hian and Hwen Thsang agree in stating that the *Danta-dhâwan* of Sâketa was only seven feet high, and that it never grew any higher, which would seem to show that it was only a small tree or shrub; and this indeed is actually the case with the *Datton*, or "tooth-brush tree" of Gonda, which is a *Chilbil*, or shrub eaten by goats, that never exceeds 8 or 10 feet. I conclude therefore that the original tooth-brush tree of Hâtila has disappeared, and that the name has been applied to the *Mahwa*, which is the only tree now remaining on the mound.

326. The north-east mound is a mere undistinguishable mass of broken bricks, but the central mound is still covered with the ruins of the temple of Asoknâth Mahadeo, containing a large broken *lingam*. Portions of the brick walls, which still remain, show that the temple was only 12 feet square; but the whole has been lifted up by the roots of a gigantic Pipal tree, which still hold the bricks together by their interlacings. These remains attracted the attention of Buchanan Hamilton during his survey of Gorakhpur, who remarks that "a wild fig tree having taken root on the *linga* will soon cover it." This actually took place, and the *linga* was almost completely hidden by the matted roots of the Pipal, until the tree was cut down by the Tahsildar of the neighbouring village of Vazirganj in A. D. 1862. As the cut stem of the Pipal shows 849 annual rings, the tree must have

been planted in A. D. 1013, during the reign of Mahmud of Ghazni. This indeed is about the date of the temple itself, which is said to have been built by *Suhri-dal*, Raja of Asokpur, and the antagonist of Sayid Sâlâr. The Raja is also called *Suhal-dhar*, *Sohil-dal*, and *Sohil Deo*, and is variously said to have been a *Thâru*, a *Bhar*, a *Kâlahansa*, or a *Bais Rajput*. The majority, however, is in favour of his having been a *Thâru*. The mound with the *Mahwa* tree is called *Raja Sohil-dal-ka-khalanga* or "Sohil-dal's seat." His city of Asokpur is said to have extended to *Dumariya-Dih*, 2 kos to the north, and to *Sareya-Dih*, half a kos to the south of the temple. At both of these places there are old brick-covered mounds, in which several hundreds of coins have been lately found. Most of the coins belong to the early Musalman Kings of Delhi, the Ghoris and Khiljis; but there were also a few Hindoo coins, in base silver and copper, with the Boar incarnation of Vishnu on one side, and the legend of *Sri-mad-Adi-Varâha* on the reverse in mediæval characters. As these coins are referred to by name, in an inscription of A. D. 920, as *Sri-mad-Adi-Varaha drammas*, or "Boar incarnation drachmas," the mounds in which they have been discovered must be of still earlier date. Tradition gives the genealogy of the Thâru Râjas of *Gauda* as follows:—

A. D.	900	1	Mora-dhaj, or Mayura-dhwaja.
	925	2	Hans-dhaj, or Hansa-dhwaja.
	950	3	Makar-dhaj, or Makara-dhwaja.
	975	4	Sudhanwa-dhaj.
	1000	5	Suhridal-dhaj, contemporary of Mahmud.

I give this genealogy with the probable dates, as it may perhaps be of use hereafter in fixing the age of other Princes and their works.

XX.—SAHET-MAHET, OR SRAVASTI.

327. The position of the famous city of *Srâvasti*, one of the most celebrated places in the annals of Buddhism, has long puzzled our best scholars. This was owing partly to the contradictory statements of the Chinese pilgrims themselves, and partly to the want of a good map of the Province of Oudh. In para. 304 of this report I have compared the bearings and distances recorded by Fa Hian and Hwen

Thsang with those preserved in the Buddhist annals of Ceylon, and I have shown conclusively that Fa Hian's distance from Sankisa and his bearing from *Shachi* or *Sâket* are both erroneous. We know from Hwen Thsang and the Buddhist books of Ceylon, that *Srâvasti* was to the north of Sâhet or Ayodhya, or in other words that it was in the district of *Gauda*, or *Uttara Kosala*, which is confirmed by the statements of no less than four of the Brahmanical Purânas. As Fa Hian also says that *Shewei* or *Sewet* was in Kosala, there can be no doubt whatever that Srâvasti must be looked for within a few days' journey to the northward of *Sâket* or *Ayodhya*. According to Fa Hian the distance was 8 *Yojanas*, or 56 miles, which is increased by Hwen Thsang to 500 *li*, or 83 miles. But as the latter pilgrim reduced the Indian Yojana to Chinese measure at the rate of 40 *li* per *Yojana*, we may correct his distance by the nearest round number of 350 *li* or 58 miles, to bring it into accordance with the other. Now, as this is the exact distance from Ajudhya of the great ruined city on the south bank of the Rapti, called *Sâhet-Mâhet*, in which I discovered a colossal statue of Buddha, with an inscription containing the name of Srâvasti itself, I have no hesitation in correcting Hwen Thsang's distance from 500 *li* to 350 *li* as proposed above.

328. The ruined city of Sâhet-Mâhet is situated between Akaona and Balrâmpur, at 5 miles from the former and 12 miles from the latter, and at nearly equi-distances from Bahraich and Gonda. In shape it is an almost semi-circular crescent, with its diameter of one mile and a third in length curved inwards and facing the north-east, along the old bank of the Rapti River. The western front, which runs due north and south for three-quarters of a mile, is the only straight portion of the enclosure. The ramparts vary considerably in height; those to the west being from 35 to 40 feet in height, while those on the south and east are not more than 25 or 30 feet. The highest point is the great north-west bastion, which is 50 feet above the fields. The north-east face, or shorter curve of the crescent was defended by the Rapti, which still flows down its old bed during the annual floods. The land ramparts on the longer curve of the crescent must once have been defended by a ditch, the remains of which yet exist as a swamp, nearly half a mile in length, at the south-west corner. Everywhere the ramparts are covered with fragments of brick, of the large size peculiar to very

ancient cities; and though I was unable to trace any remains of walls except in one place, yet the very presence of the bricks is quite sufficient to show that the earthen ramparts must once have been crowned by brick parapets and battlements. The portion of the parapet wall, which I discovered still standing in the middle of the river face, was 10 feet thick. The whole circuit of the old earthen ramparts, according to my survey, is 17,300 feet, or upwards of $3\frac{1}{4}$ miles. Now this is the exact size of 20 *li* or $3\frac{1}{3}$ miles which Hwen Thsang gives to the palace alone; but, as the city was then deserted and in ruins, he must have mistaken the city itself for the palace. It is certain at least that the suburbs outside the walls must have been very limited indeed, as the place is almost entirely surrounded with the remains of large religious buildings, which would have left but little room for any private dwellings. I am therefore quite satisfied that the city has been mistaken for the palace; and this mistake is sufficient to show how utterly ruined this once famous city must have been at so distant a period as the 7th century, when the place was visited by Hwen Thsang. As Fa Hian describes the population as already very inconsiderable in A. D. 400, while the Ceylonese annals speak of *Khiradhara*, King of *Sawatthipura* between A. D. 275 and 302, the great decline of Srâvasti must have taken place during the 4th century, and we may perhaps not be far wrong in connecting it with the fall of the Gupta Dynasty in A. D. 319.

329. *Srâvasti* is said to have been built by Raja *Sravasta*, the son of *Yuvanâswa* of the Solar race, and the tenth in descent from Surya himself. Its foundation therefore reaches to the fabulous ages of Indian history, long anterior to Râma. During this early period it most probably formed part of the kingdom of Ayodhya, as the Vâyu Purâna assigns it to Lava, the son of Râma. When Srâvasti next appears in history, in the time of Buddha, it was the Capital of King Prasenajit, the son of Maha Kosala. The King became a convert to the new faith, and during the rest of his life he was the firm friend and protector of Buddha. But his son Virudhaka hated the race of the Sâkyas, and his invasion of their country and subsequent massacre of 500 Sâkya maidens, who had been selected for his harem, brought forth the famous prediction of Buddha, that within seven days the King would be consumed by fire. As the story has been preserved

by Buddhists, the prediction was of course fulfilled, and upwards of 11 centuries afterwards, the tank in which the King had sought to avoid the flames was pointed out to the credulous Hwen Thsang.

330. We hear nothing more of Srâvasti until one century after Kanishka, or five centuries after Buddha, when, according to Hwen Thsang, Vikramâditya, King of Srâvasti, became a persecutor of Buddhists, and the famous Manorhita, author of the *Vibhâsha Sâstra*, being worsted in argument by the Brahmans, put himself to death. During the reign of his successor, whose name is not given, the Brahmans were overcome by *Vasubandhu*, the eminent disciple of *Manorhita*. The probable date of these two Kings may be set down as ranging from A. D. 79 to 120. For the next two centuries *Srâvasti* would seem to have been under the rule of its own Kings, as we find *Khiradhâra* and his nephew mentioned as Rajas between A. D. 275 and 319. But there can be little doubt that during the whole of this time Srâvasti was only a dependency of the powerful Gupta Dynasty of Magadha, as the neighbouring city of Sâketa is specially said to have belonged to them. "Princes of the Gupta race," says the Vâyu Purâna, "will possess all those countries; the banks of the Ganges to Prayâga, and Saketa, and Magadha." From this time Srâvasti gradually declined. In A. D. 400 it contained only 200 families; in A. D. 632 it was completely deserted: and at the present day the whole area of the city, excepting only a few clearances near the gateways, is a mass of almost impenetrable jungle.

331. Before attempting to identify the existing remains of *Sâhet-Mâhet* with the famous monuments of Srâvasti, it will be as well to compare and reconcile the few discrepant statements of the Chinese pilgrims, so that the description of the holy places may not be interrupted by discussion. Of these discrepancies perhaps the most notable is the difference in the name of the city itself, which Fa Hian gives as *She-wei*, while Hwen Thsang writes it, as correctly as it is possible to do in Chinese syllables, *She-lo-fa-sitî*, or Srâvasti. But this difference is more apparent than real, as there can be little doubt that *She-wei* is only a slight alteration of the abbreviated Pali form of *Sewet* for *Sâwatthi*, which is found in most of the Ceylonese books. Similarly the modern name of *Sâhet* is evidently only a variation of the Pali *Sâwet*. The other name of *Mâhet* I am unable to explain, but it is perhaps

only the usual rhyming addition of which the Hindus are so fond, as in *ulta pulta*, or "topsy-turvy," which many of the people say is the true meaning of *Sâhet-Mâhet*, in allusion to the utter ruin of the whole place. But some say that the name was originally *Set-met*, and as this form seems to be only a corruption of *Sewet*, it is probable that *Sahet-mahet* or *Sâhet-mâhet*, is simply a lengthened pronunciation of *Set-met*. One man alone, and he, strange to say, was the Musalman in charge of the tomb of Pir-Barâna close to the ruined city, affirmed that the true name was *Sávitri*, which is so close to the correct Pali form of *Sawatthi* as to leave but little doubt that it preserves the original name of the place.

332. The next point of difference is the distance of the celebrated monastery of *Jetavana* from the south gate of the city. According to Fa Hian this was 1,200 paces, or about half a mile, which is increased by Hwen Thsang to 5 or 6 *li*, or nearly one mile. But as the only mass of ruins which can possibly be identified with the *Jetavana* is exactly half a mile from the nearest opening in the south rampart of the old city, there is clearly some mistake in the distance given by Hwen Thsang, unless we may suppose him to have approached the monastery by a somewhat longer route through the multitude of holy places, of which the remains still exist to the east of the *Jetavana* ruins. By this route the distance would be increased to three-quarters of a mile, or $4\frac{1}{2}$ *li*, which is sufficiently close to the number given by Hwen Thsang.

333. A third discrepancy is contained in the statement of Fa Hian that "the town has two gates, one facing the east and the other the north," when we know that it had a *south* gate by which both himself and Hwen Thsang had issued from the city, when on their way to the *Jetavana* monastery. Perhaps Fa Hian intended to say that "besides the south gate, the city had two other gates, one to the east and one to the south." But as it is scarcely credible that a city which was $3\frac{1}{4}$ miles in circuit should have possessed only three gates, I think that we may understand that the statements refer only to the principal entrances, and that there were at least as many more smaller gates, or wickets, corresponding with the present openings in the ramparts.

334. Both pilgrims begin their account of *Srâvasti* at the old palace of King *Prasenajita*, and as both, after describing the surround-

ing buildings, leave the city by the south gate, it is certain that the palace was inside the city. Its exact position I was unable to determine, as the greater part of the interior is covered with dense jungle: but as the east half is comparatively clear, and the jungle low, I was able to satisfy myself that no large building had ever existed in this part, and consequently that the palace must have been in the west half of the city. This conclusion is confirmed by the position of the two *Stupas* of Sudatta and the Anguli-mâlyas, which Hwen Thsang places to the east of the palace, for as the only existing mounds that can be indentified with these *Stupas* are near the middle of the river face of the city, the palace must have been to the west of them, and therefore in the west half of the city.

335. The two principal places inside the city which are mentioned by both pilgrims as being to the east of the palace, were the dwelling-house and *Stupa* of Sudatta, the builder of the *Jetavana*, and the great *Stupa* of the *Anguli-mâlyas*. These *Stupas* I have already identified with the two existing mounds near the middle of the river face of the ramparts. The smaller one, which is about 25 feet in height, corresponds with the *Stupa* of Sudatta, and the larger one, which is 35 feet in height, with the other *Stupa*, which is particularly stated to have been a large one. The *Anguli-mâlyas* were the followers of a particular sect which was established by a converted brigand who had received the name of *Anguli-mâla* or "finger garland," from his practice of cutting off the fingers of his victims to form a garland which he wore round his neck.

336. On leaving the city by the south gate, both pilgrims went at once to the great monastery of *Jetavana*, which was one of the eight most celebrated Buddhist buildings in India. It was erected during the lifetime of Buddha by *Sudatta*, the minister of King Prasenajita, and it received its name of *Jetavana*, or "Jeta's garden," because the garden in which it was built had been purchased from Prince Jeta. The story of the building is given by Hardy from the Ceylonese annals. According to these, the prince, who was unwilling to part with his garden, demanded as its price as many gold *masurans* as would cover it, which Sudatta at once promised. When the garden was cleared, and all the trees, except Sandal and Mango, were cut down, the money was brought and spread out over the ground until the whole was covered, when the sum

was found to be 18 *Kotis*, or 180 millions of *masurans*. The garden is said to have been 1,000 cubits in length and the same in breadth, or 4,000 cubits in circuit. Extravagant as the sum may seem, it is still too small to have covered the garden, if we are to take Mr. Hardy's cubits at 18 inches, as each *masuran* would be one inch and eight-tenths in length and breadth, which is about three times the size of the old Indian silver coins. Unfortunately the dimensions of the Jetavana are not stated either by Fa Hian or Hwen Thsang; but the ruined mound of the monastery still exists, and its dimensions do not exceed 1,000 feet in length by 700 feet in breadth. Now, it is curious that these numbers give an area which is only one-third of the size of that recorded in the Ceylonese annals, and which therefore would be exactly covered by 180 millions of old Indian silver coins, allowing rather more than half an inch for the length and breadth of each coin. The amount said to have been paid for the garden is of course only the usual extravagant style of Indian exaggeration, for the sum of 18 *kotis*, even if taken at the lowest value of gold as ten times that of silver, would be equal to 45 krors of Rupees or 45 millions sterling.

337. The *Jetavana* is described in the Ceylonese annals as consisting of a central *vihâr*, or temple, with surrounding houses for priests, rooms for day and night, an ambulatory, tanks, and gardens of fruit and flower trees, and around the whole a wall 18 cubits in height. According to this description the *Jetavana* must have included not only the great ruined mound now called *Jogini-baria*, but all the ruins to the east and north of it, unless it extended to the westward, where there are no remains at present existing. But as I can show that most of the ruins to the east correspond with the descriptions which Fa Hian and Hwen Thsang have given of many of the holy places outside the *Jetavana*, it is certain that the original monastery must have been confined to the *Jogini-Baria* only, and that the other buildings, with the tanks and gardens, were outside the walls of the *Jetavana* itself, although it is most probable that many of them were connected together by different enclosing walls. When the Jetavana was completed by Sudatta, the Prince Jeta expended the whole of his purchase money in adding a palace, seven stories in height, to each of the four sides of the garden. It is probably to these palaces that Fa Hian

refers when he states that "the temple of *Shi-hwan* (read *Shi-to hwan*," or Jetavana) "had originally seven stories. Canopies and streamers were hung up, flowers were scattered, perfumes burned, lanterns supplied the place of day, and even in day time were never extinguished. A rat having taken into its mouth the wick of one of these lanterns, set fire to the flags and to the drapery of the pavilions, and the seven stories of the temple were utterly consumed." This occurred some time before A. D. 400, as Fa Hian adds that "they reconstructed the temple, and when they had completed the second story, they installed the statue in its former place." From this account I infer, though somewhat doubtfully, that the new temple was not more than two stories in height. I conclude also that the place was already on the decline, as a little more than two centuries later, when visited by Hwen Thsang, it was found utterly ruined and deserted.

338. The great mound of ruins, which I propose to identify with the Jetavana, is situated just half a mile distant from the south-west corner of the old city. It is rectangular in form, being 1,000 feet long from north-east to south-west, and 700 feet broad. It is worth noting, as it is most probably not accidental, that the central line of the rectangle falls upon a lofty mound, inside the south-west angle of the city, called *Sobhnâth*, which, according to some, is a name of Mahadeva. The shape of the monastery is defined by a gentle rise all round the edge of the mound, which I take to represent the ruins of the monks' cells that once formed the surrounding walls of the enclosure. The highest part, which is the south side, is not more than 12 feet above the neighbouring ground, while the other sides are not more than eight or ten feet. But the whole area was so thickly covered with jungle, that I found it difficult to take even a few measurements. During my stay at Sahet I cut pathways to all the ruined eminences within the enclosure, and after clearing the jungle around them, I began an excavation in each to ascertain the nature of the original building. With the largest mound, which was near the south end of the central line of the enclosure, I was unsuccessful. It was 15 feet in height, and looked the most promising of all, but I found nothing but earth and broken bricks, although I was assured by the people that numbers of large bricks had been carried away from it at different times. Both from its size and position, I am inclined to look upon this mound as

the remains of the original temple of the *Jetavana*. In a lower mound, close by to the west, my excavations disclosed the walls of a small temple, not quite $6\frac{1}{2}$ feet square inside, with a doorway to the north and the remains of a semi-circular brick pedestal against the south wall. The walls were upwards of three feet thick, but the whole building was only a little more than 13 feet square, from which, taking the altitude at three and a half times the side, I conclude that the temple could not have exceeded 46 feet in height.

339. Near this temple there are three brick wells: the largest to the north is octagonal above, with a side of $4\frac{1}{2}$ feet, and circular below at a depth of 12 feet. The second, to the south, which is circular, is only $3\frac{1}{2}$ feet in diameter; and the third, still farther to the south, is also circular, with a diameter of $6\frac{3}{4}$ feet. It is curious that all these wells, which are the only ones known to the people, are in the south-west corner of the enclosure.

340. A third mound, near the north end of the central line of the enclosure, gave promise of a better result than the others, as a previous excavation had disclosed the head and shoulders of a colossal figure, which from its curly hair and long split ears I knew to be that of Buddha. I was assured, however, that the Jains, who come annually to Sâhet in great numbers during the months of Magh and Baisakh, look upon the statue as belonging to themselves. But my experience having taught me that Jains are no more particular than Brahmans as to the figures that they worship, I began to dig in the certain expectation of finding a very old Buddhist statue, and with a strong hope of discovering some inscription on its pedestal that might perhaps be of value in determining the name and probable date of these long deserted ruins. After a few hours' work the four walls of the temple were brought to light, and the figure was seen to be leaning against the back wall. The interior was only $7\frac{3}{4}$ feet square, but the walls were upwards of 4 feet thick, with a projection of 6 inches in the middle of each face. The front wall to the east was thicker than the rest by one foot, which was the breadth of the jamb of the doorway. The extreme outside dimensions were 19 feet by 18 feet, which would give a probable height of between 60 and 70 feet. As the excavation proceeded, it was seen that the statue was a standing figure which had been broken off a few inches above the ancles by the fall of the temple. After

the figure was removed with much difficulty, on account of its great weight, and the floor of the temple had been cleared, it was seen that the pedestal of the statue was still standing erect in its original position. The floor was paved with large stones, and immediately in front of the pedestal there was a long flat slab $3\frac{3}{4}$ feet by $1\frac{1}{2}$ foot, with a pair of hollow foot-marks in the centre and two sunken panels on each side. At the back of the incised feet towards the pedestal there was a rough hollow, $3\frac{1}{3}$ feet long by 4 inches broad, which, judging from what I have seen in Barma, must once have held a long stone or metal frame for the reception of lights in front of the statue. But all this arrangement was certainly of later date than the statue itself, for on opening up the floor it was found that the *Buddha-pad* slab concealed the lower two lines of an inscription, which fortunately had been thus preserved from injury, while the third or uppermost line had been almost entirely destroyed.

341. The statue is a colossal standing figure of Buddha the Teacher, 7 feet 4 inches in height. His left hand rests on his hip, and his right hand is raised in the act of teaching. The right shoulder is bare as in all Buddhist figures, and there is the usual aureole or nimbus round the head; close to the neck there are two small holes cut through the nimbus which, being larger in front than behind, were evidently intended for metal cramps to fix the statue to the wall. Unfortunately the head is broken, as well as both arms, but the body of the figure is uninjured. The attitude is stiff and restrained, the two feet being exactly in the same position and somewhat too far apart. The statue is of spotted red sandstone, such as is found in the quarries near Mathura and Fatehpur Sikri; and as we know from recent discoveries that the sculptor's art was in a very flourishing state at Mathura during the first centuries of the Christian era, I feel satisfied that the *Srávasti* colossus must have been brought from that city. The inscription is imperfect at the beginning, just where it must have contained the date. It now opens with the figure 10 and some unit of the Gupta numerals, which must be the day of the month, and then follow the words *etaye purvvaye*, which, as Professor Dowson has shown, must mean "on this happy occasion," or some equivalent expression. Then come the names of the donors of the statue, three mendicant monks named *Pushpa*, *Siddhya-Mihira*, and *Bala-Trepitaka*. Next

follow the title of *Bodhisatwa*, the name of the place, *Sâvasti*, and the name of Buddha as *Bhagavata*. The inscription closes with the statement that the statue is the "accepted gift of the *Sarvastidina* teachers of the Kosamba hall." Judging from the old shapes of some of the letters in this record, the age of the statue may be fixed with some certainty as not later than the first century of the Christian era. The characters are exactly the same as those of the Mathura inscriptions, which, without doubt, belong to the very beginning of the Christian era; and as the Sravasti statue was in all probability executed at Mathura, the correspondence of the lapidary characters shows that the inscriptions must belong to the same period. As there is no mention of this statue in Fa Hian's narrative, I conclude that the temple in which it stood must have fallen down in the great conflagration which destroyed the seven-storied pavilions. But the account of Fa Hian is not very intelligible. He states that the original image of Buddha was "the head of an ox carved in sandal-wood;" that on Buddha's approach the statue "rose and went to meet him" and that when Buddha said, "Return and be seated," the statue "returned and sat down." The origin of this rather puzzling account must, I believe, be traced to a mistake, either of Fa Hian himself, or of his translator. In Sanskrit, *Gosirsha* or "Bull's head," is the name of the most fragrant kind of sandal-wood, and as we know that the famous early statue of Buddha at Kosambi was made of this very wood, it is natural to conclude that the earliest statue at Sravasti may have been made of the same material. As this is the only figure of Buddha noticed by Fa Hian, I infer that the colossal stone figure which I discovered must have been buried beneath the ruins of its own temple some time before A. D. 400, and most probably therefore during the great fire which destroyed the whole monastery. It was concealed also at the time of Hwen Thsang's visit, in A. D. 632, as he specially mentions that the only temple then standing amidst the ruins of the monastery was a small brick house containing a statue of Buddha in sandal-wood. The statue now discovered was therefore not visible in his time.

342. Both pilgrims agree in stating that the gate of the monastery was on the east side, and although I was unable to find any certain trace of an opening, I am quite satisfied that the gate must have been on the east, as all the existing ruins are on that side. On issuing

from the gate the first monuments noticed by both pilgrims are two lofty stone pillars, one on each side of the road. Hwen Thsang says that they had been erected by Asoka, that they were 70 feet high, and that the left column was crowned by a cupola or dome, and the other by an elephant. But Fa Hian, on the contrary, describes these figures as a wheel and an ox. I feel satisfied that Fa Hian is right as to the first, as the wheel is frequently represented in the Sanchi sculptures as crowning the capitals of columns, and we know that it was also used as a type of Buddha himself as the *Chakravartti* Raja, or King who "turned the wheel" of the law, or in other words who made religion advance. With regard to the animal that crowned the other pillar I am unable to offer any remark, except the obvious explanation that the trunk of the elephant must have been broken off before the time of Fa Hian, otherwise it is impossible to conceive how he could have mistaken the figure for that of an ox. But this discrepancy in the accounts of the two pilgrims is the best argument that I can offer for the mistake which I believe them both to have made regarding the animal that crowned the Sankisa pillar, as noticed in para. 247 of this Report. There are no remains of these pillars, but there are two slight eminences only 300 feet distant from the monastery which may have been the basements on which the pillars stood, as the pathway leading to the ruined mound on the east side runs between them.

343. To the north-east of the monastery of Jetavana, and therefore to the north of the pillars, there was a *Stupa*, built, on the spot where Buddha had washed the hands and feet of a sick monk and had cured his sickness. The remains of this *Stupa* still exist in a mass of solid brick-work, to the north of the presumed pillar basements, and at a distance of 550 feet from the Jetavana monastery. This ruined mass, which is $24\frac{1}{2}$ feet in height, is built entirely of large bricks, 24 by 10 by $3\frac{1}{2}$ inches, which is a sufficient proof of its antiquity. I made an excavation from the top, to a depth of 20 feet, without any result save the verification of the fact that the ruin was a mass of solid brick-work.

344. To the east of the monastery, at a distance of 100 paces, or 250 feet, there was a large deep trench, which was said to be the spot where the earth had opened and engulfed *Devadatta*, the cousin and

implacable enemy of Buddha. Fa Hian calls the distance only 70 paces, or less than 200 feet, in a northerly direction from the east gate of the monastery. But as the two pillars and the *Stupa*, which have just been described, stood in the very position here indicated by Fa Hian, it is certain that we must read "southerly." The accuracy of this correction is confirmed by the existence of a large deep tank within 200 feet of the south-east corner of the ruined monastery, called *Bhulânan*. This tank is 600 feet long and 250 feet broad, and is now filled with water. Close by, on the south side, there was another great hollow, in which it was said that the mendicant monk *Kukâli*, a disciple of Devadatta, had been swallowed up alive for calumniating Buddha. This is represented by the *Lambaha Tâl*, a long narrow tank, only 200 feet to the south of the Devadatta gulf. The third great fissure or hollow is described by Hwen Thsang as being at 800 paces, or 2,000 feet, to the south of the second. According to the legend this was the spot in which a Brahmani girl, named *Chanchâ*, had been engulfed alive for falsely accusing Buddha of incontinence. This *Chanchâ* gulf is represented by a nameless deep tank, 600 feet long by 400 feet broad, which lies 2,200 feet to the south of the Kukâli gulf. The exact correspondence of position of these three tanks with the three great fissures or gulfs of the Buddhist legends offers a very strong confirmation of the correctness of identification of the *Jogini-baria* mound with the great Jetavana monastery.

345. The pilgrims next describe a pair of temples of the same dimensions, of which one was situated to the east and the other to the west of the road, which should therefore be the main road that led from the city towards the south. Hwen Thsang says that the first temple was only 70 paces to the east of the monastery, while Fa Hian places it at the same distance from the eastern gate, but towards the north. The position of these temples is doubtful, as I was unable to discover any remains in the immediate vicinity of the monastery that corresponded with the description. There are, however, in another position the remains of two temples, which answer the description so accurately as to leave but little doubt that they must be the buildings in question. The first, or west temple is described by both pilgrims as containing a seated figure of Buddha, while the second or east temple belonged to the Brahmans. Both were 60 feet in height, and

the Brahmanical temple was called the "shadow-covered," because, as the credulous Buddhists asserted, it was covered by the shadow of the Buddhist temple when the sun was in the west, while its own shadow, when the sun was in the east, never covered the Buddhist temple, but was always "deflected to the north." Now, the two ruins which I would identify with these temples are situated to the east and west of the road leading from the city, and due east and west from each other. They correspond therefore exactly as to relative position with each other; but instead of being only 70 paces, or 175 feet, from the monastery, the nearest is nearly 700 feet from the great mound of ruins. It is highly probable, however, that the surrounding walls of the monastery may have extended as far as the two stone pillars on the east, in which case the nearest temple mound would be within 250 feet of the walls, and the whole enclosure would then correspond in size with the dimensions recorded in the Ceylonese annals. As this increased size would also bring two tanks within the limits of the monastery, which according to the *Cingalese* were actually included within the walls, I feel inclined to adopt the larger measurement of 1,000 cubits side, or 4,000 cubits circuit, as the true size of the Great Jetavana Monastery.

346. To the north-west of the monastery Hwen Thsang placed a well and a small *Stupa*, which marked the spot where *Maudgala-putra* tried in vain to unloose the girdle of *Sâriputra*. As the distance is not mentioned, it may be inferred that the *Stupa* was close by, and therefore I would identify the site with that of the shrine of *Pir-Barâna* in the small village of Husen Jot, which is within 700 feet of the north-west corner of the monastery. Near the same place there was also a *Stupa* of Asoka, and a stone pillar, which the King had raised to note the spot where Buddha and his right-hand disciple Sâriputra had taken exercise and explained the law. I could find no trace of any of these monuments, and I conclude that the *Stupas*, as usual, must have furnished materials for the erection of *Pir-Barâna's* shrine.

347. The situation of the next holy place, which Fa Hian calls the "Wood of the Recovered Eyes," is fixed by both pilgrims at 4 *li*, or two-thirds of a mile, to the north-west of the monastery. This position is now represented exactly by the village of *Rajgarh Gulariya*,

which is situated in the midst of a very large grove of trees. The present grove is said to have been planted only two generations back, but the trees about the village itself are of great age, and the name of *Gulariya* points to some remarkable *Gular* tree as more ancient than the village itself. The legend attached to this spot is sufficiently marvellous. Five hundred brigands, having been blinded by order of King Prasenajita, attracted the commiseration of Buddha, who restored their sight. The five hundred men who had thus recovered their eyesight, threw away their staves, or according to Fa Hian, planted them in the ground, when they immediately took root, and grew to be a large grove, which was called the "Wood of the Recovered Eyes." The monks of *Jetavana* were in the habit of repairing to this grove for exercise and meditation, and all the spots which holy Buddhists had made famous by their meditations were marked by inscriptions or by *Stupas*. There is one small brick mound to the east of the grove, but I could find no trace of any inscriptions, although rewards were offered for even a single letter.

348. We now come to the second great monument of *Srâvasti*, the celebrated *Purvvârâma*, or "Eastern Monastery," which was built by the lady *Visâkhâ*, who has already been mentioned in my account of Sâhet. Fa Hian places this monument at 6 or 7 *li*, or rather more than a mile, to the north-east of the Jetavana. But this bearing is certainly wrong, as it would carry us right into the middle of the old city. I would therefore read "south-east," which is the direction of a very large mound, called *Ora-jhâr*, or "Basket-shakings," that is upwards of a mile from the *Jetavana*. Hwen Thsang places the *Vihâra* and *Stupa* of Visâkhâ at more than 4 *li*, or upwards of 3,500 feet, to the east of the "shadow-covered temple" of the Brahmans. Now, the *Ora-jhâr* mound is just 4,000 feet to the south-east of the ruined mound, which I have already identified with the Brahmanical temple. I am therefore quite satisfied that it is the remains of the great *Vihâra* of the *Purvvârâma*, or Eastern Monastery. Hwen Thsang's account of this famous monastery is meagre; his whole description being limited to the fact that "in this place Buddha overcame the Brahmans, and received an invitation from a lady named Visâkhâ." Fa Hian's notice is equally brief. We must therefore turn to the Ceylonese annals for an account of the lady and her works. According to them

Visâkhâ was the daughter of Dhananja, a wealthy merchant of *Sâket*. At 15 years of age she was married to Purnna-Vardhana, the son of *Migâra*, a rich merchant of *Srâvasti*, and from that time her whole life was spent in the observance of the religious rites of Buddhism. She was the means of converting her father-in-law Migâra, and "she was called in consequence" *Migâra-Mâtâwi*, and became the mother or chief of the *Upâsekawas*, or female lay-disciples of Buddha. Towards the end of her career she determined to sell her wedding ornaments to obtain funds for the erection of a *Vihâra*, "but there was no one in *Sewet* who had wealth enough to purchase them. She therefore bought a garden at the east side of the city, and expended immense treasures in the erection of a *Vihâra*, which was called *Purvvârâma*, or the Eastern Monastery, from the place in which it stood."

349. The great mound, now called *Ora-jhâr*, is a solid mass of earth 70 feet in height, which was formerly crowned by a brick temple. Within the last century a Musalman Fakir, who had lived under the trees at the foot of the mound, was buried in a tomb on the very top of it, which was built with the bricks of the ruin. Some years later his successor was buried beside him, and their two tombs at present preclude all hope of making any excavation from the top of the mound. I cleared the north face completely, and the other three faces partially, until I reached the paved brick flooring which surrounded the original Buddhist temple, at a height of 55 feet above the ground. The wall of the temple on the north face is only 20 feet long, and although I failed to reach the other two corners of the building, I was satisfied that it must have been square. Its height, at $3\frac{1}{2}$ times its side, would not therefore have been more than 70 feet, but as its floor is 55 feet above the ground, the total height of the temple would have been 125 feet. The wall of the north face is divided into four panels by pilasters six inches thick. The bases of these pilasters, which are still very perfect, are of the same style as those at Gaya and Baragaon in Bihâr, and of Mânikyala and Shah Dheri in the Punjab. The style would therefore seem to be one that was peculiar to early Buddhism. The other faces of the temple I was unable to examine, as the foundations of the Muhammadan tomb, which are only $2\frac{1}{4}$ feet above the broken walls of the temple, project 16 feet beyond its east and west faces.

Unfortunately the doorway of the temple must have been towards the east, as there are traces of steps at several places down the slope of that side There is an old well also amongst the trees on the east side of the mound, but I could find no traces of cloisters for the resident monks who ministered at the temple. The mound, however, is still surrounded by fine trees, and there are two small tanks at the very foot of it which would of course have been included within the limits of the monastery.

350. The *Stupa* mentioned by Hwen Thsang as belonging to the *Purvvarama* may perhaps be represented by a small ruined mound close to the north-east corner of the *Ora-jhâr*. The mound is only 8 feet high, but an excavation which I made to the depth of 11 feet, showed it to be made of solid bricks of large size, 12 by 9 by 3 inches. It is 40 feet in diameter, and when complete, with its pinnacle, it must have been about 50 or 60 feet in height. From its vicinity to the Purvvarama I have little doubt that this is the *Stupa* which *Visâkhâ* built on the spot where Buddha had overcome the Brahmans in argument.

351. The last place mentioned by the pilgrims is the spot where King *Virudhaka* halted with his army to converse with Buddha, and out of respect for the teacher gave up his expedition against the *Sakyas*, and returned to his Capital. Hwen Thsang states that this famous spot was close to the monastery of Visâkhâ on the south side, while Fa Hian says that it was 4 *li*, or two-thirds of a mile, to the south-west of the city. The former is the more probable position, as it is to the south-east and on the high road to *Kapilanagara*, the capital of the Sakyas. Close by there was a *Stupa* to mark the spot where 500 Sakya maidens were afterwards massacred by Virudhaka for refusing to enter his harem. Near the *Stupa* there was a dry tank, or gulf, in which Virudhaka had been swallowed up. According to the legend, Buddha had predicted that Virudhaka would be destroyed by fire within seven days after the massacre. When the seventh day arrived, the King, accompanied by his women, proceeded gaily to a large tank, where he entered a boat, and was rowed to the middle of the water. But flames burst forth from the waters and consumed the boat, and the earth opened beneath the tank, and Virudhaka "fell alive into hell." The only large piece of water that I could find is a

nameless tank close to the south side of Visâkha's temple, and therefore in the very position indicated by Hwen Thsang; but there are no existing remains near it that could be identified with the *Stupa* of the 500 Sakya maidens.

352. The monuments of *Srâvasti* hitherto described by the pilgrims are directly connected with the personal history of Buddha. The places where he sat and walked, where he taught his law, and where he worsted the Brahmans in argument, were all specially holy in the eyes of devout Buddhists. But these sacred monuments formed only a small portion of the Buddhist buildings of the great city of Srâvasti, where, according to Hwen Thsang, the monuments were counted by hundreds. Fa Hian, however, quotes a tradition which limited their number to ninety-eight, at a period not remote from his own time, and as he visited the place nearly two centuries and a half earlier than Hwen Thsang, when most of the monasteries were in ruins, we may be satisfied that their number never reached one hundred even at the most flourishing period of Buddhism. I traced the ruins of nine monasteries in the immediate neighbourhood of the old city, and there are probably as many more within a range of two miles. I found also the foundations of at least ten temples of various sizes, but they were all in too ruinous a state to be of any interest. But when I remember that the Jetavana itself, as well as nearly the whole of the ninety-eight monasteries of Srâvasti were in complete ruin upwards of twelve centuries ago, I think it is more wonderful that so much should still be left for the use of the archæologist, than that so little should remain of all the magnificent buildings of this once famous city.

XX.—TANDA, OR TADWA.

353. From *Srâvasti* both pilgrims proceeded to visit the birth-place of Kâsyapa Buddha, at *Tu-wei*, which Fa Hian places at 50 *li*, or $8\frac{2}{3}$ miles to the west. Hwen Thsang does not name the town, but he states that it was about 60 *li*, or 10 miles, to the north-west of Srâvasti. The bearing and distance point to the village of *Tadwa*, which is just 9 miles to the west of *Sahet-mahet*. Some people refer this name to *Tanda*, because for the last hundred years the Banjâras have been in the habit of halting, or of making their *tanda*, at this place. But the people themselves spell the name of their village *Tadwa*, and not *Tanda*,

which properly means the whole venture of goods belonging to a party of Banjaras, but which is also applied to the places at which they halt. I think therefore that the name of *Tadwa* may possibly refer to the old name of *Tu-wei* as it is written by Fa Hian. There can, however, be no doubt as to the identity of the two places, as Tadwa is a very old site, which is still covered with brick ruins. According to tradition, the town belonged to Raja *Suhir dal*, after whose death it was destroyed by the Muhammadans, and remained uninhabited until about one hundred years ago, when a *Bairagi*, named *Ajudhya Das*, established himself under the banyan tree, and discovered the female figure which is now worshipped as *Sita Mai*. The present village is situated amongst brick ruins one quarter of a mile to the north of the road leading from Akaona to Bahraich. All the fields around are strewn with broken bricks and within 1,000 feet of the village to the north-west there is a mound of brick ruins 800 feet long from east to west, and 300 feet broad. Beyond the mound, and to the north of the village, there is a large irregular shaped sheet of water, nearly half a mile in length, called Sita-Deva Tal. But this name cannot be older than the discovery of the statue which is attributed to Sitâ.

354. The west end of the mass of ruins is very low, but it is covered with broken walls and fine trees, and was therefore most probably the site of the monastic establishment. The general height of the east end is 16 feet above the fields, but rises to 20 feet at the south-west corner. At this point the mound is formed of solid brick-work, which after close examination I discovered to be the remains of a large *Stupa*. As two different measurements gave a diameter of not less than 70 feet, this *Stupa* must have been one of the largest and most important in the famous province of *Uttara Kosala*. Hwen Thsang mentions only two *Stupas* at this place, one to the south of the town, being built on the spot where *Kasyapa Buddha* had performed his meditations under a banyan tree, and the other to the north of the town, containing the complete body of Kasyapa. This is also confirmed by its size, as Fa Hian calls this *Stupa* a great one. The *Stupa* on the mound must certainly represent the latter monument, because the tank precludes the possibility of any other having existed to the northward of it. I wished very much to have made an excavation in this mound, but the presence of a *lingam* of Mahadeo on the top of it,

which with *Sita-Mai* shares the devotions of the villagers, was an effectual check against any excavations. This is the more to be regretted, as the *Stupa* is said to have been built by Asoka, an attribution which might have been verified by an exploration of its interior.

355. The figure which the ignorant villagers worship as *Sita* is in reality a statue of *Maya Devi*, the mother of *Sakya Buddha*. She is represented standing under the *Sâl* tree, with her right hand raised and holding one of the branches, which is the well known position in which she is said to have given birth to Sakya. Her left hand is placed on her hip, and there is a parrot perched on her shoulder. The statue is 3 feet 4 inches in height.

XXI.—NIMSAR, OR NIMKAR.

356. *Nimsar* is a famous place of pilgrimage on the left bank of the *Gumti* (or Gomati) River, 45 miles to the north-west of Lucknow. The Brahmans derive the name from *Nimisha*, a "twinkling of the eye;" hence *Naimisha-saras*, or *Nimsar*, means the pool where in the twinkling of an eye the sage *Gaura-Mukha* destroyed the *Asuras*. The place is also called *Nimkhâr*, which is formed from *Naimisha*, pronounced *Naimikha*, and *aranya* a forest, which becomes *Naimikhâran*, and *Nimkhar*. The Vishnu Purâna declares that "he who bathes in the Gomati at *Naimisha* expiates all his sins." Its popularity is therefore very great. It is noticed in the Ayin Akbari as "a famous large fort, with a great number of idolatrous temples, and a reservoir." This reservoir is called the *Chakra-tirtha*, and is said to be the place where the *Chakra*, or "discus," of Vishnu fell during the contest with the Asuras. The shape of the pool is nearly hexagonal with a diameter of 120 feet. The water springs up from below and flows out by the south side into a swampy rill about 20 feet broad called the Godâveri Nala. The pool is surrounded with a number of shabby brick temples and *Dharmsálas*, and though the water is clear, yet the place looks dirty and uninviting.

357. The fort of *Nimsar* is situated on a precipitous mound to the north of the holy pool, about 1,100 feet long, from east to west, between 300 and 400 feet broad, and 50 feet high. The west end is a high cliff called the *Shah Búrj*, or King's Tower, which overhangs

the Gumti. The gate of the fort, which is at the east end, is arched and therefore of Muhammadan construction. But it is built of Hindu materials, partly brick and partly *kankar* blocks, which betray their origin by their carvings and by the presence of the *Swastika* symbol, or mystic cross. The walls were originally of brick, but they have long ago disappeared, and the only parts of the old fort now standing are the gateway and the *Shah Bûrj*. The foundation of the latter is, however, of Hindu construction, and as there are many carved bricks lying about, I presume that it was a temple. The fort is provided with a well $8\frac{1}{2}$ broad and $51\frac{1}{2}$ feet deep to the water level.

358. The tradition of the place is that the building of the fort was finished on Friday, the 9th of the waxing moon of *Chaitra*, in the *Samvat* year 1362, or A. D. 1305, by *Hâhâjâl*, a renegade Hindu, who is said to have been the Vazir of *Ala-ud-din Ghori*. For Ghori we must read *Khilji* to bring the King's name into agreement with the date, and as the people are in the habit of styling all the Pathans as Ghoris, the alteration is perfectly allowable. But who was *Hâhâjâl*? As a renegade Hindu and the Vazir of Ala-ud-din, he might perhaps be the same person as *Kafûr*, who in A. D. 1305 was appointed as Malik Naib to the command of the army for the conquest of the Dakhan. I procured several of Ala-ud-din's coins at Nimsar, and in his reign I conclude that the fort passed from the hands of the Hindus into those of the Musalmans. The original fort is said to have been as old as the Pândus; and if the derivation of the name of the place has been truly handed down, it must have been occupied even earlier than the time of the Pândus.

XXII.—BARIKHAR, OR VAIRATKHERA.

359. *Barikhar* is the name of a village on the top of an extensive old mound called *Vairâtkhera* which is situated on the high road between Nimsar and Pilibhit, at 42 miles from the former, and 68 miles from the latter place. *Barikhar* is said to be a corruption of *Bariya-khera* or *Vairât-khera*, and its foundation is attributed to *Vairât* Raja in the time of the Pândus. The ruined mound is 1,000 feet in length at top from east to west, by 600 feet in breadth, and from 16 to 20 feet in height. But the dimensions at the base are much more, as the slope is very gentle, being 200 feet in length on the north side, where

I measured it. This would make the base of the mound about 1,400 feet, which agrees with the size of 50 *bigahs*, or 1,400,000 square feet, which is popularly attributed to it by the villagers themselves. But the fields are strewn with broken bricks for upwards of 1,000 feet to the northward, and for 500 or 600 feet to the eastward, where there are the remains of several temples. The area actually covered by ruins is not less than 2,000 feet square, or upwards of $1\frac{1}{2}$ mile in circuit, which shows that Barikhar must once have been a good sized town, but I strongly doubt the story of the Brahmans which attributes its foundation to Vairât Raja. The name is written by the people themselves *Badishar* बड़ीषर , although it is pronounced *Barikhar*, and I believe that similarity of sound alone has led to the identification of Barikhar with Bariyakhera and Vairât Raja.

XXIII.—DEORYIA AND DEWAL.

360. I couple these two places together, because they actually form parts of the old nameless capital of the *Bâchhal* Rajas, who ruled over Eastern Rohilkhand and Western Oudh before the time of the *Katehriyas*. Dewal itself is a small village, which has received its name from a temple in which is deposited a very perfect inscription dated in *Samvat* 1049, or A. D. 992. The opposite village is called *Ilâhâbâs* by the Muhammadans, but this name is scarcely known to the people, who usually call it *Garh-Gâjana*. The inscription is chiefly remarkable for the clean and beautiful manner in which the letters have been engraved; and its perfect state makes it the more valuable, as it furnishes us with a complete specimen of the alphabet of the *Kutila* character, in which it is said to be engraved. James Prinsep gave a specimen of the characters, along with a translation of the inscription, in the Asiatic Society's Journal for 1837, page 777. But the copy from which he framed his alphabet was made by hand, and although it is wonderfully accurate as a mere transcript of the words, yet it is very faulty as a copy of the individual letters. This is the more to be regretted, as the alphabet thus framed from an inaccurate copy has become the standard specimen of the *Kutila* characters. Now, the term *Kutila* means "bent," and as all the letters of the inscription have a bottom stroke or tail, which is turned, or "bent," to the right, I infer that the alphabet was named *Kutila* from this

peculiarity in the formation of its letters. But this peculiarity was unnoticed by the original transcriber, and consequently the print types of the Kutila characters, which have been prepared both in Germany and in England, are entirely wanting in this special characteristic which gives its name to the alphabet. The letter *l* and the attached vowels are perhaps the most faulty.

361. The village of Dewal is situated 16 miles to the S. S. E. of Pilibhit, on the west bank of the *Kau*, or *Katni* Nala. There are two or three plain brick rooms which are called temples, and in one of these the inscription is deposited; but it is said to have been found amongst the ruins of *Garh-Gâjana*, or Ilâhâbâs, on the opposite bank of the stream. Garh-Gâjana is a large ruined mound, about 800 feet square, which includes two small tanks on the east side; but although it is called a *Garh*, or fort, it was most probably only the country residence of Raja Lalla, who founded it. The small modern village of Ilâhâbâs is situated close to the south-east corner of Garh-Gâjana, and near it on the south side are the ruins of a very large temple, amongst which the inscription is said to have been discovered. The figure of the Varâha Avatâr of Vishnu, which is now in the *Dewal* temple, was found in the same place. The mound of ruins is 200 feet square at base, but the walls of the temple are no longer traceable, as the bricks and kankar blocks have been carried away by the villagers. I traced the remains of at least six other temples around the principal mass of ruin, but there was nothing about them worth noting. To the south there are two larger mounds, which appear to be the remains of an old village.

362. The *Kau* or *Katni* Nala continues its course to the south for three miles, until opposite the large village of Deoriya, when it turns sharply to the east for two miles, to the south end of a large ruined fort which is now called *Garha-Khera*, or the "fort mound." The Katni Nala here turns to the north, and, after running round the three other sides of the ruined fort, returns to within a few hundred yards of the point from whence it took its northerly course. It thus forms a natural ditch to the old stronghold of the Bâchhal Rajas, which is only approachable on the southern side. The fort has been deserted for many centuries, and is covered with dense jungle, in which several tigers have been killed within the last few years. A single cart track

leads to the nearest portions of the ruins, which have afforded materials for all the buildings in the large village of Deoriya. The exact extent of the fort is not known, but the position enclosed by the Katni Nala is about 6,000 feet in length from N. W. S., and 4,000 feet in breadth, and the fort is said to be somewhat less than half a *kos*, or just about half a mile in length. The bricks are of large size, 13 by 9 by 2 inches, which shows considerable antiquity, but the statues of kankar are all Brahmanical, such as the goddess *Devi*, *Siva* and his wife, as *Gauri-Sankar*, and two *arghas* of *lingams*. These figures are said to be discovered only in the foundations of the buildings, which, if true would seem to show that the existing remains are the ruins of Muhammadan works constructed of Hindu materials.

363. The Katni Nala is an artificial canal drawn from the *Mâla* river near *Sohâs*, 10 miles to the south-east of Pilibhit, and 6 miles to the north of Dewal. Its general course is from north to south, excepting where it winds round the old fort of *Garha-Khera*, after which it resumes its southerly course and falls into the *Kanhaut* Nala, about 3 miles to the south of the ruins. Its whole course is just 20 miles in length. All the maps are wrong in giving the name of Katni Nala to the *Mâla* river, instead of to the artificial canal which joins the *Mâla* and *Kanhaut* rivers. The canal varies in width from 30 and 40 feet to 100 feet, and even more, at the places where it is usually forded. Its very name of *Katni* Nala, or the "cut stream," is sufficient to prove that it is artificial. But this fact is distinctly stated in the inscription, which records that Raja Lalla "made the beautiful and holy *Katha-Nadi*." That this was the *Katni Nala*, which is drawn from the Mâla river, is proved by the previous verse, which records that the Raja presented to the Brahmans certain villages "shaded by pleasant trees, and watered by the *Nirmala Nadi*." This name is correctly translated by James Prinsep as "pellucid stream," which though perfectly applicable to the limpid waters of the *Mala* river, is evidently the name of the stream itself, and not a mere epithet descriptive of the clearness of its waters. And as the canal was drawn from the Nirmala River, so that villages on its banks are correctly described as being watered by it.

364. The inscription goes on to say that Raja Lalla and his wife Lakshmi "made many groves, gardens, lakes, and temples." Prinsep

has given the last as "many other extensive works," but the term in the original is *devalayataneshu cha*, "and temples," *devalaya* being one of the commonest names for a temple of any kind. In the 27th verse the great temple to which the inscription was attached is said to have been dedicated to *Siva* by the Raja, while the Queen built another fane to Pârvati. In the next verse they are described as "two divine temples" *(sura-griha)*; and in the 32nd verse it is stated that the god and goddess were worshipped together under the title of *Devapalli*. This then must be the origin of the name of *Dewal*, and the great temple mound to the south of *Garh-Gâjana* must be the remains of the two temples dedicated to *Devapalli*.

365. In the inscription Raja Lalla calls himself the nephew of *Mâns Chandra Pratâpa*, and the grandson of *Vira Varmma*, who is said to be of the race of *Chhindu* and descended from the great Rishi *Chyavana*. This holy sage is mentioned in the Vishnu Purâna as having married Sukanyâ, the daughter of Saryâti, the son of Manu. He is also noticed in the Bhagavata and Padma Puranas, as appropriating a share of the marriage offerings to the Aswini Kumâras, which entailed the quarrel with Indra, that is alluded to in verse 4 of the inscription. The family therefore was reputed to be of ancient descent; but if Vira Varmma, the grandfather of Lalla, was the first Raja, the establishment of the dynasty cannot be dated earlier than A. D. 900. Now the *Bâchhal* Rajputs claim descent from Raja *Vena*, whose son was *Virât*, the reputed founder of Barikhar or *Virat Khera*, and whom I believe to be the same as Vira Varmma of the inscription. To Raja *Vena*, or *Ben*, is attributed the erection of the great forts of *Garha-khera*, and *Sâhgarh*; and to his queen, *Ketaki Râni*, is assigned the excavation of the *Râni Tâl* at the old town of *Kâbar*. *Garh Gâjana* and the temples of Dewal were built by Raja Lalla. The town and fort of *Maraori* are attributed to *Moradhwaj*, and *Barkhera* to *Harmal* Raja; but neither of these names appears in the very imperfect and scanty list of their family which the *Bâchhals* now possess.

366. It is admitted by every one that the *Katehriyas* succeeded the *Bâchhals*, but the *Katehriyas* themselves state that they did not settle in *Katehar* until *Samvat* 1231, or A. D. 1174. Up to this date therefore the *Bâchhal* Rajas may be supposed to have possessed the

dominant power in eastern Rohilkhand beyond the Râmgangâ, while western Rohilkhand was held by the *Bhûdar*, *Gwâlâ*, and other tribes, from whom the Katehriyas profess to have wrested it. Gradually the *Bâchhals* must have retired before the *Katehriyas*, until they had lost all their territory to the west of the Deoha or Pilibhit river. Here they made a successful stand, and though frequently afterwards harried by the Muhammadans, they still managed to hold their small territory between the Deoha river and the primeval forests of Pilibhit. When hard pressed, they escaped to the jungle, which still skirts their ancient possessions of *Garh Gâjana* and *Garha Khera*. But their resistance was not always successful, as their descendants confess that about 300 or 400 years ago, when their capital *Nigohi* was taken by the King of Delhi, the twelve sons of Raja *Udarana*, or *Aorâna*, were all put to death. The twelve cenotaphs of these princes are still shown at *Nigohi*. Shortly after this catastrophe *Chhavi Rana*, the grandson of one of the murdered Princes, fled to the *Lakhi* jungle, where he supported himself by plundering; but when orders were given to exterminate his band, he presented himself before the King of Delhi, and obtained the district of *Nigohi* as a *jâghir*. This place his descendant Tarsam Sing still holds, but the *jâghir* is reduced to the town of Nigohi with a few of the surrounding villages.

367. The *Gotrâchârya* of the *Bachhal* Rajputs declares them to be *Chandravansis*, and their high social position is attested by their daughters being taken in marriage by Chohâns, Râhtors, and Kachwâhas. According to Sir H. Elliot, Bâchhal Zemindars are found in the districts of Aligurh and Mathura, as well as in Budaon and Shahjahanpur of Rohilkhand. But the race is even more widely spread than the Gangetic Bâchhals are aware of, as Abul Fazl records that "the port of Aramray (in the Peninsula of Gujarât) is a very strong place inhabited by the tribe of Bâchhal." Of the origin of the name nothing is known, but it is probably connected with *bâchhnâ*, to select or choose. The title of *Chhindu*, which is given in the inscription, is also utterly unknown to the people, and I can only guess that it may be the name of one of the early ancestors of the race.

XXV.—BALAI KHERA.

368. *Baliya*, or *Balai Khera*, is a large ruined mound about 1,200 feet square, or nearly one mile in circuit, and not less than 20 feet in

height at the southern end. The mound is situated close to the Muhammadan town of *Jahânâbâd*, which is just 6 miles to the westward of Pilibhit. It is covered with broken bricks of large size, and from its square form I infer that it must once have been fortified, or at least walled round. Near the south-east corner there is a very old banyan tree, and the ruins of a brick temple. To the west there are two tanks and six ruined heaps which are said to be the remains of temples. There is nothing now standing that can give any clue to the probable age of the town, as the bricks are removed to *Jahânâbâd* as soon as they are discovered. But the large size of the bricks is a proof of antiquity, which is supported by the traditions of the people, who ascribe the foundation of *Balpur* or *Baliya* to the well known Daitya, or demon, named *Bali*.

XXVI.—PARASUA KOT.

369. Four miles to the westward of Balai-Khera there is a long lofty mound lying east and west called *Parasua-kot*, which is said to be the ruins of a temple and other edifices that Bali Raja built for his *Ahir* servant, named Parasua. The mound is about 1,400 feet long, and 300 feet broad at base, with a height of 35 feet at its loftiest point near the eastern end. On this point there are the brick foundations of a large temple, 42 feet square, with the remains of steps on the east face, and a stone *lintel* or door step, on the west face. I conclude therefore that the temple had two doors, one to the east and the other to the west, and as this is the common arrangement of *lingam* temples, it is almost certain that the building must have been dedicated to Siva. Towards the west, the mound gradually declines in height, until it is lost in the fields. Forty feet to the west of the temple there are some remains of a thick wall which would seem to have formed part of the enclosure of the temple, which must have been not less than 130 feet square. Five hundred feet further west there are the remains of another enclosure, 100 feet square, which most probably once surrounded a second temple, but the height of the ruins at this point is more than 16 feet above the ground. Although the *Parasua* mound is well known to the people for many miles around, yet there are no traditions attached to the place save the story of *Parasua*, the Ahir, which has already been noticed. When we consider that a temple 42 feet square

could not have been less than $3\frac{1}{2}$ times its base, or 147 feet in height, and that its floor being 35 feet above the ground the whole height of the building would have been 182 feet, it is strange that no more detailed traditions should exist regarding the builders of so magnificent an edifice. I am of opinion that the temple must have been the work of one of the earlier *Bachhal* Rajas, but unfortunately the records of this race are too imperfect to afford any clue to the ancient history of the country.

XXVII.—KABAR, OR SHIRGARH.

370. The old town of *Kâbar* is situated on a lofty mound, 20 miles to the north of Bareli, and 26 miles to the west of Pilibhit. The ruins consist of a circular mound, 900 feet in diameter and 25 feet in height, which is still surrounded by a deep ditch from 50 to 100 feet in width. This was the old fort of *Kâbar* in the time of the Hindus, and there are still some remains of the walls of a large oblong building on the top of the mound, which the people say was a temple. The old city, which surrounded the fort on all sides, is now divided into four separate villages, called *Kâbar*, *Islâmpur*, *Dongarpur*, and *Shirgarh*. All these are situated on old mounds which are nearly as lofty as the fort mound itself. The place is usually called *Kâbar* by the Hindus, and *Shirgarh* by the Musalmans. It is said to have been taken from the Hindu Rajas 550 years ago, or in A. D. 1313, during the reign of Ala-ud-din Khilji. Falling again into the hands of the Hindus after the death of Firuz Tughlak, it was again captured by Shir Shah, who built the fort of *Shirgarh* to the south of the old fort, for the purpose of keeping the townspeople in check. To the south of Shirgarh there is a fine tank, called *Khawâs-Tâl*, which no doubt belongs to the same period, as Khawâs Khan was the name of Shir Shah's most trusted General. That portion of the town, called Islâmpur, is said to have been built by Islam Shah, the son of Shir Shah, but it was more probably only re-named by Khawâs Khan in honour of his master's son, during the lifetime of Shir Shah himself. On the north side there is a shallow sheet of water called the Râm Sâgar, and on the north-west there is an old tank called Râni Tâl, which is attributed to Ketaki Râni, the queen of Raja Ben, the founder of the dynasty of *Bâchhal* Rajputs. The extreme length of the whole mass of ruins from east to west is 3,500 feet, and the breadth 2,500 feet, the complete circuit being 9,800

feet, or nearly 2 miles. The long continued Muhammadan occupation of five centuries has most effectually swept away all traces of Hinduism; but old coins are occasionally found, of which a few belong to the later Hindu dynasties of the ninth and tenth centuries. From the great size of the place, as well as from its evident antiquity, I should have expected that very old Hindu coins would occasionally be found; but all my enquiries were fruitless, and the only actual traces of Hindu occupation that I could hear of were two small stone figures, of which one was a representation of Durgâ slaying the Mahisâsur, or "Buffalo-demon," and the other a broken statue of some god which was too much injured to be recognized.

Notes on Boodh Gya.—By C. Horne, *Esq., C.S.*

[Received 24th April, 1865. Read 7th June, 1865.]

During the holidays, October and November, 1864, I had an opportunity of carefully studying the great Tope at Boodh Gya, relative to which interesting remains of the past there would seem to have been considerable discussion between modern archæologists.

The subject of the said discussions, whilst referring to the age of the tope itself, relates more particularly to that of the arches, both pointed and semicircular, found in and near the said tope.

These arches are some of them built of stone, but the greater part are of brick; and they are all constructed on the radiating principle with external faces of truncated wedges or "voussoirs"—the bricks used in their construction being set on edge and of the description commonly termed Buddhist, their dimensions being either $13\frac{1}{2}'' \times 9'' \times 2\frac{1}{2}''$ or $15\frac{1}{2}'' \times 10\frac{1}{2}'' \times 3$.

There are in all no less than nine (9) of these arches, of which 3 are semicircular and 6 pointed.

But before proceeding farther with my account of them, it will be well to describe as briefly as possible the interior construction of the tope, offering at the same time a few remarks as to its antiquity, as thereby we may be able to infer whether the art of arch-building (radiating, not horizontal) was known to those who built the structure

in which the said arches occur, or whether they may not have been subsequently inserted.

Genl. Cunningham, in his excellent Archæological Report for 1861-62, assigns A. D. 500 as the date of the building of the present tope or temple, and names Amara Sinha as the builder.

He also works out the same date from a certain inscription once said to have been therein found, and which he holds to be authentic.

His arguments from the latter source appear to me to have been fully met and set aside by Baboo Rájendralála Mitra in his paper on Boodh Gya in 1864, which was read before a meeting of the Bengal Asiatic Society, and in which he shews that Sir Charles Wilkin's* inscription, in which the virtues of a shraddh performed here are much extolled—cannot be historically true, and also that the partial silence of Fa Hian, the great Chinese traveller in A. D. 400, does not prove the non-existence of the said tope at that time—the more so as Fa Hian speaks in Chap. XXXI of a great tower having been erected at the place where Foe (Buddha) obtained the law, i. e. under the Bo tree at Boodh Gya.

Fergusson (p. 109, Vol. I) states the earliest authentic Hindu building to date A. D. 657, and in allusion to the great tope of Boodh Gya, which it is doubtful whether he ever visited, says to the effect that "the temple of Boodh Gya is certainly Buddhist—was built in the 14th century A. D. — is a square Hindu Vimana and a true 'stupa' as it never possessed any relic."

Montgomery Martin, in his account of Eastern India, alludes to Asoka as being the reputed founder of the temple, and doubts the authenticity of Amara's inscription, as does also Buchanan Hamilton.

It will thus be seen that the age of the building and of the arches are both open questions.

And now, a few words as to the age of Hindu or Boodhist buildings:—

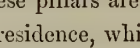
Fergusson says—pages 4-5, Introduction.—"It is of more importance to our present purpose that with this king (Asoka) B. C. 250, the architectural history of India commences; not one building, nor one sculptured stone having yet been found in the length and

* That above alluded to.

breadth of the land, which can prove to date before his accession. From his time, however, the series of monuments, some monolithic, some rock cut, and others built, are tolerably complete during the 10 or 12 centuries in which Boodhism continued to be a prevalent religion in the country of its birth."

Again p. 129, he says, "Indian architecture began about 250 B. C., with a strong admixture of Grecian, or at least of Western art, as if the Indian was then first learning from foreigners an art they had not previously practised; but this extraneous element soon died out, and is not again to be traced, except perhaps in Cashmere where it seems to have long remained in force."

The inscriptions in the sculptured pillars or rather the carving on the Boodhist railing posts, which these pillars really are, remind one of Bhilsa. They are in fact, identical.

Genl. Cunningham, in describing them, says—"A few of them have an inscription in the ancient Pali character of Asoka's pillars  , 'Ayaya Kudrangiye danam' i.e. Gift of the venerable Kudrangi." This is 5 or 6 times repeated.

Now these pillars are of granite and placed in the quadrangle of the Mohunt's residence, whilst those at the tope itself, discovered by Capt. Mead subsequently to Genl. Cunningham's report, are all of the same character, so that his remark to the effect that the first named "cannot be of much later date than Asoka's" will apply equally to those last spoken of. They, moreover, appear "in sitû" and if so, argue the existence of the tope and of a Bo tree when they were placed around them.

It should also be borne in mind, that within a few miles we have the rock cut temples of the Barabur, Nagarjuni Hills, relative to the date of the excavation of which, the inscriptions borne by them leave no doubt.

The dates of some of these vary from 250 to 230 B. C., or the time of Asoka.

We might also argue from the bricks used, did I not hold this to be a very uncertain test of age. Their bluish tinge remarked upon by Hwen Thsang is very remarkable, as such a tinge is not common, and the bricks used in the great tope decidedly possess it.

I in vain sought for any mason marks; but their non-existence may

be accounted for by the very small quantity of stone used in or about the building.

From what has been before stated I am led to assign a far greater antiquity to the great tope at Boodh Gya than has been hitherto generally done.

I am of opinion that the temple existed from before the Christian era, when the railing stood around it—say from 200 B. C.; but that it has often been repaired, and once thoroughly renewed by Amara Sinha, most probably about 500 A. D.

I, however, hold that the shell of the building has remained as at first constructed, with alterations to be hereafter pointed out. If this be the case, it would, together with perhaps the remains of some Boodhist Monasteries, be one of the oldest buildings we have in India.

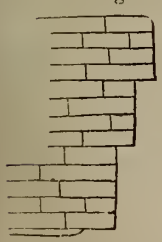
The general external form differs considerably from ordinary Hindu Vimanas, being much more perpendicular; but the system under which it was built allows of great variety of outline.

The tope is exteriorly about 50 feet square at the base, with an original interior diameter of 20 ft. The walls are about 8 ft. thick to a height of perhaps 60 feet, and the rest is made up by a masonry terrace rising from 25 to 30 feet.

The thickness of the upper part, i. e. from the springing of the curve to the crown, varies from 7 feet to much less at the top.

There has been an opening left at the top* apparently about 6 ft. square, which is at present covered in with beams of Saul wood, and upon this is built a tope-like pinnacle which in its entirety probably reached to 25 feet, including the thickness of the pucka roof over the beams.

Ceilings.



The square basement walls have been stated to rise about 60 ft., whilst the interior height of the curved part may also be from 60 to 70 feet. The whole interior I believe to have been originally without intermediate ceilings.

This curved part is built on the system called in Bengal "Lehra" i. e. of over-lapping bricks. In this instance I counted 52 of these laps, each projecting from 3 to $4\frac{1}{2}$ inches.

* Query, whether this was so originally?

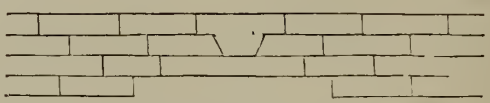
The lowest 12 laps were made after the placing of 4 bricks perpendicularly, making a height for each such set of bricks of 9 inches only. Then there came 16 laps, over 5 inches similarly laid and measuring 13 inches in height, whilst again above them came 24 laps over courses of 4 bricks as at first.

I had hoped to be able to calculate the height accurately in this manner, having with me no means for measuring so great a height; but I imagine the laps got less at the top and the height assigned has therefore only been approximately ascertained. This system of "Lehra" still exists in Orissa. Mr. Armstrong, the assistant to Mr. Shore, Commissioner, has obligingly sent me a drawing of a long draw-bridge of more modern construction at Jajipore near Balasore.

Part of an opening in Jajipur drawbridge.

The openings thus covered are said to be from 8 to 15 feet. The space at Boodh Gya is about 20 feet. At the temple of Kooch Behar, is an excellent example, and it seems to have been universal throughout Eastern Bengal.

Capt. Austen informs me that in Cashmere this "Lehra" is very neatly tied with a ⊤ stone.



Cashmere Lehra.

The arrangement above described holds good as regards the north, south and west sides of the temple; but on the east, the front wall is pierced with two large openings, the one over the other, and above these in the curved part are two "Lehras" or horizontal arches running east and west in the thickness of the said wall.

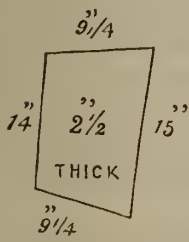
The upper one, which is closed outwardly, was doubtless made to lighten the weight of masonry over the entrance, and both shew plainly that when they were constructed, i. e. at the same time as the original building, the architects of the same, did not know how to build a true arch. The temple at Kooch is similarly constructed.

The lower one which runs through was probably arranged so as to throw the eastern sun-light, at a particular hour, on the figure of

Boodha, which was on the "Singhasun" or throne to the west, and thus lighted the building dimly from over the entrance door-way, as I have observed to be the case in other ancient Buddhist edifices and which has also been remarked upon by Fergusson.

We now approach the arches and arched chambers which have led me to put pen to paper.

In what must have originally been the thickness of the terrace, or what was a projecting porch ere the terrace was raised, we find a ruined pointed arched chamber built with bricks set on edge, the said bricks having been carefully dressed. Their size $15\frac{1}{2}'' \times 10\frac{1}{2}'' \times 3''$.



This must evidently have been built round a centering of some kind. The diameter of the arch is $13\frac{1}{2}$ feet and the marginal sketch shews one of the bricks taken from the haunch of the broken arch.

This porch is at present entered by a square door-way built of odd stones, with a long stone serving as an architrave.

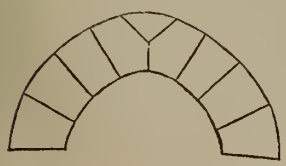
Immediately on entering, there are to the right and left small door-ways covered with semicircular arches in stone, under which there is a flight of steps leading to the terrace above.

These arches are built radiating and of regular "voussoirs" or truncated wedges, and are manifestly of far more recent date than the rest of the building. In fact they would appear to have been built at the same time as the structure called by Genl. Cunningham Amara Sinha's archway.

This archway is evidently the entry to the modern courtyard before the great tower, and runs east and west.

It is built of somewhat smaller bricks than are elsewhere used, set on edge and without any special facing. Its depth, as far as my memory serves, is about 12 feet, and it looks quite modern.

On the top of the flight of steps to the left (or south) is another archway similar to the one below it, and dating probably with the terrace to which it leads.



In the base of the tower is an arched room, approached from the ruined arched

portico before described, by an arched door-way only 5 feet wide. This is faced, as shewn on the preceding page, with Boodhist bricks regularly cut, and is probably built internally of bricks on edge, and has been constructed on a centering, as has the inner room to which it leads.

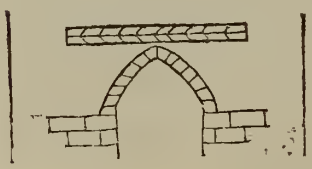
This arched room is $16\frac{1}{2}$ feet wide; the difference between this and 20 feet, which I have stated to have been the original internal width, being occupied with a lining of brick on which the arching rests.

For 12 feet in height the walls north and south are straight—at this point there is a small cornice whence the arch springs, the said arch being evidently built brick on edge.

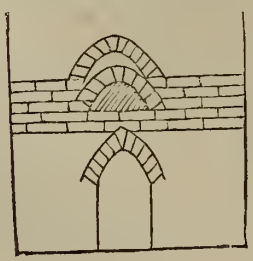
The whole of the walls to the north and south, as well as the roof of the arching, is plastered white with a chess board pattern, in each square of which is painted in a reddish colour a sitting Boodh. There must thus be many thousands of these figures, now however, much obliterated by the hand of time.

The total height of this chamber may be 20 feet, and adding 4 or 5 feet for the thickness of the flooring of the upper room and of the arch, the story may be allowed to count as 25 feet.

Before ascending to the terrace, I would observe that the "Singhasun" or throne where the figure of Boodha was placed, is still left as arranged at the last restoration (probably 500 A. D.) and there are still the holes in the stones, which were formerly filled by the rivet affixing gilt copper plates.



Over the doorway and above the arch of this basement chamber is inserted in the wall a huge beam of Saul wood, evidently of great antiquity and to which allusion will be made hereafter.



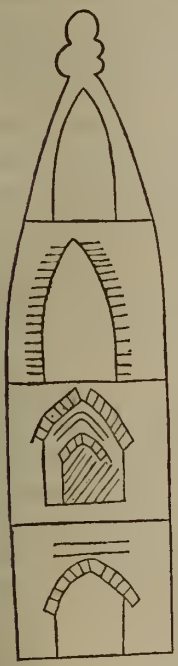
Ascending to the room above, we find a repetition of the lower arched chamber without the end of semicircular arched recess, and with no less than three arches at the entrance within one another, and all of the same character. The marginal sketch taken from a photograph shews these, and it is difficult to understand their object.

This chamber, the floor of which is at about the level of the terrace, may probably have had before it an open porch; but all traces of this would have disappeared with the falling in of the arched roof below.

I have before alluded to the extraordinary opening—or horizontal arch on the overlapping or Lehra principle as existing in the story above this.

By the aid of ladders and bamboos obligingly furnished me by the Mohunt, I with considerable difficulty got within this, and found the floor to be about 55 feet from the ground, and that within it, on all sides, there was a space of about 5 feet of upright wall before the springing of the curve, and that this bit of wall was plastered!

This room might have been entered from the roof of the porch above suggested; but was evidently not used for any purpose.



Rough plan shewing general elevation.

The open arch extends just half way in the height. Another similar arch, but closed externally, stands upon it as shewn marginally, and it is very curious that the open arch above mentioned should have been left in its singularly unfinished condition. The temple at Kooch, however, displays the same peculiarity.

I have now at some length described the arches at Boodh Gya, relative to which Bábu Rájendra-lála Mitra notes, (p. 4,) that when he brought the fact of their existence to the notice of Capt. Mead, Executive Engineer, who was shewing him through the ruins—"He readily acknowledged that the builders of the temple, whoever they were, certainly knew the art of constructing an arch, and the one before them was a very good specimen of it."

The first thing that strikes an observer, when looking at the great tower from a little distance, and it is clearly seen in the photographs of Boodh Gya kindly prepared for me by my companion, Mr. Peppe of Gya, is, that the whole of the arch arrangements are a subsequent insertion and formed no part of the original building.

In fact, together with the arched, plastered and painted chamber, they may and probably were all erected by Amara Sinha, when he thoroughly restored the temple.

The enormous thickness of the walls and the goodness of the mortar would allow of large breaches being made with impunity; whilst the insertion of the great beam over the lowest arch gives colour to this theory. The two interior arched chambers, with the semicircular recessed end of the lower, appear to me to have been subsequently put in. The plaster of the upright wall on the inside above the flooring of the upper room shews how the other work would seemingly have been built on to it.

The outer plastering also, when removed from the capitals of the little columns in relief, shews ornamental work below of a very primitive type: whilst the original brick-work is substantial in the extreme.

The entrance to the basement of the tower was doubtless a somewhat narrow, but extremely lofty rectangular doorway with stone jambs and a stone architrave. If this were the case, the insertion of an arch were extremely easy, and this would correspond with the—in many points similar—temple of Kooch.

The only difference is that the last named temple is smaller—hence many inferences may be drawn therefrom as it was probably a copy of the great tower.

I would, therefore in conclusion, with great deference suggest that the arches are all of them of the date of Amara Sinha, or about 500 A. D., whilst the original building dates back perhaps to 200 B. C.

The country around Boodh Gya, as it is well known, is studded with Boodhist remains of every age, which would well repay careful study, and I shall be very glad if these notes provoke others, as those of Bábu Rájendralála Mitra did me, to make a pilgrimage to this very ancient and interesting district which has never yet been explored, except in the most partial manner.

April 20th, 1865.

[Received 6th May, 1865.] [Read 7th June, 1865.]

P. S.—The junction of the inserted work with the original is clear every where. The floor of the upper chamber comes through the wall of the building, i. e. the beaten pucka floor line shews a white line, most plain in the photograph. At the sides too the insertion is most plain. The use of different sized bricks in the different arches, whereas those in the body of the building are all the same, would indicate their having been built at a different date, which most probably was long subsequent.

Nothing in the foregoing paper refers to other structures (excepting to a few temples in Eastern India)—and I am well aware that, as it has been clearly shewn that the radiating arch was known to the builders of the Pyramids, Nineveh, and other very ancient structures, the art of building such arches may have been acquired by travelled Indians; still I am decidedly of opinion that the builders of the original tower of Boodh Gya were not acquainted with the art of constructing a radiating arch, however well they may have constructed them on the horizontal principle."

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VOL. XXXIV.

PART II.

Nos. I. to IV.—1865.

EDITED BY

THE NATURAL HISTORY SECRETARY.

"It will flourish, if naturalists, chemists, antiquaries, philologers, 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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INDEX II.

New Genera and species described in this Volume.

ERRATA.

Page 135, seq. for "Notes of a trip up the Salween" read "Notes of a trip in the Yoonzalin District."

„ 273, below M. variabilis for "could" read "would" for "3-1" read "var. 1st."

„ 274, for "naticordes" read "naticoides" for "notest" in last line, read "subest."

„ 276, for "it is not larger," read "it is not only larger."

„ 277, for "armed" read "wound." For "cryptosonea" read "cryptosoma." For "in species with new" read "two species, both new."

„ 278, "Diplommatina 4" read "Diplommatina 5."

JOURNAL

OF THE

ASIATIC SOCIETY.

PART II.—PHYSICAL SCIENCE.

No. I.—1865.

Notes of a tour made in 1863-64 *in the Tributary Mehals under the Commissioner of Chota-Nagpore, Bonai, Gangpore, Odeypore and Sirgooja.—By* LT.-COL. T. DALTON.

[Received 2nd September, 1864.]

Bonai is a small hilly district lying very snugly isolated from all civilization, between Sarundah the wildest part of Singbhoom and the Tributary Mehals of Keonjhur, Bamra, and Gangpore. It is 58 miles in greatest length from east to west and 37 miles in greatest breadth from north to south, with an area of 1,297 square miles. It is for the most part a mass of uninhabited hills, only $\frac{1}{12}$th of the whole being under cultivation, but about its centre, on both banks of the Brahmini river, which bisects it, there is a beautiful valley containing the sites of upwards of twenty good, and for the most part coterminous villages, the houses well sheltered by very ancient mango and tamarind trees, with a due proportion of graceful palms. The tâl and date appear to grow very luxuriantly in the valley, and sugar-cane thrives there. Many of the villages lie close to the river and their luxuriant groves meet and form long undulating lines of high and well-wooded bank. On all sides, at the distance of a few miles, are hills, some nearly three thousand feet above the level of the valley, and thus a very pleasing and varied landscape is disclosed at every turn of the broad and rapid rock-broken stream.

The Brahmini river in its progress from Gangpore has forced its way through the barrier of hills separating the two districts, and enters the valley I am describing, after a course of eight miles through a beautiful glen, in a succession of rapids and loughs, the latter swarming with alligators. The shortest route from Gangpore to Bonai is by a rugged path through this pass ; but is only practicable in the dry weather.

Bonaigurh, where the Rajah resides, is in the valley, occupying a bend of the river in latitude 28° 49′ N. and longitude 85° E., being 508 feet above the sea level. It has the river on three sides, and is surrounded by a mud wall and moat, within which are about 150 houses, including those of the chief, his court-house, and jail : the village altogether, inside and outside the gurh, contains about 300 houses, but nothing that can be called a bazar. The inhabitants are the Brahmins and other retainers of the Rajah ; his own family, including most of the collateral branches, legitimate and illegitimate ; people practising trades—workers in brass and pewter, potters, weavers, smiths ; and people of low caste, Gonds, Pahans, Ghassees and Domes. Ooriah is the language spoken, and the costume and customs followed are those of the Orissa provinces. This includes a lavish use of saffron in their ablutions, hair neatly dressed with silver ornaments, and a general tidy appearance. They have good features and rather fair complexion. The young girls, till they attain the age of puberty, are very scantily dressed. The only garment usually worn by them is a " kopin"—a scarf, round the loins and between the legs. This is national and classical, as we find from the images of the oldest temples, that it was the favourite costume of the Hindu goddesses, who thus enjoyed the full play of their limbs. The young people of both sexes are fond of adorning themselves with wreaths of bright yellow flowers.

There are 217 inhabited villages in Bonai, and from the number of houses returned by the topographical survey recently completed, the population may be estimated at fifteen thousand six hundred souls. About one half of the agricultural population is of the " Bhooya" caste or race. They are doubtless the earliest settlers, and it was from their hands that the ancestor of the present Rajpoot Rajah first obtained his insignia as chief. The Bamra and Gangpore Rajahs are reported to have in the same manner derived their chieftainships from

the Bhooya aborigines, and when a succession to the Raj takes place in any of these districts, the acknowledged head of the Bhooya clan goes through a ceremony of making over to the new chief the country and the people. The person who claims this prerogative in Bonai is titularly called "Sawunt." He holds, at the very trifling quit-rent of Rs. 18 a year, twelve villages with their hamlets, and claims to be the hereditary Dewan of Bonai, but the chief neither employs nor acknowledges him as such. There are two other similar tenures with the titles of 'Dhunput' and 'Mahapater,' and subordinate to them are certain privileged heads of villages called Naiks. Under the Sawunt, Dhunput, or Mahapater, the subordinate officers of the Bhooya *militia*, —all the able-bodied males of the tribe are bound at the requisition of the chief or of the Government, to turn out for service fully armed and equipped. There are no military tenures in the hands of people of any other caste. The Bhooyas thus have great power in the little state. Nor is it only in consequence of their being thus organized as a military body; I find they have also charge of the oldest temples and shrines, and discharge the duties of Levites to the exclusion of Brahmins. Yet the temples are dedicated to Hindu gods. Whatever their origin may be, the Bhooyas are now completely Hindnized. They have no peculiar language or customs of their own. In Bonai and the southern parts of Gangpore they speak Ooriah. In the northern parts of Gangpore and Jushpore, Hindi. They are a dark-complexioned race, with rather high cheek-bones, but with nothing else in feature or form to distinguish them as of extraneous origin. According to their own traditions, they were once a great people in Eastern India and had a king of their own, but were dispersed by invasion from the west. They are now found in all the districts between Cuttack and Behar, but they are most numerous in this and the adjoining estates, and here may be found the most civilized and respectable and the most primitive of the family. While in the lowlands, they dwell in villages, clothe themselves decently, and otherwise follow the customs, adopt the manners, and, I may add, the intriguing nature of the more civilized Brahminical races. In the hills of Bonai they are found as naked, as simple, as truthful and unsophisticated as the wildest of the Cole tribes. There are a great number of Bhooyas in the Singbhoom district, and it is said that they were driven out of the west portion of it, by the advance and spread of the Lurka Coles.

The Bhooyas call themselves 'children of the wind' 'Pawun buns,' this would establish their affinity to the Apes, as Hunooman is called "Pawun-ka-poot," the son of the wind.*

The Bonai hills shelter some thousands of the race commonly called Coles, who all represent themselves as having at some period emigrated from Singbhoom or Chota-Nagpore. They have not benefited by the change. Their brethren on the Chota-Nagpore plateau and in the plains of Singbhoom are better off and better looking. The emigrants must be the most unimprovable of the race, who, finding that the old country is becoming too civilized for them, fly from the clearances they have made, hide themselves in the hill forests, and relapse into the condition of savages.

Amongst the races of Bonai yet to be noticed, are the Kolitas, a very enterprising and respectable class of cultivators, that are found in these regions, Sumbulpore, and strange to say, Assam.

A very large proportion of the purely Hindu part of the Assamese population are Kolitas, and in accounting for the different races that are found in that province, the antecedents of the Kolitas have always been a difficulty. They have none of the peculiarities of the Indo-Chinese stock. They are considered, in Assam, as of very pure caste, next in dignity to Kaists, and are on this account much in request amongst the higher classes as house servants. Another difficulty in Assam was to account for what was called the Bhooya dynasty, of which traces are found all through the valley, and it is recorded in their history, that the north bank of the Brahmapootra above Bishnath was known as the country of the Barra Bhooya, long subsequent to the subjugation of the districts of the southern bank by the Ahoms. It appears to me, that there is a strong reason for supposing that the purely Hindu portion of the Assamese Sudra population was originally from this part of India. There is, in idiom especially, a strong resemblance between the Assamese and Ooriah languages, and though the Ooriah written character did not take root in Assam, this may be owing to all the priestly families having been introduced from Bengal.†

* They very probably formed a division in Rama's army, hence their adoption of Hunooman's pedigree, and their veneration for "Mahabir."

† In a paper in the Asiatic Society's Journal for June 1848, the Assam Kolitas are described by Col. Hannay as having the high and regular features of the Hindu, and many of them with the grey eye that is frequently found amongst the Rajputs of Western India.

The appearance of the Bonai Kolitas reminded me very much of the Assam Kolitas, and I may mention that Ram Chunder, the seventh Avatar, is the favourite object of worship with both.

Of the mineral and other resources of Bonai, I have not much to say. Iron is produced, but the hills are for the most part quite unexplored, and their riches, if they possess any, unknown. The population, with so much room for expansion, does not increase. There are 83 deserted village sites, and what are now small hamlets appear to have been at one time large villages. The cause is not apparent, as the people of the more civilized class are well to do and content, and rent is very low, and as in all the Tributary Mehals, fixed. It is Rs. 2-8 for a hull of 17 khundees. Nevertheless the chief tells me he is obliged to grant all manner of extraneous indulgences to his ryots to induce them to remain.

Wild beasts are very numerous, and in their ravages lies one great difficulty that villages bordering on or in the jungles have to contend against—the ryots complain not of loss of life but of the destruction of crops. They say they have to raise grain for the beasts of the forest as well as for their own families. On this account very little cotton is cultivated, though the soil is well adapted for it.

The store of Sâl timber in Bonai is immense, but the isolated and almost inaccessible position of the forests will prevent their being utilized for years to come, except for the resin, to obtain which, so many noble trees are girdled and killed. Together with the Sâl, are found vast quantities of the Asan tree on which the tusser silk-worm feeds, and a considerable quantity of the wild tusser is exported from Bonai, but it is not much cultivated as the mass of the population look upon it as an impure or unorthodox occupation, and none but people of the lowest castes, the Domes, Ghassees, Pahans and Gonds practice it. (The Gonds are out of their element in Bonai and are thus classed.)

We meet with no Rajpoot or Khettree family except that of the chief. Nothing can be more absurd than the tradition handed down to account for this possession of power by one Khettree family over an alien population. The Nagbungsi family of Chota-Nagpore admit that they are sprung from a child found by and brought up in a "Moondah"* family, and that this child was made chief of the whole

* *Kole.*

Moondah raee. It is I think highly probable that the chiefs of Bonai and Gangpore were originally Bhooyas who becoming leaders of their people and Rajahs, and allying themselves by marriages with other Rajahs were gradually admitted into the fraternity of Rajpoots or Khettrees. It may be said indeed of both of them, that the intermarriage with families of better certified Khettree descent has not yet obliterated their Bhooya lineaments, for they bear a very remarkable likeness to that race in feature.

Gangpore.

This is a very extensive estate lying between Chota-Nagpore, Jushpore, Oodeypore, Sumbulpore, Bamra, Bonai and Singbhoom. It is kidney-shaped. Its greatest length from east to west is about 97 miles, and in breadth from north to south it varies from 15 to 50 miles. The topographical survey of the estate is not yet complete and its area cannot therefore be computed with accuracy, but I estimate it at double the size of Bonai or about 3000 square miles. Of this area not more than a tenth is under cultivation.

The Sunkh and Koel rivers from the plateau of Chota-Nagpore, unite near Gurjun in Gangpore and form the Brahmini. The Eeb, another river of some magnitude, flows through Gangpore south on its way to the Mahanuddee. The ordinary level of Gangpore is about 700 feet above the sea; the highest hill yet noted by the topographical surveyor is 2,240, not much above the general level of the Chota-Nagpore plateau. The descent, however, from the plateau to the ordinary level of Gangpore is gradual, and there is a tolerable road. As in Bonai, the majority of the population are Bhooya, and they were no doubt the first settlers. All the zemindars under the Rajah are of that race, and hold their estates as fiefs at low fixed rates and terms of service. Consequently the Rajah is under the neeessity of adopting a conciliatory poliey towards some of them at least. There are generally one or two in opposition, but fortunately for the Lord Paramount, the great vassals are too jealous of each other readily to combine. The largest estate is held by the vassal who bears the title of Mahapater. It borders on Singhbhoom, extends to the Brahmini river and comprises 100 villages for which the Mahapater pays only Rs. 200. This part of Gangpore was at one time more densely populated than it is at present, but all the more peaceably disposed of the old inhabitants

including, it is said, several colonies of Brahmins, were slaughtered or driven out of the country by the Lurka Coles. To the south, another great vassal, under the title of Gurhoutea, holds the Hemzeer estate, consisting of 84 villages, and an unlimited run of hill and forest. Gungadhur the Gurhoutea, boasts that he can travel twenty-four miles in a direct line over his own ground without seeing a human habitation, all through hill and forest, which, united to enormous tracts of hill and forest of Raigurh and Sumbulpore, forms perhaps the most extensive uninhabited region in all India. The third of these vassals has his estate on the north-west of Gangpore and holds the passes into the country from Jushpore and Chota-Nagpore. This estate is in advance of the passes, and looks as if it had been filched from Jushpore, to which from the geographical features it ought to belong.

The chief is of the 'Seekur' family and claims connectionship with the Rajah of Pachete. His ancestor the first Rajah of Gangpore, was, we are told, invited by the Bhooyas to take charge of their country; from which, it is said, they had just expelled a Rajpoot family called the "Kaiserbuns;" but as I stated above, I think it more probable that the ruling family are descended from the original Bhooya chiefs. The traditions, assigning to them a nobler birth, are founded on the supposition that the Rajpoots or Cshetryas were the only class qualified to rule, that where there was no one of this class over a nation or a people, "the Guddee" was vacant, and a Cshetrya had only to step in and take it. The Cshetryas must have wandered about like knights-errant of old, in search of these vacant Guddees, as we do not find in the country any descendants of the followers whom they must have had, if they came in other fashion to oust the native chiefs and seize the country.

It was admitted to me that until these Tributary Mehals came under British rule, a human sacrifice was offered every third year before the shrine of Kali at Suadeeh, where the present Rajah resides. The same triennial offering was made in Bonai and Bamra, Bhooya priests officiating at all three shrines. This fact appears to me to be confirmatory of the theory that the Hindus derived from the aboriginal races the practice of human sacrifices.

In the above named districts, the practice of widows going "suttee" was also generally followed in the family of the chiefs and in Brah-

min families, up to a recent date; many of the grandmothers of the present generation of chiefs and Brahmins having so distinguished themselves. One man was pointed out to me as having lost his mother by the rite of suttee. *He* would not say 'lost;' he no doubt regards her as canonized by the act.

A rather romantic story of a suttee that occurred some fifty years ago in Gangpore is related.

A Brahmin took a dislike to a girl he had just married, and turned her out of doors, a wedded maid. She took refuge with her parents who were poor, and who soon after died, leaving her destitute; then she wandered from village to village subsisting on alms and leading a wretched widowed life. Her husband married a second time, and sons and daughters were born to him and grew up about him, and in the fullness of years he died. His second wife had preceded him, so his corpse was placed alone on the funeral pile, and the torch was about to be applied to it, when a poor emaciated and meanly clad female stepped forward, and as the first, the faithful and only surviving wife of the deceased, claimed the right of suttee. Her request was complied with. Bathed, anointed, clothed, and adorned with flowers like a bride, she ascended the pile and clinging to the corpse of the husband who had so cruelly discarded her, and for the first time in her life pressing her lips to his, the flames arose and their ashes were mingled together!

There is no doubt still a strong sentiment in favour of suttee in the Tributary Mehals, and States under native government. Its prohibition has not been long enforced in the eastern parts of Rewa. Not long ago, in that territory, on the death of a Brahmin, his widow, notwithstanding the prohibition, was so vehement in her desire to join her husband on the pyre, that her relatives as the only method of restraining her, *locked her* up. When the ceremony was over they proceeded to release her, but found that her spirit too had fled. She had attained her object, as my informant declared, by a special interposition of Providence in her behalf.

Proceeding north-west from Nugra and the banks of the Brahmini river, you enter the Nuagurh division of Gangpore and come to Lainggurh, near the confluence of several streams, which was once the capital and promises to be so again, as the present Rajah is just now

building there. It is very prettily situated, and the gurh on a little hill in the centre of the valley has a commanding position, but I fear it is not a healthy site, from the number of enlarged spleens and cases of skin-disease I observed amongst the people. There are many fine old village sites in Nuagurh, now occupied by impoverished squatters, mostly Oraons from Chota-Nagpore.

The old inhabitants have died off or removed to more civilized and securer regions further south. The shabby huts of the squatters huddled together under the shade of the grand old trees, the monuments of the more civilized race that preceded them, look as much out of place as mud cabins in a street of palaces. The Rajah and other zemindars give these new settlers, when they first come, three years of absolute immunity from demands of every kind. In the fourth year they are called on to pay a light assessment. It is difficult to describe on what principle it is imposed, but in old settled villages of Oraons it does not amount, including rent and contribution, to more than Rs. 1-8 per house or family. The soil in this part of Gangpore appears very fertile, and there is still available much of the slightly swampy, rich looking land, that gives the best crops of rice. I find "Sirosha" now in flower, growing in great luxuriance. It is sold here at one maund for the rupee.

The Coles are evidently a good pioneering race, fond of new clearings and the luxuriant and easily raised crops of the virgin soil, and have constitutions that thrive on malaria; so it is perhaps in the best interest of humanity and cause of civilization that they be kept moving by continued Aryan propulsion. Ever armed with bow, arrows and pole-axe, they are prepared to do battle with the beasts of the forest, holding even the king of the forest, the "Bun Rajah," that is the tiger, in little fear. Mixed up with them are numbers of the Kherria tribe, who are as yet a mystery to me, and I will say nothing more about them till I learn more. I am assured that they have no affinity with either Moondahs or Oraons, *i. e.* with those who are generally called Coles.

Borgaon, near the Mahabeer hill on the borders of Bamra, is the largest village Gangpore possesses on this side. It contains 160 houses—20 of Brahmins, 20 of 'Telis,' oil-pressers, 22 of various Hindu Ooriah castes, and the remainder Oraons and Kherriahs. The two

latter coming in contact with Brahmins, have at once succumbed and become their farm labourers. It appears to make little difference in the condition of Oraon emigrants, whether they are farm servants or farmers on their own account : they have the same wretched huts, scanty apparel, and generally uncared-for appearance, as if they had in despair given up all ideas of rendering themselves attractive; but the wonder is that they remain in this dependent position, when they can get land on such easy terms and become farmers themselves.

The village pays direct to the Rajah a *rent* of Rs. 34, magun or contribution Rs. 34 !, and 64 maunds of rice. The price of rice is from one maund to two maunds for the rupee. On births, deaths and marriages in the Rajah's family, the villagers are called on for additional contributions, and when that family, as it is just now, is a large one, the extra charge comes to from Rs. 30 to 40 a year. The total demand is therefore about Rs. 160 a year, and from the extent of land under cultivation, I do not think this would amount to more than 3 annas a beegah on the cultivated area. It is evidently a very old village site, surrounded by extensive groves of mangoes, and with several tanks of very insalubrious water overgrown with water lillies. Hills are seen on all sides, but the most remarkable feature in the landscape is the great Mahabeer hill; a mass of rock tilted up, and shewing towards Borgaon, an uneven wall of disrupted ends, forming a cliff of fantastic outline, nearly 2000 feet high.

The tutelary deity of this hill is a favourite object of worship with the Bhooyas, and is more or less revered by all the country. The top of the hill or rock being difficult of access, Mahabeer has studied the convenience of his votaries, and entered an appearance down below in the form of a stone, in a sacred grove or ' Surna' at the foot of the hill. The idea of a ' Surna' is pretty and poetical. It is or ought to be a fragment of the primitive forest left when the first clearance was made, as a refuge for the sylvan deities whom the clearing might have disturbed. The best villages and most thriving portion of the population in Gangpore are found on both banks of the Eeb river, as we approach the boundaries of Sumbulpore. Here the very industrious and respectable looking caste called Agureahs are first met with. They are found in Gangpore, Sumbulpore, Raegurh, Raipore and Ruttenpore. They number about 5000 in the three first places named.

According to their tradition, they are called Agureahs from having, ages ago, come from Agra.

They were a proud Cshettrya or Khettree family, a stiff-necked generation, and refusing, when making an obeisanee, to bow their heads, the Rajah lowered some of them summarily by cutting them off. They therefore left Agra and wandered south through Central India till they eame to Sumbulpore, and eventually settled in these regions. Acquiring lands, and determining to devote themselves entirely to the tilling of the soil, they divested themselves of their "paitas" making them over to the Brahmins, and no longer styling themselves or being styled Khettrees, they became known as Agurials.

They *bury their* dead, and for this departure from the usual enstom of Hindus, they can assign no specific eause, but that they gave up the praetiee of ineremation when they resigned their pretensions to be esteemed Khettrees. They nevertheless now profess to be Vishnoovis, divided into two denominations, 'Ramanundyas' and 'Kubeer punthees.' The Vishnoovi doctrines they have probably taken up, since their migration to tracts bordering on Orissa and approximating the great fane of Juggernath. They say they gave up the worship of Kali when they resigned their 'paitas' and took to the plough. It is probable that they were Boodhists, obliged to leave the Gangetie provinces for refusing to conform to Brahminism.

Their physiqne decidedly supports the tradition of their Khettri extraction: they are distinguished amongst the dark, coarse-featured aborigines of this country, as a tall, fair, well-made and handsome race, resembling the Rajpoots in every thing but swagger. *That* went with the 'paitas,' as a farewell offering to Kali. The women, who are not very jealously secluded, have good features and figures, and a neat and cleanly appearanee.

The latter are snbjeeted to no field labour, their sole business being to look after the domestic arrangements, to gin cotton and to spin. They do not weave. Their spun thread is made over to the weavers, who are paid in kind for their labour. Their villages, laid out in streets, are comparatively well kept, and their own houses in these villages substantial, elean, and eomfortable. Mungnspore, near the Sumbulpore boundary, is, I think, the largest. It eontains 200 houses, those of the Aguriahs occnpying the eentre of the village, surrounded by huts

of Coles and others of the primitive races, whose services they have secured as their farm labourers, and who are not allowed to hold lands, but are paid for their labour at the rate of three seers of dhan per diem, and a modicum of clothing doled out annually.

The soil in this part of Gangpore is exceedingly rich, producing magnificent crops of sirosha, sugar-cane, and tobacco, besides the staple rice. The plants of the country tobacco grown by the Aguriahs are the finest I ever saw, and they grow more cotton than they require for their own use, though they do not stint themselves in raiment. I am certain the soil and climate is well suited for the finer kinds of cotton.

Proceeding north up the Eeb from this, the Arabia Felix of Gangpore, we came again upon untidy Bhooya villages, and their patches of cultivation, separated by miles of the monotonous Sâl forests, and there is no change in the features of the country or the population, till we come to the estate of Bhugwan Manjee, which, as above mentioned, does not appear as if it belonged to Gangpore, as it is separated by a range of hills, and approached by a very narrow and difficult pass. We are still amongst Bhooyas, but here they speak Hindi instead of Ooriah, and the peculiarities of Ooriah costume and decoration are rarely met with.

Jushpore.

The small state of Jushpore, though specially mentioned as a cession to the British in the agreement taken from Appa Sahib, after his defeat at Setahbuldee in 1818, has hitherto found no place in any published map. In the very latest issued from the Surveyor General's office, a few scattered villages of Jushpore are inserted as if contained within the boundaries of Sirgoojah, but the name of the estate is not given, and the chief town, where the Rajah now lives, is not down. It is singular how old the information must be, from which some names have been inserted on the maps of the unsurveyed parts of India.

Konkale appears in large letters in about the centre of the tract which should be called Jushpore. It is now an insignificant hamlet, but there is the trace of a fort, where resided an ancestor of the present Rajah. The present capital, Jugdispore, is about two miles to the north and west of it.

Jushpore is bounded on the north by Burway of Chota-Nagpore; south by Gangpore and Oodeypore; east by Chota-Nagpore; and west

by Sirgoojah. It is about 50 miles in length from north to south, and 30 in greatest breadth from east to west, and may comprise about 1000 square miles. It contains upwards of 200 villages, exclusive of the hamlets or detached huts of migratory hill savages; the population is about 30,000, and the total income of the Rajah from all sources may be estimated at about Rs. 6000. With this moderate income he maintains a very becoming state, and so rules as to be greatly beloved by all his people.

Jushpore is about equally divided into highlands and lowlands, 'Oopur Ghât' and 'Heth Ghât.' The highlands consist of a magnificent plateau, a continuation of the great tableland of Chota-Nagpore, averaging upwards of 2000 feet above the level of the sea, and fringed by hills, rising in places 1000 feet higher. The lowlands lie in steppes descending towards the south, broken by low ranges of hills isolated bluffs, and masses of granite, sometimes semi-globular in form, and without vegetation, bare and round as an old man's bald pate, and hence the most conspicuous of them is called the 'Boora.'

The Eeb river has its sources in the Jushpore highlands, and grows so rapidly into a respectable stream, that when it reaches the brink of the plateau, it bounds into the lowlands with a roar that is heard for miles. It is, shortly after, joined by another stream, the Maini, which also rises in the Jushpore heights. There is a story that, years ago, an invisible spirit in a visible light canoe ascended the Eeb, waterfall and all, to its source, and there the boat is still waiting for the spirit's return. I *did not* see it.

It is also called the 'Heera' river, as diamonds are found in its bed, and it is probably the source of the diamond stores of the Maha Nuddee, as I understand that none have been found above the confluence of the two streams. It is auriferous, and from time immemorial its sands and deposits have been explored by hereditary gold-washers, called "Jhorahs." These gold-washers do not, however, confine their operations to the bed of the river. They find it more profitable to penetrate the soil some distance from its banks, and on both sides you find tracts honey-combed with shafts, sunk by successive generations of gold seekers.

These shafts are from 10 to 30 feet in depth, and three in diameter. The Jhorahs excavate till they cut through the upper

stratum of vegetable mould and the red soil beneath it, and come to a layer of pebbles and fragments, chiefly of quartz, forming a dirty damp gravel; this they remove and wash. I have watched their operations close along the banks of the river, and at some miles distant from the stream, and the process and result was much the same in both places. Near the river, five pits or shafts had been recently sunk by as many families of Jhorahs, for they work in families, women and children assisting. They had one washing trough, called a 'dooin,' to each family, and the washing commenced in my presence. The stuff selected is either of a dirty drab or of a reddish colour, with occasional small white spots, little balls of particles of decomposed felspar, adhering together from moisture, and drying into powder. The Jhorahs regard these white spots as the surest indication that the gravel contains gold. The stratum of gravel which they were working on this occasion was not more than a foot in depth. It rests on decomposed granite, which crumbles when taken in the hand, and the gold-washers assured me that this contained no gold, but I insisted on having some of it washed, and found their statement not strictly correct. It contains gold, but is less rich in the mineral than the gravel above. When the gravel immediately under the shaft is all removed, they scoop out from the sides all round, as far as they dare venture to penetrate laterally, and in this way sometimes connect the shafts, but they take no precautions, and sometimes, going too far, have to be dug out, not always alive! There appear to have been several accidents of the kind, but with all this danger and labour, the pursuit does not return sufficient to support them, and they are farmers as well as gold-washers.

They are greedy and reckless in taking advances, trusting much, no doubt, to the facilities their remote situation gives them, of evading payment, and some of them are enormously in debt. One man was pointed out to me as owing Rs. 1000! He grinned as the sum was mentioned, as if exulting over his victim. The greed for gold and the gambling nature of the pursuit is surely a great corrupter of human nature, for in the midst of a population generally remarkable for honesty, truthfulness and simplicity, these gold-washers are mendacious and unscrupulous rogues.

Some years ago, a trader came amongst them whilst they were at

work, accompanied by his wife, hoping to obtain some return for the advances he had made. He dunned and worried them, and to get rid of his importunity, they knocked him on the head and popped him into one of the 30 feet shafts, where he was told to seek gold for himself! The unfortunate woman was similarly disposed of. The crime was, however, brought home to the delinquents, who were all transported.

The yield of these pits in gold is of course very uncertain. The out-turn obtained in my presence from the five pits, in about four hours, would not have given to the individuals employed, more than half an anna a head, but they admitted that they sometimes obtained as much as half a tolah of gold from one 'dooin' in a day, and this would give about Rs. 2 a head to the hands employed, and make up for many blank days. From their mode of washing, there must be great waste. I observed it is only very palpable particles of gold that are retained. The grains are irregularly shaped, with sharp angles, and do not appear to have undergone any disturbing process since they were evolved from their original matrix. There is no indication of flattening or rolling out.

The northern portion of Jushpore, bordering on Burway and Sirgoojah, is a wild mountainous region called Khooria, inhabited chiefly by *Korewahs;* some, utterly savage and almost nomadic; others, somewhat more civilized, living in villages; but all invariably armed with bow and arrows and a battle-axe.

In 1818 when Sirgoojah and Jushpore were ceded to the British Government by Appa Sahib, the chief of Khooria, himself a Korewah, and claiming to be hereditary Dewan of Jushpore, was in rebellion against his Rajah; and for several years, by savage raids at the head of his Korewahs, both on Sirgoojah and Jushpore, gave much trouble. In one of these expeditions, his son Muniar Singh was captured and detained as a hostage by the British authorities till the death of the old chief, when a reconciliation was effected between the Rajah and Muniar Singh, who was restored to his possessions and hereditary office. The policy adopted on the occasion has proved very successful: the dewans Korewahs have ever since conducted themselves peaceably.

Having expressed a wish to see some of the wild hill Korewahs, the present zemindar of Khooria, a nephew of Muniar Singh's, ap-

peared in camp with forty warriors of the tribe. Their costume was nothing in particular, exeept that they had very shaggy heads of hair, into which their store of spare arrows were stuek by the barbs. They each carried in one hand a very powerful bow and two or three arrows, and in the other the gleaming long edged battle-axe of the eountry. The arrows are carefully made with flat bright heads of iron, 9 inches long and $2\frac{1}{2}$ in breadth, with long barbs, the edges and points all carefully sharpened. These are attached to light reeds, the other ends of which are neatly spirally feathered.

The men were mostly short of stature but with well knit muscular frames, springy and energetic in action, better looking and of lighter complexion than the Oraons of the plateau. There was no remarkable protuberance of the maxillary processes nor lowness of forehead. Those who were old enough had beards and moustaches. They evinced no timidity, but immediately on seeing me, gruffly vociferated that they had had nothing to eat all day, and they wanted immediately, rations of rice, dâl, oil, salt, tobacco and *pig*, and expected as they had come so far to see me, that they were each to be presented with a *cap*, a *coat* and a *waist cloth*.

I placed a small earthen pot on a peg, and offered it as a mark to those amongst them who wished to shew their skill in archery. In great excitement, all eagerly volunteered, bows were instantly strung, and though they did not once hit the small target, they all planted their arrows close to it, and a man in the same position would not have escaped. I tried them afterwards at a tree at 40 yards, and almost every arrow told. Their bows are very powerful, and arrow after arrow was delivered with a force and rapidity that made one feel a very profound respect for this, *our* once national weapon. In bush warfare it is more formidable than the matchlock, and I do not doubt that the Korewahs could render a hostile entry into their country, a difficult and dangerous task.

There is every point of resemblance between them and the wilder section of the Lurka Coles, and so little do the languages of the two tribes differ, that my slight acquaintanee with that of the Coles, enabled me to understand what the Korewahs, on first appearing, were demanding; and a Cole chaprassee of mine kept up a conversation with them.

It is almost unnecessary to seek for further proofs of affinity, but they

are to be found in the identity of many of their customs. Their sacrifices in cases of sickness, their songs, their dances, their mode of disposing of the dead—all these shew them to be of kin to the 'Ho' or Lurka of Singbhoom, the Moondahs of Chota-Nagpore, and to the Sonthals. It is not possible to trace the similitude through all the relations of life. The Singbhoom Coles live in large communities and have an organization unattainable by the hill Korewahs, who prefer to dwell apart. Except on great occasions, when there is a 'gathering of the clan,' the Korewah has only his own family to think of and associate with. The head of the family is chief and priest—the god to whom he sacrifices, the spirit of his father.

The Korewahs are found also in the wildest parts of Sirgoojah, and in the ranges of hills between Sirgoojah and Palamow. Many of them have abandoned their free mountain life, and have formed settlements on the skirts of hills, near villages; and where this is the case they appear to be losing their own language and peculiar habits, and becoming Hinduized.

The Hill Korewahs live in wretched little detached huts, in the midst of the patch of hill forest they have partially cleared and are then cultivating, shifting every three or four years as the ground becomes exhausted. They cultivate very little rice. Their crops consist of pulses, millet, pumpkins, cucumbers,* melons, sweet potatoes, and yams. They also grow and prepare arrow-root, and there is a wild arrow-root which they use and sell. The grain they store for winter use is secured in small parcels of the leaves of a plant called 'muhoolain,' sown together by fibres of the same, and these parcels they bury. The grain thus preserved remains for years unimpaired. They have no prejudices in regard to animal food, and they drink freely of an intoxicating beverage prepared by themselves from millet. They are as devoted to songs and dances as the Moondahs and Sonthals, and have the same steps and melodies. They bury or burn their dead, whichever they find most convenient, but the practice of marking the spot where the body or ashes are deposited, is common to both.

The Khooria Korewahs resort in large numbers to an annual fair held at Muhree on the borders of Sirgoojah, and give in barter for salt

* They have a gigantic cucumber about a foot and a half in length and ten inches in diameter!

and other necessaries, wax, arrow-root, resin, gums, honey and stick lac, and excellent iron smelted by themselves. The Korewah iron, roughly fashioned as battle-axes, is greatly prized by the inhabitants of all the neighbouring States.

Whilst conversing with the Rajah about these savages, he mentioned to me that there existed a tribe called Birhores, whom he accused of a sort of interfraternal anthropophagy, of feeding literally on their blood relations.

They are alluded to by the late Col. Ouseley, in a paper that appeared in the Journal of the Society for January 1848, but he relates the story, as of the Korewahs, calling them inhabitants of Mynepât in Sirgoojah. The Korewahs repudiate all affinity with the Birhores, nor could I hear of either Korewahs or Birhores on the Mynepât: the latter are found in some of the wildest parts of Chota-Nagpore and Jushpore, but they are of rare occurrence. With much trouble some were caught and brought to me. They were wretched looking objects, but had more the appearance of the most abject of one of those degraded castes of Hindu, the domes or pariahs, to whom most flesh is food, than of hill people. Assuring me that they had themselves given up the practice, they admitted that their fathers were in the habit of disposing of their dead in the manner indicated; *viz.* by feasting on the bodies, but they declared they never shortened life to provide such feasts, and shrunk with horror at the idea of any bodies but those of their own blood relations being served up at them! The Rajah said he had heard that, when a Birhore thought his end was approaching, he himself invited his kindred to feast on his body. The Birhores brought to me did not acknowledge this, but they spoke on the subject with a degree of reticence that made me think it might be true. I told the Rajah to enquire particularly about it, and gave out that if the horrid rite was still practised, it must be discontinued. But, query,—'would not Saturday reviewers regard my order as an injudicious interference with a time-honoured custom, on a point that natives were so peculiarly tenacious of——the *disposal of their dead?*'

The Birhores speak a jargon of Hindi, which I found intelligible; and have no other language.

Nine-tenths of the population of the remaining portion of the Jushpore highlands are "Coles." Chiefly Oraons, there are very few Moon-

dahs amongst them; the Jushpore Oraons are the ugliest of the race, and appear to me utterly destitute of all ambition to rise into respectability of appearance. With foreheads "villainous low," flat noses and projecting maxillaries, they approach the negro in physiognomy, much closer than do their brethren in Chota-Nagpore.

Jushpore produces an excellent iron, much prized for making weapons and implements of husbandry. Amongst its exports may be included about ten thousand maunds of cotton.

The lowland villages of Jushpore have a sprinkling of the tribes from all the surrounding districts. Of the Orissa type are "Makoors" from Keonjhur, the most thriving people in these parts, well dressed, and occupying good houses. They have great herds of cattle, like the Aheers and Gwallas. Then there are a few of the Gangpore Bhooyas, intermingled with a good many Khairwars from Palamow, (of which caste is the Rajah,) and Gours or Gonds from the south and west, and as we approach Oodeypore, we come for the first time on the *Kaurs*.

The Kaurs form a considerable proportion of the population of Oodeypore, Sirgoojah, Korea, Chang Bhukar, and Korbah of Chutteesgurh, and there is this point of interest in them, that they claim to be the descendants of the "Kooroos" who fought the Pándavas, who, when defeated and driven from the scenes of the war, found a safe retreat in these mountainous and densely-wooded regions. In appearance they more resemble the aborigines than the Hindu tribes. They are, in fact, next to the Jushpore Oraons, the ugliest race I have seen in the course of my tour: dark and coarse-featured, broad noses, wide mouths and thick lips. They resemble the Khairwars of Palamow, especially that ill-favoured section of them called Bhogtahs, in features, but in nothing else, as the Kaurs are an exceedingly industrious and thriving people. Their houses are unusually neat and commodious, built like bungalows, with verandahs on two or more sides. Of these there is one to each married member of the family, who, however, meet and eat together in the largest, belonging to the head. The houses are placed so as to form a small court-yard, which is kept scrupulously clean. The Kaurs do not strictly conform to Hinduism: they rear and eat fowls, and have no veneration for Brahmins. The "Nâu," the village barber, whom they sometimes call Thakoor, is their priest, and officiates as such at all marriages and other ceremonies. The

combination of priestly functions and operations with the easy shaving line, is singular; but it arises from the fact that the great ceremonial law of the Kaurs is all comprised in the act of shaving. At births, deaths and marriages, the parties immediately interested, and all connected with them, are clean shaven all round. In regard to the disposal of the dead by this tribe, they tell me that they bury those that die unmarried, while the bodies of married folk are burnt in orthodox Hindu fashion! I wonder if matrimonial interests are advanced by this invidious custom. The tonsure of the males is peculiar; the hair is allowed to grow long on the crown of the head and collected in a knot, but the forehead is shaven to the knot, and there is a shaven ring round it as if to facilitate the operation of scalping; the back of the head is also shaven, but over the ears and temples the hair is worn long.

They worship Shiva under the denomination of Mahadeva, and Parvati as Gouree, and they have a festival in the year for each, at which they dance and sing, men and women. In some villages there is a Baiga who offers sacrifices at these festivals; but this Baiga is not a Kaur. He belongs to one of the aboriginal tribes, and it is a remarkable feature in the religious ceremonies of the people of the Tributary Mehals, that the aborigines should have a monopoly of such offices. The new settlers dread the malignancy of the local spirits, and to appease them, naturally rely on the aborigines, who have longest known them. The zemindar of Korbah in Chutteesgurh is a Kaur, and as far as I can learn is the most influential person of their caste existing: there was a Kaur zemindar in Sirgoojah formerly, called Kumol Singh, but he rebelled and came to grief.

Most of the "Khalsa" villages in Oodeypore are held in farm by 'Kaurs' and two-thirds of the population of these villages are Kaurs. With one exception all the permanent service tenures of Oodeypore are in the hands of Gours, and the people in those estates are for the most part Gours. We find therefore, that the Gours have, in Oodeypore, a position similar to that held by the Bhooyas in Bamra, Gangpore and Bonai, and the right to the office of Dewan and to instal a new Rajah, claimed in those districts by certain Bhooyas, is in Oodeypore claimed by one of the Gour zemindars, Bhowany Singh of Kourajah. Thus we find the Gours or Gonds, who in Bonai were

classed amongst the most degraded of the people, (and in Gangpore not held in much higher estimation,) holding a high position in Oodeypore.

I have insensibly glided into Oodeypore. In no published map are the boundaries of that district defined. It has to the north the great tableland of the Mynepât, as a massive barrier between it and Sirgoojah, to the west Korbah of Chutteesgurh or the Belaspore district, to the south Raigurh, and to the east Gangpore and Jushpore. It is about 64 miles in length by 40 in breadth, and contains about 1800 square miles. There are 220 villages. The population may be roughly estimated at 25,000. The only river of consequence is the Mand, an affluent of the Mahanuddee. It rises near Girsa in Sirgoojah, and receives the streams that flow south from the Mynepât. Near Rabeope, which, though not much of a place, we may call the chief town, it has cut its way through a great mass of sandstone rock, and now flows without obstruction through a narrow pass with perpendicular or rather overhanging cliffs, on the highest portion of which the former Rajahs of Oodeypore, like Barons of the Rhine, had their castle. The site was occupied by the leader of the Oodeypore insurgents in 1857-58, and had he not abandoned his position on the approach of a force sent against him, he might have given us much trouble, as the rock is or might easily be made as inaccessible from the land as from the river side. The river has generally a deep cut channel, flows in alternate rapids and pools, and is not navigable in any part of its course. The country north of Rabcobe rises in steppes to the base of the Mynepât, but the surface is everywhere undulated by masses of sandstone rock, forming hills, dividing and enriching the culturable lands, as the rocks have many springs, from which fertilizing streams are ever flowing over the terraced plains. But with all these advantages the country is sparsely populated, the villages small and 'far between,' and there appears little prospect of improvement, as the districts all round are in much the same condition.

There is at present but one weekly market held in Oodeypore, at Dukree, 24 miles due south of Rabcobe. This is attended by people from Raigurh, Chutteesgurh, Sucktee, &c. The chief exports are lac, cotton, resin, oil seeds, rice, wild arrow-root, iron, and a small quantity of gold.

touch of Moses. The temperature of the water was, strange to say, much higher than that of the air, but cooled in a *sorai* it was delicious. A broad seam of coal is here seen underlying the sandstone. It burns well, but I say no more about it, as the Sirgoojah coal from this vicinity has been fully reported on by my predecessor Col. Ouseley. To continue the ascent of the hill, you repass the gate, and proceed by an easy path three parts round the hill to its southern face, and then as best you can *up*, by an exceedingly difficult zig-zag path, sometimes a mere ledge cut out in the rock. Just at the commencement of the difficult part of the ascent, you pass a large boulder of sandstone with nothing to distinguish it externally from many others that are lying about, but which has been hollowed into a chamber of sufficient capacity to allow of a man sitting in it at his ease, and with an aperture just large enough for a slender man to creep in by. The opening is not seen from the path ; so that an unconscious pilgrim might find himself exhorted by a voice from the bowels of a rock in a manner truly awe-striking. Crowning the most difficult part of the ascent, so perched that you cannot obtain a good view of it without looking right up to the sky, from a position that makes it unpleasant to throw your head back to the necessary angle, is a second gateway, which is in better preservation, and is the best executed and most beautiful architectural antiquity of the entire region. Though its origin is equally unknown, it is unquestionably a more modern work than the other gateways and temples on the hill. It belongs to that description of Hindu architecture which bears most resemblance to the Saracenic. Instead of a flat lintel over the gate, we have an arch formed of three voussoirs of stone. The soffit of this arch is cut into a wavy scroll, terminating on the abutments, in heads of some animal not clearly discernible. There is an exterior and interior arch of this description, springing from fluted pilasters, and the space of about three feet between them is covered in by another loftier arch similarly formed. Entering, you find yourself in a small court, at the bottom of a flight of steps. A projection of the rock has been scarped to form this resting place, and from it a most extensive view south and west is obtained. The steps are to the right as you enter, to the left there is a projection with stone breastwork used as a look-out. Opposite the entrance, there was a covered colonnade, but this has fallen in.

In the thickness of the gateway wall, a niche four feet in depth and about eight feet in height and breadth, is divided by a column still in position, shewing how the fragments of the columns of the ruined colonnade should be restored. The shaft and base are octagonal and the bracket-like projections of the capital are crouching human figures, so placed, that head, arms, hands and back all appear to support the abacus. There is one well executed figure in this enclosure, of a man kneeling on a coiled cobra, and with snake heads peering over each shoulder.

A flight of 48 cut stone steps leads from this resting place to another mass of ruins which appear to have been a temple and gateway combined. There is here an image of Durga with 20 arms, another with eight, and a large figure of Hunooman, all more or less mutilated. We are now on the ridge forming the top of the hill. Bare as are the sides of the rock, there must be here a great depth of soil, as it supports a variety of large forest trees and shrubs, which are growing luxuriantly. On the highest part of the ridge and about the centre of the hill, is the temple, which contained no doubt the principal object of worship. It consisted of a small fane, the inner crust of which, constructed of parallel courses of roughly cut stone, is still standing, with a detached portico on columns. It is small and insignificant, but no doubt immensely old ; it is impossible to say to what idol or object of worship the temple was originally dedicated ; at present, on the old "argha" or stand, there is a group of Vishnu with his wives, but the group does not fit the pedestal, is of more elaborate workmanship than the figures that are lying about, and whilst all the old figures are mutilated, this one is perfect. I conclude that it was placed in the temple after its partial destruction, and the mutilation of the original images.

I found the air on the hill keen and invigorating. There is space for several houses on the saddle back ; and as it is an independent isolated mountain, it commands an extensive view, shewing that all this part of Sirgoojah, which the maps make out to be a mass of hills, from the foot of the Mynepât, as far as the eye from this elevation can penetrate westward, is, thus seen, a plain slightly undulating, but on the whole well adapted for the *Railroad*, which, I am confident, will some day be made through it, connecting, by the most direct route, Calcutta, Central India and Bombay.

The tableland called the Mynepât is 50 miles in length by 40 in breadth, with an elevation of 3,700 feet above the sea level. Its soil, like that on the Ramgurh hill, is deep and rich, and it possesses numerous springs and streams. It abounds in game; gaur, buffalo, tigers, leopards, and deer, and some of the streams are large enough to give the angler gentler sport. The day must surely come for the fructification of all these natural advantages, and the tract now occupied by a few herdsmen and savages, may become the head-quarters of a division, or the seat of a Government.

Not far from the summit of the Ramgurh hill, an attempt has been made to construct a tank, but it probably was not a success, and it is now nearly filled up with light vegetable mould, of not less than three feet in depth and quite dry. In another direction, a descent of a few hundred feet brings you to a pool of good water percolating a scam of white calcareous clay. A party defending themselves on the rock could not be cut off from this supply, as it is perfectly inaccessible from below, but it would not be adequate to the supply of a large party, and the next nearest source is the spring near the first gateway.

But the great curiosity of the Ramgurh hill has yet to be described. Two of the spurs of the great rock, themselves rocky and precipitous, forming buttresses on the northern face, instead of gently blending with the plain like others, have their bases truncated, and then united by a vast natural wall of sandstone rock, 150 yards thick and 100 to 150 in height. A semi-circular or rather horse shoe shaped nook is thus formed, which, from the height and precipitous nature of the sandstone rock enclosing it, would be almost inaccessible, had not nature provided an entrance by a natural tunnel through the subtending wall. This is called the "Hathphor." The waters collected from springs in the nook form a little stream that flows out through the tunnel. At its mouth it is about twenty feet in height by thirty in breadth, but at the inner extremity of its course of 150 yards, it is not more than eight feet by twelve. A man on horseback could ride through it. The sand of the stream in the tunnel was impressed with old and recent foot-prints of a whole family of tigers, who had taken up their abode in this pleasant and secure retreat, but we did not find them at home. The horse shoe embraces an acre or two of ground, well wooded and undulating, so that a considerable body of men could

conveniently encamp there. In the face of the great rock opposite the entrance, two large caves have been excavated by human labour, the largest of the two, sufficient to afford accommodation for forty or fifty people. The entrance, about 30 feet wide, opens into a gallery of double that length, with recesses at the extremities, intended for more private apartments, probably for females. The excavation is made so as to leave a platform of stone, extending through its whole length, and also in the recesses, for the occupants of the cave to sit and sleep on. The floor is some fifteen feet above the ground, but is accessible by steps cut in the rock. In both caves I found inscriptions carved on the rock in ancient 'Pali' character, and I made the best transcript of them I could: this is now in the hands of Babu Rajendra Lal Mitra, and it will, I trust, throw some light on the history of the retreat.

Since writing the above, I have seen Col. Ouseley's brief notice of the Ramgurh hill in the Asiatic Society's Journal No. CLXXXVI. for January 1848. He does not appear to have observed the inscriptions, and I do not recollect having seen in the caves any of the stone figures that he noticed there. They may have been since removed. Col. Ouseley calls these antiquities cave temples, but there is nothing now to indicate that they were intended as places of worship.

There are many other interesting collections of ruins in Sirgoojah. Those to the west, in the Pal Pergunnahs, noticed by Col. Ouseley, I have not seen, but he found there a stone with an inscription on it, which I think must be in the Society's museum. On the banks of the Kunhur river in Tuppah Chulgalee, there is a large collection of temple ruins. Three distinct heaps of fragments were at my request opened out, till the foundations of three large temples dedicated to Shiva and Durga were disclosed. The object of worship in the largest, was a huge Lingum, five feet in length, which we found divorced from its appropriate "Yoni" as if it had been blown up. The latter was smashed into several pieces by the destroying force, whatever it may have been, and the numerous sadly maimed gods and goddesses that were found in the debris, are further memorials of the barbarous zeal of some uncompromising iconoclast. I observed a Shib's bull in good preservation, as large as life, a well executed figure of 'Parvati' three feet high, and a grand, colossal, four armed figure with one foot resting on a broad-edged axe, not unlike what is still the national

weapon of the tributary mehals. Close to the temples there is a stone-faced tank.

Six miles to the west of the above ruins at Sirnidee there is another small temple which appears to have been overlooked by the destroyer.

The dome over the fane is still standing, and part of the vestibule, the latter a pyramidal roof supported on columns. The stones forming the lintels and uprights of the entrance to the fane are elaborately carved with minute representations of all the principal Hindu gods. Shiva and his wife on Nandi occupying the place of honour in the centre of the lintel.

The Ruksale Rajpoot family who now hold Sirgoojah, have no tradition regarding the antiquities I am describing, but they tell me that under the Mahratta rule, their ancestors often availed themselves of the retreat of the Hathphor to save their property from pillage and their women from dishonour.

The ruins of an ancient castle of the Ruksale Rajahs of Sirgoojah are to be seen on a hill near Bisrampore, and this appears to be the Sirgoojah, marked as the chief town on the map, shewing again the antiquity of the information from which the maps of these unsurveyed tracts had been filled in.

According to the tradition preserved in the family, the first Ruksale was called into existence by a 'Muni' or sage, to destroy a demon that troubled the holy man in his devotions. The hero thus created was the ancestor of the lovely Rukmini carried off by Krishna. In about Samvat 251, a lineal descendant of Rukmini's brother, Rukman, entered Sirgoojah and fought with and killed the Rajah of the place called 'Balind,' and became Rajah in his room. The present Maharajah Inderjeet Singh has a family tree to shew that he is the 111th in descent from the conqueror of Balind ! but I have been told there is a popular tradition assigning to the family a local origin, and considering there are no Ruksales in any other country, it is not unlikely that it is the most truthful of the two. If so, it is probable that the family are derived from the same stock as the 'Gours,' the most influential and numerous of the races now inhabiting Sirgoojah.

In A. D. 1758, a Mahratta army in progress to the Ganges overran the district of Sirgoojah, and the chief was compelled to acknowledge himself a tributary of the Berar government, but

beyond a fine imposed at the time, and engagements taken for the security of the roads from Mirzapore, Benares and Gya to the capital of Nagpore, no proofs of submission were exacted.

In the year 1792, Sirgoojah first engaged the attention of the British Government, in consequence of its Rajah Aject Singh having invaded and taken possession of Burway, a Pergunnah of Chota-Nagpore. At the requisition of the Governor-General, the Rajah of Berar interposed; but ineffectually, as about this time, on the death of Aject Singh, his third brother Lall Sungram Singh usurped the chieftainship, murdered Ajeet Singh's widow, and not only retained possession of Burway, but assisted a rebellion in Palamow against the British Government. This led to an expedition into Sirgoojah under Col. Jones by order of Marquis Wellesley, which resulted in the restoration of Burway to Chota-Nagpore, and Sirgoojah itself became a dependency of the British empire by treaty with Appa Sahib in 1818.

Sirgoojah has not been surveyed, and it is therefore impossible to give its area with any degree of accuracy. It is about 90 miles from east to west and 80 from north to south; is divided into 26 tuppahs and contains 1197 villages, and according to a return of houses made some years ago, a population of 1,30,000, one hundred and thirty thousand souls. About one-sixth of the whole are of the Gour tribe: the Khairwars, Kawrs, Kisan Rajwars, Korewahs and Coles number from 5000 to 7000 each: there are about 2000 Bhooyas, and about as many of the hill tribe found in greater numbers further west, called Boyars: the remainder of the population are for the most part Sudras. The ruling race, Rajpoots, number only 505 souls, and there are only 369 Brahmins.

Of the Gours, I have already observed that they are the same as the Gonds of the south. Of this there can be no doubt, as we find amongst the Gours of Oodeypore and Sirgoojah, blood relations of the Gonds down south; and they intermarry. It is only a different way of pronouncing the name of the tribe. They have always I believe been considered as amongst the aboriginal races of India, but in Sirgoojah and Oodeypore they are completely Hinduised, retaining neither the language nor any other characteristic of their own race.

The Kaurs and Korewahs have already been disposed of; the Coles must have a chapter to themselves; the characteristics of

the Rajwars and Kisans I have not yet had an opportunity of studying, and shall conclude with a few words about the Khairwars. They are found in many parts of this province but are most numerous and have been longest resident in Palamow. They are said to have migrated from the hills west of Rhotas ; there is a place there, called Kyra, supposed to be named after them, and they are found about the Kymoor hills. The Rajah of Turki in that vicinity is a Khairwar. In this division several of our great men are said to be of Khairwar extraction, but they are all now undergoing that process of being refined into Rajpoots which I have described as likely to have occurred in other families, by intermarriage with Rajpoot maidens. They have to pay very high for the honour, but by giving large dowries with their daughters, they sometimes obtain for them also the distinction of Rajpoot alliances.

The two races appear to blend well; a handsomer and more energetic stock is the result; so the aspiring families I allude to, have gained something by their outlay in marriages, as the ordinary or pure Khairwars are generally a dark, ill-favoured race, with coarse features and of lazy unimprovable habits.

The people called Bhogtahs are a Khairwar tribe. There was a small clan of them in Palamow, who long defied the power of the British Government. They lived on a narrow plateau, with the Sirgoojah mountains behind them, and a range of hills with difficult passes in front of them; and with the cattle and property of their neighbours, they did very much as they pleased; and as they had wonderfully contrived retreats amongst the hills and rocks for themselves and their plunder, they defied all efforts to capture them. At last the wild country they occupied was given to them at a nominal rent, on condition of their living honest and peaceful lives. This kept them quiet for many years, but when the mutinies broke out in 1857, the two chiefs, Lilumber and Pitumber, headed an insurrection in Palamow and came to unmitigated grief. One was hanged and the other was transported for life and died in the Andamans.

The actual income of the Rajah of Sirgoojah from all sources is not more than Rs. 30,000 a year: the estates held by members of his family are worth in addition about Rs. 23,000, and other vassals hold estates worth annually about Rs. 20,000. A fixity of tenure is the

predominating feature in the revenue system of all the Tributary Mehals, and will no doubt be found to prevail in all parts of Hindustan where ancient landmarks have not been swept away by the tide of conquest. In these mehals, the great mass of the cultivators are the descendants of those who first occupied and tilled the soil, and to them, (says Malcolm in his Central India,) according to the most revered texts of the sacred writers, the soil in the first instance belongs; and where a monarchy or chieftainship is by some process eliminated, the peasant proprietor contributes for the support of the sovereign a moderate share of the produce of his land. This accounts for the lowness of rates of rents that prevail in these districts. The actual rent does not exceed 2 annas a beegah in Sirgoojah, and this is unchangeable. It probably represents the proportion of the produce first assigned to the chief, and both the cultivating classes and heads of villages in this province are exceedingly tenacious of their right to pay no more than one fixed rate of rent. The hereditary village headman pays no more on this account, and collects no more than the old fixed rate, but it does not now suffice for the requirements of the chief, and as noticed before in treating of Gangpore, a practice has arisen of giving as an ordinary contribution, a sum equal to the amount paid as rent, whilst extraordinary contributions are often exacted, and demands made for unpaid labour, which must greatly hamper the productive industry of the cultivators. In Sirgoojah I asked the Rájah and zemindars if all these irregular demands could not be done away with and a fair fixed rent taken in lieu. They expressed their willingness to abide by any arrangement of the kind that I could make, but referred me to the rent-payers and village headmen. *They*, with one consent, refused to acquiesce in any enhancement of rent.

Description of a supposed new Genus of the Gadidæ, Arakan.—By Lieut.-Col. S. R. Tickell, *Bengal Staff.* Plate I.

[Author's date, October, 1862.] [Received 8th June, 1864.]

Order. Malacopterygii subbrachiati.

Family. Gadidæ.

Genus. Asthenurus (mihi).

(ασθενὴς feeble and Ουρὰ Tail).

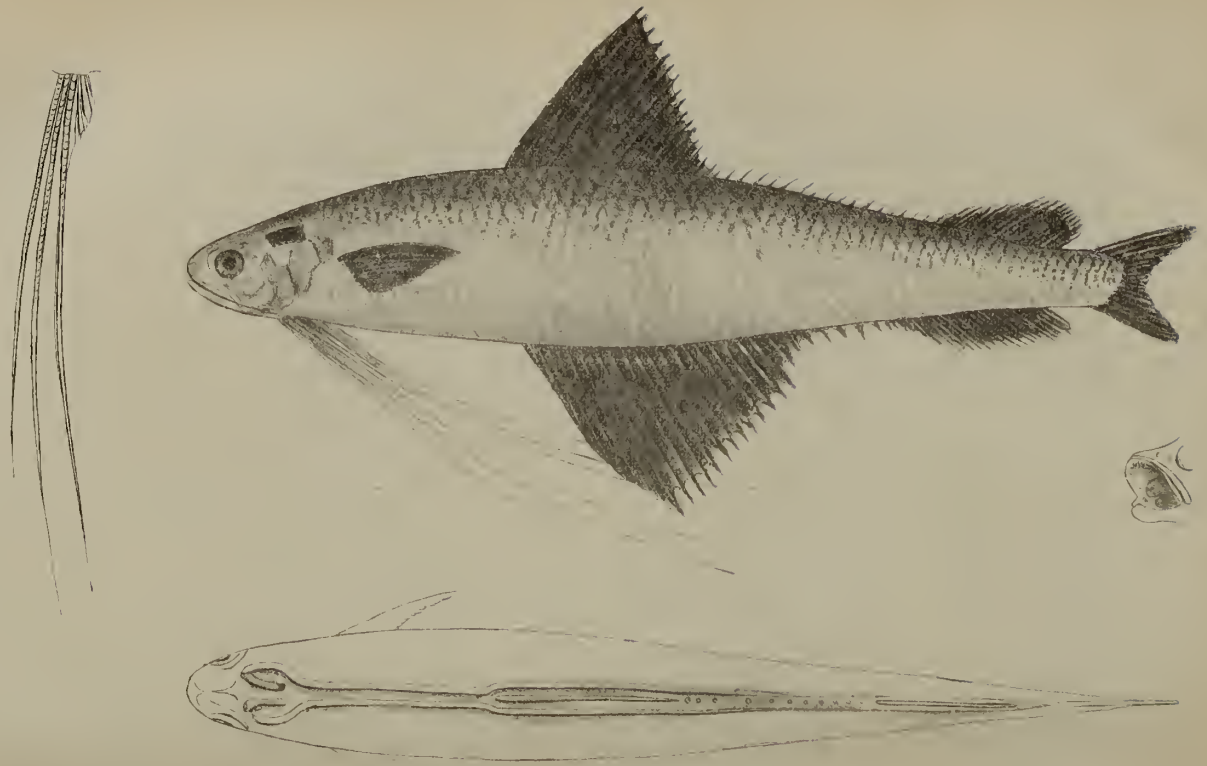
Body rounded—very little compressed—head small, muzzle short, mouth wide with a single row of minute teeth in each jaw, and a band across the anteal part of the palate. Scales of a medium size. No lateral line visible. Fins; two dorsals and two anals, joined by intermediate detached rays, which are partially membraned. The anterior dorsal and anal, quadruple the height of their posterior fellows. Ventrals jugular and filiform. Caudal bilobed and very small. Brancheostegous rays 7.

Asthenurus Atripinnis. Tickell.

Specimen $5\frac{3}{8}''$ long. The largest of 4 or 5 observed, Akyab harbour. Arakan. October 15th, 1862.

Structure. See above for Genus. Body lengthened in the portion of the tail behind the 1st dorsal. Head small; snout short and blunt. Gill plates smooth and smooth-edged, their divisions not very distinct: but suboperculum large: scales medium-sized, semitransparent and deciduous. Along the back, from occiput to 1st D, a mesial groove, with a ridge along each side for the whole length of the fish to caudal. A deeper groove along mesial belly, in which the ventrals can lie encased. Intermaxillary long and narrow, and set with a row of minute pointed teeth jammed close together. Mandibles with a similar row, smaller still. Rest of mouth smooth. Tongue short, round, tied down to floor of mouth. Scales round at free edge, concentrically furrowed; about 67 from gill cover to base of C and 14 tiers. Air bladder large. Its shape and that of the intestines could not be ascertained, as the specimen examined had been a long time in spirits.

Fins. 1st D 20, detached rays 15—2nd D 20.—P, 21.—V 5.—A 20, detached rays 12—2nd A 26.—C 6-13-6.



ON STONE BY H. L. FRAZER

NAT: SIZE

LITH: BY H. M. SMITH. S. G. O. CALCUT

1st D and 1st A have their 5th and 6th rays as long as the greatest depth of the body, the fins decreasing rapidly to the first and last rays. The 2nd D and A are much shorter rayed and close to C, and the space between them and their preceding fins is occupied by a row of short rays each with a basal membrane. Pectoral, small, broad, and pointed. C very small, and bilobed, the lower lobe blunter and shorter than the upper. Ventral, 3 first rays filiform, the 2nd reaching to the space between the two anals; 1st and 3rd a little shorter; 4th and 5th ordinary and membranous.

*Colour.** Pale ochreous grey, or horn colour, blackish along back, from minute dots powdered along edges of scales. Snout and head, red carneous. Iris, greenish silver. Fins black, with whitish bases, except Vs which are fleshy white. A rectangular patch of black above gill plates. Gill plates nacreous.

The specimen here figured is the largest of 4 or 5 obtained in the fish market of Akyab. The fish is not described by Cantor in his ichthyological catalogue of the Straits, and Cuvier and Valenciennes' great work, which is incomplete, does not include the Malacopterygii Subbrachiati. None of the Gadidæ (Cod family) have as yet been noticed in India, and the present subject is one of peculiar interest on that account: that is, if my allocation of it should prove correct, of which I think there can be little doubt, on an examination of the structure of the fish. In the synopsis of Cuvier's Regne Animal there is no genus amongst the Gadidæ which resembles it: but it may rank next to Phycis (Artedi.)

It does not appear uncommon. In October 1862 I procured four or five specimens from the estuary of the Koladyn at Akyab, and from Kyoukphyoo. Two of these I do myself the pleasure of forwarding to the Museum of the Asiatic Society. The alcohol in which they are preserved, has very little affected their natural colour.

* Fresh specimen.

"*On the degree of uncertainty which Local Attraction, if not allowed for, occasions in the Map of a Country, and in the Mean Figure of the Earth as determined by Geodesy; a Method of obtaining the Mean Figure free from ambiguity by a comparison of the Anglo-Gallic, Russian, and Indian Arcs; and Speculations on the Constitution of the Earth's Crust.*"—*By* Archdeacon Pratt.

[Received 4th August, 1864.]

To the Secretary of the Asiatic Society.

Sir,—I beg to forward to you a copy of a Paper lately printed in the Proceedings of the Royal Society (No. 64) on the topics notified at the head of this letter. Two years ago you accepted from me a "Series of Papers on Mountain and other Local Attraction in India," and published in your Journal a memorandum, regarding the effect of local attraction upon the operations of the Great Trigonometrical Survey of this country. The present Paper is not confined to India; but appertains to the globe in general. But as the results of the Indian Survey occupy an important position in the calculations, you may deem it to be not irrelevant to the objects of your Journal to publish some account of it.

The state in which the question of local attraction was left in my former communications to the Royal Society was this:—That in India the deviation of instruments of observation from the true vertical caused by the Mountains and by the Ocean is very great, far greater than had ever been supposed; that this deviation might be much increased or diminished by the effect of variations of density in the solid crust of the earth, but that of the amount of this we have no means of judging, as we are entirely ignorant of the constitution of the crust: and that the effect of local attraction on the Map of India constructed from the Survey would fortunately disappear as far as regards the relative position of places laid down, but that the precise position of the Map on the terrestrial spheroid could not be discovered, as it would depend upon the unknown total resultant local attraction arising from all causes at the station from which the Survey operations commence.

M. Otto Struve has lately called attention to similarly important deflections caused by local attraction in Russia—and especially to a remarkable difference of deflection at two stations near Moscow, only about eighteen miles apart, which is attributed to an invisible unknown cause in the strata below.

It has become, therefore, an important inquiry :—What degree of uncertainty does Local Attraction, if not allowed for, introduce into the two problems of geodesy, viz. (1) obtaining correct Maps of any country, and (2) determining the Mean Figure of the Earth.

These matters are discussed in the present Paper; and I would here observe, that the paper is complete in itself, and does not require a study of the previous communications.

2. With regard to the construction of Maps from Survey operations I show, as before in India, that no map in any other part of the world will be affected except in the way already stated, if the length of every measured arc of latitude is not greater than twelve degrees and a half, and of every measured arc of longitude not greater than fifteen. Now in point of fact, however long the great arcs (such as the Anglo-Gallic, the Russian, and the Indian) may be, they are always broken up into much smaller portions, so as to bring them very far within the above-mentioned limits. Hence the maps constructed from geodetic operations will always be relatively correct in themselves; but the precise position of the map on the terrestrial spheroid will be unknown by the amount of the unknown deflection of the plumb-line in latitude and longitude at the place which fixes the map.

In India the effect of the Himalaya Mountains and the Ocean, taken alone, would throw out the map by nearly half a mile. And, as already stated, there is no way of discovering with certainty how much this is increased or diminished by the effect of variations of density in the crust. If, however, the calculations which I give in the third section of this Paper are accepted, they show that the effect of variations in the density of the crust below almost entirely counteracts that of the mountains and ocean at Damargida in latitude 18° 3′ 15″, and the displacement of the map is almost insensible if fixed by that station. If fixed by the observed latitude of any other station, the map will be out of its place by the local

deflection of the plumb-line at that station. This, in the Indian Great Arc, will not exceed (supposing my reasoning as described below is accepted) one-thirteenth of a mile at any of the stations where the latitude has been observed. It appears also from these calculations, that, except in places evidently situated in most disadvantageous positions, the local attraction is rarely of any considerable amount.

3. In the second section of the Paper I proceed to ascertain the degree of uncertainty introduced, by our ignorance of the amount of local attraction, into the great problem of the Mean Figure of the Earth.

Bessel was the inventor of the method now in use for solving this problem. His method enables us to bring all the arcs which have been measured in any part of the world to bear simultaneously upon the solution. He made use of arcs measured in eight parts of the earth's surface; called the Anglo-Gallic, Russian, Indian II, (or Great Arc), Indian I, Prussian, Peruvian, Hanoverian, and Danish Arcs, the first three of which are very long. For each of these arcs he made use of an algebraical symbol to represent the unknown error of the precise position of the arc on the meridian. In his method he treats these eight quantities as independent variables; which is tantamount to ignoring local attraction altogether. The calculations, therefore, of the Mean Figure of the Earth hitherto made have left this most important element out of consideration. To remedy this has been my object. By a change, I venture to call it a correction, of Bessel's method I have succeeded in obtaining formulæ for the semiaxes and ellipticity of the Mean Figure, which involve expressions for the unknown local deflections of the plumb-line at the standard or reference-stations of the several arcs.

If a and b represent the semiaxes and e the ellipticity, the following are the results arrived at:—

$$a = 20928627 + 1057{\cdot}8t_1 + 342{\cdot}9t_2 + 152{\cdot}3t_3 + 27{\cdot}3t_4 + 93{\cdot}6t_5 + 8{\cdot}8t_6 + 63{\cdot}7t_7 + 62{\cdot}9t_8 \text{ feet.}$$

$$b = 20849309 - 3762{\cdot}6t_1 - 334{\cdot}3t_2 - 661{\cdot}3t_3 - 101{\cdot}5t_4 - 372{\cdot}6t_5 - 14{\cdot}0t_6 - 249{\cdot}3t_7 - 249{\cdot}1t_8 \text{ feet.}$$

From these we may easily deduce the ellipticity

$$e=\frac{1}{263\cdot9}\{1+0\cdot0608t_1+0\cdot0085t_2+0\cdot0103t_3+0\cdot0016t_4+0\cdot0059t_5 + 0\cdot0003t_6+0\cdot0039t_7+0\cdot001639t_8\}.$$

where $t_1\ t_2 \ldots t_8$ are the eight unknown deviations of the plumb-line from the true vertical at the standard stations of the eight arcs arising from local attraction.

These formulæ for the semiaxes and ellipticity of the mean figure of the earth show us, that the effect of local attraction upon the final numerical results may be very considerable : for example, a deflection of the plumb-line of only 5″ at the standard station (St. Agnes) of the Anglo-Gallic arc would introduce a correction of about one mile to the length of the semi-major-axis, and more than three miles to the semi-minor-axis. If the deflection at the standard station (Damargida) of the Indian Great Arc be what the mountains and ocean make it (without allowing any compensating effect from variations in density in the crust below, which no doubt exist, but which are altogether unknown) viz. about 17″·24, the semiaxes will be subject to a correction, arising from this cause alone, of half a mile and two miles. This is sufficient to show how great a degree of uncertainty local attraction, if not allowed for, introduces into the determination of the mean figure. As long as we have no means of ascertaining the amount of local attraction at the several standard-stations of the arcs employed in the calculation, this uncertainty regarding the mean figure, as determined by geodesy, must remain. The effect of our ignorance in this case is far more serious than that already noticed in mapping a country with minute precision.

4. The third section of the Paper is occupied in devising means for removing this ambiguity. Although it has been necessary to *assume* one step in the argument, I think that the sequel shows that a very high degree of probability exists that the process is a correct one.

Each of the three great arcs—the Anglo-Gallic, the Russian, and the Indian—is divided into a number of subordinate arcs. I therefore take each of these three great arcs and apply the method described in the last section to find the semiaxes of the ellipse which best represents that arc. The expressions for the semiaxes involve one unknown quantity, viz. the amount of deflection at the standard station of the arc. In this way I obtain the semiaxes of three ellipses,

involving three unknown quantities. The *assumption* which I then make is, that the Mean Figure of the Earth is a spheroid; that is, that these three ellipses are all the same. The effect of this is to give me four equations of condition, involving the three unknown quantities. These I solve by the method of least squares. The result is that the unknown deflections all come out very small; and the semiaxes of the three ellipses come out remarkably near each other in value. The first part of this result shows, what I have intimated in para. 2, that the local attraction arising from invisible causes hidden in the solid crust of the earth must be such, as very nearly to compensate for the effect produced by visible causes at the surface existing in mountains and oceans. And the second part of the result gives a very satisfactory solution of the problem of the Mean Figure taking local attraction into account, making the semiaxes

$$20926189 \text{ and } 20855316 \text{ feet}$$

$$\text{and the ellipticity} = \frac{1}{295\,3}$$

5. In the fourth or last section of the Paper I enter into speculations regarding the Constitution of the Earth's Crust, suggested by the result of the preceding section. The following extract will best represent my views on this interesting subject :—

"The first thing I observe in the results given in the last paragraph is the very small amount of the resultant deflections at the two extremities of the Indian Arc—Punnœ close to Cape Comorin, and Kaliana the nearest station to the Himalaya Mountains; whereas the effect of the Ocean and the Mountains has been shown to be very large. This shows that the effect of variations of density in the crust must be very great, in order to bring about this near compensation. In fact the density of the crust beneath the mountains must be less than that below the plains, and still less than that below the ocean-bed. If solidification from the fluid state commenced at the surface, the amount of contraction in the solid parts beneath the mountain-region has been less than in the parts beneath the sea. In fact, it is this unequal contraction which appears to have caused the hollows in the external surface which have become the basins into which the waters have flowed to form the ocean. As the waters flowed into the hollows thus created, the pressure on the ocean-bed would be increased, and the crust, so long as it was sufficiently thin to be influenced by hydrostatic principles of floatation, would so adjust itself that the pressure on any *couche de niveau*

of the fluid should remain the same. At the time that the crust first became sufficiently thick to resist fracture under the strain produced by a change in its density—that is, when it first ceased to depend for the elevation or depression of its several parts upon the principles of floatation—the total amount of matter in any vertical prism, drawn down into the fluid below to a given distance from the earth's centre, had been the same through all the previous changes. After this, any further contraction or any expansion in the solid crust would not alter the amount of matter in the vertical prism, except where there was an ocean; in the case of greater contraction under an ocean than elsewhere, the ocean would become deeper and the amount of matter greater, and in case of a less contraction or of an expansion of the crust under an ocean, the ocean would become shallower, or the amount of matter in the vertical prism less than before. It is not likely that expansion and contraction in the solid crust would affect the arrangement of matter in any other way. That changes of level do take place, by the rising and sinking of the surface, is a well-established fact, which rather favours these theoretical considerations. But they receive, I think, great support from the other fact, that the large effects of the ocean at Punnœ and of the mountains at Kaliana almost entirely disappear from the resultant deflections brought out by the calculation.

This theory, that the wide ocean has been collected on parts of the earth's surface where hollows have been made by the contraction and therefore increased density of the crust below, is well illustrated by the existence of a whole hemisphere of water, of which New Zealand is the pole, in stable equilibrium. Were the crust beneath only of the same density as that beneath the surrounding continents, the water would be drawn off by attraction and not allowed to stand in the undisturbed position it now occupies.

I have, in what goes before, supposed that, in solidifying, the crust contracts and grows denser, as this appears to be most natural, though, after the solid mass is formed, it may either expand or contract, according as an accession or diminution of heat may take place. If, however, in the process of solidifying, the mass becomes lighter, the same conclusion will follow—the mountains being formed by a greater degree of expansion of the crust beneath them, and not by a less contraction, than in the other parts of the crust. It may seem at first difficult to conceive how a crust could be formed at all, if in the act of solidification it becomes heavier than the fluid on which it rests; for the equilibrium of the heavy crust floating on a lighter fluid would be unstable, and the crust would sooner or later be broken through, and would sink down into the fluid, which would overflow it. If, however, this process went on perpetually, the descending

crust, which was originally formed by a loss of heat radiated from the surface into space, would reduce the heat of the fluid into which it sank, and after a time a thicker crust would be formed than before, and the difficulty of its being broken through would become greater every time a new one was formed. Perhaps the tremendous dislocation of stratified rocks in huge masses with which a traveller in the mountains, especially in the interior of the Himalaya region, is familiar, may have been brought about in this way. The catastrophes, too, which geology seems to teach have at certain epochs destroyed whole species of living creatures, may have been thus caused, at the same time breaking up the strata in which these species had for ages before been deposited as the strata were formed. These phenomena must now long have ceased to occur, at any rate on a very extensive scale, as Mr. Hopkins's investigations on Precession appear to prove that the crust is very thick, at least 800 or 1,000 miles ; and this result has been recently confirmed by Professor W. Thomson in a paper on the 'Rigidity of the Earth.'"

These results meet with some confirmation from an examination of the direction of the deflection of the plumb-line at several coast-stations where it is drawn *towards* the sea. The amounts of deflection are, however, so small that much cannot be built upon this. This, at any rate, may be said, that they present no obstacle to the theory so remarkably suggested by the facts brought to light in India, viz. that mountain-regions and oceans on a large scale have been produced by the contraction of the materials, as the surface of the earth has passed from a fluid state to a condition of solidity—the amount of contraction beneath the mountain-region having been less than that beneath the ordinary surface, and still less than that beneath the ocean-bed, by which process the hollows have been produced into which the ocean has flowed. These coast-stations do in fact in several instances tend directly to favour the theory, as they seem to indicate, by *excess* of attraction towards the sea, that the contraction of the crust beneath the ocean has gone on increasing in some instances still further since the crust became too thick to be influenced by the principles of floatation, and that an additional flow of water into the increasing hollow has increased the amount of attraction upon stations on its shores.

I am, your's faithfully,

Calcutta, August 2, 1864. JOHN H. PRATT.

Postscript.

[Received 29th April, 1865.]

If the raw or uncorrected results of the Surveys in India and Europe (I mean uncorrected for local attraction) are made use of, they bring out meridians of a slightly different curvature in these different parts of the earth. If these were the true forms of the several meridians the result would be that the equator could not be a circle and the figure of the earth not a spheroid of revolution. A few years ago, General T. F. de Schubert calculated the form of an ellipsoid of three unequal axes which would best suit the observations. Captain Alexander Clarke, R. E. (*Memoirs Roy. As. Soc.* Vol. XXIX, for 1860,) went through the same calculation, following Bessel's method. His result was that the equatorial radius in longitude 14° or thereabouts is one mile longer than that in longitude 104°. He speaks with hesitation regarding the result, on the ground that the data are far too scanty to lead to a conclusion to be relied upon. He appears, however, not to shrink from the hypothesis on which he works, from the true grounds of distrust, viz. (1) the *à priori* improbability that the earth's mean figure is not one of revolution, as the evidence of the fluid-origin of that figure is overwhelming* and (2) that the effect of local attraction is altogether overlooked by him. General de Schubert indeed in a subsequent paper (See *Monthly Notices of Royal Astronomical Soc.* for 1860, p. 264, where it is noticed) does anticipate that local attraction may modify and altogether destroy the data on which he rested the argument of an ellipsoidal figure. The Paper which I have sent to the Society and have noticed in this letter gives, for the first time, a method for estimating the effect of local attraction and proves (in the third section) that so very moderate an allowance as 1″ or 2″ for local attraction will altogether destroy the disparity between the curvature of the different meridians. When the arguments in this paper are impartially weighed I feel convinced that the improbable ellipsoidal theory will be abandoned altogether.

* The evidence, with full details, is given in the third edition of my treatise on the "Figure of the Earth" now passing through the press at Cambridge and a copy of which when published I purpose sending to the Society.

From the above letter it will be seen, that I come to the conclusion that the earth's crust below the mountains is somewhat less dense than below the plains; and still less than below the ocean-bed. Mr. Airy (*Phil. Trans.* for 1854, p. 101) came to the former part of this conclusion. But his argument requires that the crust should be thin—and so thin as to be influenced for its position by the principles of floatation. But Mr. Hopkins' and Prof. W. Thomson's results show that the crust cannot be thin. Moreover Mr. Airy's line of reasoning does not lead to the latter part of the result, in that the crust is more dense below the ocean-bed. For these reasons I have not alluded to Mr. Airy's hypothesis in my Paper. The argument therein explains both these phenomena without requiring that the crust should be thin, but rather the contrary.

Notes to accompany a Geological map and section of the Lowa Ghur or Sheen Ghur range in the district of Bunnoo, Punjab; with analyses of the Lignites.—*By* Albert M. Verchere, Esq., M. D.

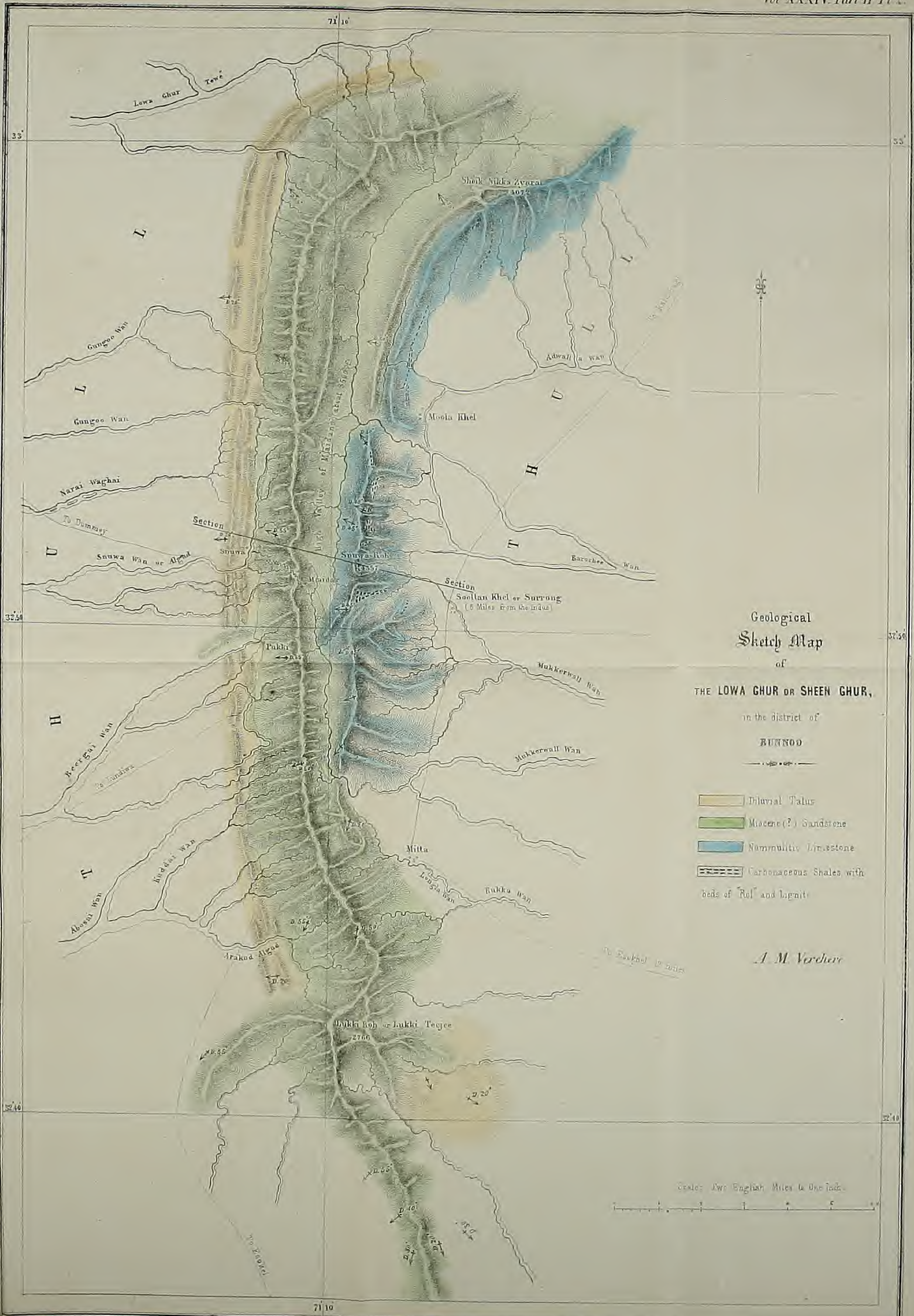
[Received 10th June, 1864.]

Description of the Section, Pl. III.

1. Hillocks or morraines formed by the pebbles and boulders of miocene conglomerates and sandstones which have been removed by the effect of the rains: the sand is carried away to the plain, but the boulders and pebbles are left behind and form a morraine. The stones have arranged themselves in layers resting against the miocene beds, with an inclination towards the plain (W) of 20°.

2. Miocene (?) sandstone, very friable, grey or rather salt and pepper; calcareous and often so soft that it can be crumbled in the hand. It contains boulders and pebbles, well rounded and worn, generally arranged in bands. It is these boulders and pebbles which form No. 1, as No. 2 is being destroyed. The pebbles and boulders are greenstone, quartzite, quartzose porphyry, gypsose agglomerate, carboniferous and nummulitic limestone, etc.

3. Similar to 2, but a little harder, and contains occasionally bands of slate in a state of disintegration. Carbonized wood found here, (seldom,) in an iron-stained sandstone.


71 10
33
Lowa Ghur Tewe
Sheik Nikka Zyarai 4072
Gungoo Wan
Gungoo Wan
Adwalla Wan
Moola Khel
Narai Waghai
To Dummey
Section
Snuwa
Snuwa Wan or Algud
Snuwa Roh
Maidan
Section
Soollan Khel or Surrung
(6 Miles from the Indus)
Barochee Wan
32 50
Pukki
Mukkerwall Wan
Mukkerwall Wan
Beergai Wan
Kuddai Wan
Abosai Wan
Mitta
Longia Wan
Rukka Wan
Arakud Algud
Lukki Roh or Lukki Teejee 2766
To Kolwal
32 40
U L L
T H U L L
T H U L

Geological
Sketch Map
of
THE LOWA GHUR OR SHEEN GHUR,
in the district of
BUNNOO

Diluvial Talus
Miocene (?) Sandstone
Nummulitic Limestone
Carbonaceous Shales with beds of "Rol" and Lignite

A. M. Verchere

Scale: Two English Miles to One Inch.

On transfer paper by Bulloram Nath.

Lith by H. M. Smith, Surv. Genl's Office Calcutta April 1865.

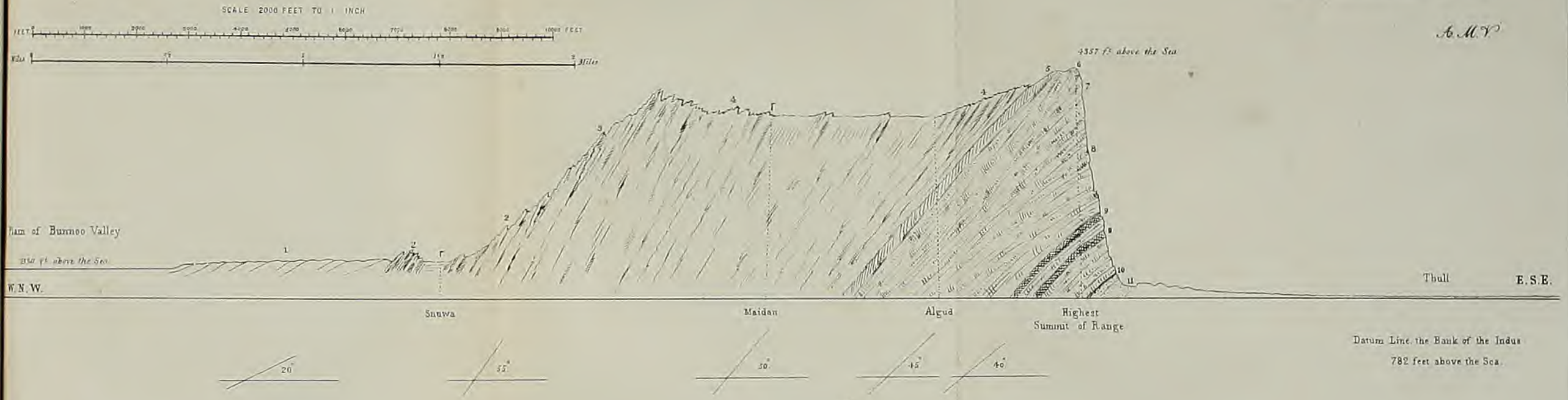
Section across the Lowa Ghur or Sheen Ghur

(also called locally Snuwa, Maidani, Meelakel or Miltah Reh or Pahar)

From Snuwa to near Seoltankel. Direction W.N.W—E.S.E (True Section)

The Nummulitic formation is here well displayed: it has a total thickness of 4500 feet. The Miocene? Sandstone and Conglomerate are much faulted, the faults being parallel to the Strike.

A.M.V.



Datum Line, the Bank of the Indus
782 feet above the Sea.

On Transfer Paper by Sheik Mumeeroddeen.

LITH. BY H. M. SMITH, SURVEYOR'S OFFICE, CALCUTTA, MAY 1866.

4. Harder and greyer sandstone. The bed has been broken up and re-cemented by a coarser, more salt-and-pepper-like sand. The pieces of the original bed are seen sticking out at all angles like drifted ice. On the east side of the valley of Maidani, this breaking up is not observed.

5. Conglomerate composed of yellow limestone pebbles cemented by a very hard calcareous cement. The cement appears first to have coated the pebbles with two or three coats of various shades of yellow or brown, like a calculus of the bladder. This bed is seen always (west of the Indus) on the top of the nummulitic or bottom of the miocene beds. It is striking in appearance, especially when polished by a running torrent.

6. Flesh-coloured, hard, nummulitic limestone, weathering rough, pitted and grey. It contains a few nummulites of small size and a few small bivalves.

7. Limestone, argillaceous and yellow; it is arranged in concentric masses cemented by an earthy marly limestone. Both the rounded masses and the intervening earthy rocks are full of fossils; N. Lœvigata and N. Pushi are abundant; also a small flat species and two species extremely gibbose and always very abundant in muddy nummulitic limestone. Bivalves very numerous. Casts of Trochus very abundant. A large Spatangus, 6 inches across, found here also.

8. Limestone, glaring-white like chalk and not much harder than chalk. It contains the same fossils as the preceding layer, but no Spatangus. It is of very great thickness and forms a high white cliff facing the east and remarkable from a great distance.

9. Slate in a state of decomposition. It is interbedded with limestone and occasionally contains small nummulites; but it is generally without fossils.

10. Carbonaceous shale with beds of "Rol" or alum shale and of lignite. The Rol and the lignite beds are generally in contact with the nummulitic limestone above.

11. Shales of all colours, white, red, yellow, grey, olive, nearly black; very calcareous, with thin beds of muddy limestone (very soft) containing debris of shells, rootlets and stems of plants. No nummulites in these beds. Some of these shales are a good fire-clay and are used to make crucibles. These shales are generally more or less wavy.

Examination of the Lignites.

The following samples were given to me by Lieut. Lane, District Superintendent of Police, Bunnoo.

No. 1.—From a seam newly discovered near Chushmea, north of Moolakhel, 8 miles from the Indus.

Best quality, with a resinous fracture and lustre; jet black in colour; Sp. gravity 1.25.

Volatile inflammable substances,	50
Fixed carbon,	35
Ash,	15
	100

There is a partial caking when the lignite is burnt in a close vessel. The ash is a mixture of a reddish earthy powder, of hardened pieces of slaty shale (holding a little unreduced lignite) and of a fluffy white ash like wood-ash. The red earth and the pieces of shale are mechanical impurities. The white fluffy ash is the proper ash of the lignite.

No. 2.—Best quality, as No. 1. Apparently a very little yellowish white clay adhering to the lignite which is $1\frac{1}{2}$ inch bedded.

From the same locality as No. 1.

Volatile inflammable substances,	50
Fixed carbon,	40
Ash,	10
	100

Same remarks as for No. 1.

No. 3.—Middling quality, the usual quality of the bed. The lignite is in thin plates like leaf bed; each thin plate is sometimes resinous in appearance, but more frequently has the appearance and lustre of charcoal. It contains a considerable amount of yellow clay between the plates. It crepitates in water like salt deflagrating on fire. Its Sp. gravity is 1.28.

From the same locality. Given by Mr. Lane.

Volatile inflammable substances,	25
Fixed carbon,	40
Ash,	35
	100

N. B.—Some of the volatile substances were unreduced in the experiment, and consequently increased the percentage of fixed coal above its proper figure. The ash is mostly a reddish powdery earth with pieces of shale; very little fluffy ash.

No. 4.—Middling quality like No. 3. Structure woody.

Same locality. Given by Mr. Lane.

Volatile inflammable substances,	46.66
Fixed carbon,	20.83
Ash,	32.50
	99.99

Ash, like No. 3.

No. 5. Picked specimen, having the appearance of fine jet. Heavier than the preceding specimens and very resinous in appearance.

Obtained from a native who said that it came from a seam near Sooltan Khel.

Volatile inflammable substances,	46.66
Fixed carbon,	45.
Ash,	8.33
	99.99

The ash was nearly entirely composed of white fluffy ash, like wood-ash. This lignite cakes a good deal in the close vessel.

Average of four analysis of the Chushmea mine.

Volatile inflammable substances,	42.91
Fixed carbon,	33.95
Ash,	23.10
	99.96

I copy here Dr. A. Fleming's analysis of the lignite of Kottree near the Chichalee Pass as it is evidently a continuation of the beds seen a few miles south of the Pass at Chushmea.

Volatile inflammable matter,	36.421
Carbon,	33.579
Ashes,	30.000
	100.000

The coal or lignite from Sooltan Khel (see No. 5) comes nearer to the Baganwallah lignite as analyzed by Dr. A. Fleming. Compare my No. 5 with the following analyses copied from Dr. A. Fleming's report:—

Baganwallah, No. 1.		Baganwallah, No. 2.	
Volatile,	40.64	Volatile,	38.455
Carbon,	41.36	Carbon,	59,705
Ashes,	18.00	Ashes,	1.840
	100.00		100.000

Average.

Volatile,	39.547
Carbon,	50.532
Ashes,	9.920
	99.999

To conclude, I enter here a table of the composition of the lignites of the Lowa Ghur, of Baganwallah, and of the coal of Raneegunj and Sirsol in Bengal and of some coal in the British Islands.

Comparative table of the composition of the Lignite of the Punjab and of the coal of Bengal and of the British Islands.

	Bunnoo.		Salt Range.	Bengal.		Wales.	Scotland.	Wales.		Wailich.
	Chushmea.	Sooltan Khel.	Baganwallah.	Raneegunj.	Sirsol.	Pontypool.	Walls'end.	Bedwas.	Ebbw Vale.	Patent Fuel.
Volatile inflammable matter,...	42.91	46.66	39.547	38.5	36.5	35.18	41.60	28.26	22.50	14.89
Fixed Carbon, ...	33.95	45.00	50.532	51.1	52.5	59.3	47.70	64.80	76.0	82.2
Ash, ...	23.1	8.33	9.920	10.4	11.0	5.52	10.70	6.94	1.50	2.91

ALBERT M. VERCHERE.

Scientific Intelligence.

Mr. T. Tomlinson, late Superintendent of the Barrackpore Park, has recently succeeded in hatching an Ostrich by placing the fresh-laid egg in a box lined with straw and exposing it to the sun by day for some weeks, keeping it under a domestic fowl during the night. To prevent one side of the egg being more exposed than the other, it was occasionally turned over. The new born bird is doing well.

Col. Dalton from Chota-Nagpur announces the discovery of a vein of lead in a hill named Puttia near the village of Pelowa, Tuppeh Ramkola, in Sirgooja.

From an analysis of the specimen forwarded by Col. Dalton, it appears to be pure galena with a small trace of silver and the ore is tractable. When fairly cleared, its value would be in England from 12£ to 13£ per ton. An attempt to work the mine was made, but the outturn not proving profitable, it was abandoned.

The following is from our late Curator :—

Belmont, St. Briavel's,

W. Gloucestershire, Dec. 2, 1864.

My dear Grote,—In the *Reader* for November 19th, you will read that a paper was read by me at the Zoological Society on November 8th; but I was not there, having left a short paper with Sclater. In the *Proceedings*, p. 335 of our Journal, I observe '*Felis Jacquemontii*' mentioned. This I consider to be merely the longer-furred mountain variety of *F. chaus ; F. ornata* too, I now refer to *F. torquata, F. Cuv. ;* and *celidogaster* turns out to be African, and distinct from *viverrina, F. torquata* of Sykes being a striped domestic Indian cat,—at least identical with the latter, whether or not descended from domestic stock. A dead Tiger from Barrackpore is mentioned in the same page of the Journal. I hope this was skeletonized, because I could get you a *Megaceros* skeleton in exchange for it! Lastly, about the "new species of *Varranus*" in the same page, I presume this to be the *Hydrosaurus* noticed by me from the Andamans and Nicobars, which I could not perceive to differ *structurally* from *H. Salvator*. I suppose

you have received Günther's work on Indian reptiles, which will materially assist the study of them. I do not, however, agree with him in all cases; for instance, his identification of the Bengal *Emys ocellata* with the Tenasserim *E. Berdmorei*.—He has certainly not *seen* specimens of the former, and I wish that some could be sent to him. The species is not very commonly brought to the Calcutta bazar, but by offering a slight reward to one of the museum servants a few might be obtained, and there is a good series of both races in the Society's museum. I have written pretty regularly to Jerdon, communicating to him what I learn; but he has not largely availed himself of my notes in his Appendix, and I seldom hear from him. He never was a good correspondent. I certainly told him in good time for publication that the common Indian Curlew is not *Numenius arquata*, but *N. major*, Schlegel, figured in the *Fauna Japonica;* and I sent British specimens of the former to the museum. He is quite wrong, too, in placing the Burmese Peafowl in Asám! The Indian species occurring so far round as Chittagong. The *Gallus Temminckii*, Gray (p. 541,) which he mentions as a peculiar species, is a most obvious hybrid between *bankivus* and *furcatus*, though differently coloured from the so-called *G. œneus*. In p. 481, he is quite wrong in identifying *Turtur chinensis* with *T. tigrinus:* the former is much larger, with quite plain plumage on the back, and is correctly figured by Sonnerat. Both are in the Society's museum. I cannot make out the middle-sized Indian Cormorant erroneously referred to *sinensis* in p. 862. P. 870, l. 3. For "*poliogenys*," read *pyrrhogenys*. P. 597. *T. ocellatus*, the Philippine species (*luzoniensis*, Gm.,) is quite distinct from the Indian *T. pugnae*, to which Jerdon's other synonyms belong. *Arboricola rufogularis*, (p. 598) was sent by Tickell from *Tenasserim*, as noticed in one of my Reports. Another time I will annotate Jerdon's work for you in detail. About the Darjeeling Kalij Pheasant (*melanotus*), these breed at the Gardens, and are distributed, but not any have died, to be promoted to the British Museum. A good pair of skins would accordingly be acceptable. Bruce has sent from China a noble pair of skins of *Crossoptilon Mougolicum*, Swinhoe, (*auritum*, Pallas, apud Sclater,) and ditto of a new species of *Pucrasia*, *P. xanthospila*, E. R. Gray, from the mountains N. W. of Pekin. The sexes of the former only differ in the male being larger

and spurred. Hodgson's *Cr. tibetanum* still remains unique, I believe. The localities assigned to many specimens in the British Museum are unreliable. Thus the Burmese lineated or pencilled Kalij is assigned to Bootan, and various Tenasserim squirrels, also to Bootan, all doubtless from the same collection, but received with the erroneous locality from the old India-house. The distinctions we recognise between Indian, Indo-Chinese and Malayan *faunæ* are little understood by naturalists here who will have *all* alike, to be *Indian*. Günther's *Indian* reptiles, for example. About Sikhim and Asám monkeys. I look upon *assamensis* (original specimen in India museum,) as a mere variety (not unlikely an *individual*, var.) of *rhesus*, wanting the fulvous hue of the hair on the hind-parts. *M. pelops* I know little of, but Jerdon should get this at Másuri. Of the Lungoors, I know nothing of more than one Himálayan species, which is Hodgson's *schistaceus*. Does true *entellus* range, into Asám, and is it not the Hunumán of the table-land of S. India? Is not *priamus* peculiar to the ghâts and mountainous country, as *Johnii* (verus) is certainly peculiar to the W. ghâts? I do not remember who wrote the Review of Jerdon's work in the Annals, and cannot refer to it here. Smythe has yet to shoot the Shau, and perhaps the Tibetan Lynx. Is it the *wild* yak he thinks of sending home alive? The tame breed here as regularly as domestic cattle. A young bull was calved last year, and a cow this year, at the Zoological Gardens; both females hornless. Pallas refers to wild two-humped camels in the Mongolian deserts; and not many years ago the existence of wild yaks was doubted by Hutton and others. In the long stretch of desert country between the Red Sea and the valley of the Nile wild one-humped camels are numerous; and I see no reason why these should not be aboriginally wild, like genuine *Asinus vulgaris* in Africa (the *a. tœnispus*, Henglin). There is a fine male of the latter now in the Zoological Gardens, a most decided and unmistakeable true donkey or *Onager;* and the series of wild asinine animals (including zebras) is complete, every known race or species being represented. All of the animals brought by Thompson were alive when I left London and the Hornbills in first rate condition. The *Aceros nipalensis* would be a grand prize; have not *both sexes* the rufous plumage in the nest? Reversing the usual arrangement, in *Rhynchœa* and in *Turnix pugnax*, the adult females are the

more ornamented, and the young resemble the old males! The old she-rhinoceros soon made friends with the young ones, but is kept separate from them. *Bos sondaicus* did not die from the injury to the foot. That was a very slight affair and soon over; there was a 'gathering,' when the animal walked lame, and he recovered as soon as it was lanced. He grew much, and became in fine condition, and when he died the mass of thickened cuticle had begun to form between the bases of the horns; but the colour of the coat had not begun to blacken. Poor fellow, he is now admirably stuffed, in the *B. M.* He died of inflammation of the bowels. In the Zoological Gardens, are one pair *Arboricola torqueola*, two pairs *Ortygornis gularis*, and one pair of each Indian species of *Galloperdix*, all in first-rate health and condition. The 'blood-pheasant' (*Ithaginis cruentus*) from interior of Sikhim, is a great desideratum. A young African wild boar (*S. Scropha* vera) has been put to *S. Andamanensis*, but I believe with no result as yet. I suppose there is no chance now of getting a boar of the Andamán race. Thanks for the Darjeeling Shrews and Bats, which I look forward with interest to see. F. More, when I last saw him, was mainly interested in insects of economical value, as honey-bees, &c. Has the hive bee of Kashmir ever been scientifically examined? It is likely enough to prove as distinct as the Ligurian Bee. Just before I left London I saw, with Wolf, in spirit, a most curious new mammal, sent by Du Chaillu from Fernando Po. It is an Otter-like modification of the order *Insectivora*, and the most distinct new genus of mammal that has turned up for a long time. It will be figured and described in the forthcoming Number of the *Tr. Z. S.* Size of a large stoat, but more bulky, with tail exceedingly tumid at base, laterally flattened for the remainder. Whiskers very copious, thick and coarse, as in *Cynogale Bennettii*. Eyes small. Two of the hind toes connected, as in so many marsupials. General appearance, colour and fur, very otter-like. Front teeth hooked, approaching to Sorex. Alphonse Milne Edwards has published a monograph on the Chevrotains, upon which part of my note bears. I have sent the particulars to Jerdon, and by the way I wish Jerdon would contribute to the Journal a selection from the many notes that I have sent him. There are two groups of Chevrotains (united by A. Milne Edwards,) viz. *Meminna* of India

and Ceylon, and *Tragulus* of the Indo-Chinese and Malayan countries, —for *M. malaccensis*, Gray = *M. indica*. Of *Tragulus*, there are 3 large races and 3 small, as follow :—

Large.
1. *Tr. napu*, F. Cuv. = *javanicus* apud Gray and Cantor. One specimen in Calcutta museum.
2. *Tr. Stanleyanus*.
3. *Tr.* (like last, but with black sides of neck and breast-marks; in Calcutta museum ♂ ♀, and unknown here.)

Small.
4. *Tr. javanicus* (verus) = *pelandoc*, nobis, from Java only, I suspect, and one ♂ only in Calcutta museum. Numerous specimens in Liverpool museum.
5. *Tr. kanchil*. Extends to S. Tenasserim.
6. *Tr. affinis*, Gray, placed as a synonym of *Kanchil* by Edwards, and the original specimen so named by Gray, from Malacca, is just a *Kanchil* wanting the medial breast-stripe; but others sent by Mouhat from Cambodia appear to be a distinct race, whatever name it may bear. The Society's museum has all but the last, and the specimens should be re-labelled according to this present determination of them.

JOURNAL

OF THE

ASIATIC SOCIETY.

PART II.—PHYSICAL SCIENCE.

No. II.—1865.

Remarks on the Vegetation of the Islands of the Indus River.—By J. E. T. AITCHISON, M.D., F.R.C.S.E., F.L.S., *Extr. Member, Royal Med. Soc., Edin., &c., Asst. Surgeon, Bengal Army.*

[*Received*, 18*th March*, 1864.]

As much interest is being attached to the local production of fire-wood for the use of the steamers that ply on the Indus river, I have the honor to forward the accompanying notes taken during a passage made up that river and its tributary, from Kotree to Mooltan, on board the steamer 'Havelock,' Capt. Davis, Commander, which left Kotree on the 29th of August and reached Mooltan on the 16th of September.

The river at the time of starting was at its highest, inundating much of the country and causing an immense number of islands to be formed in its course.

It is the vegetation of these islands I would describe. It is not very extensive, but what there is of it is turned to much account and might be to more.

The following is a list of the Flora met with, viz.:—

Acacia Arabica, L.

A. Arabica, var *Cupressina*.

Prosopis spicigera, L.

Populus Euphratica, Oliv.

Tamarix Indica (= T. Galliea, L.)
T. Dioica, Roxb.
T. Orientalis.
Phœnix Dactylifera, L.
Saccharum Munja, Roxb.
S. spontaneum, L.
S. cylindricum, Lam.
Typha (angustifolia ?)

Creeping amongst the above, climbing to the top of all, shewing off its lovely flowers, was Aselepias rosea, Roxb. in great beauty.

Acacia Arabica, 'Bubber' (Scindee,) 'Babool' (Hind.) 'Kekur' (Punjabee). *A. A. var Cupressus*, 'Caublee-bubber' (Seindee).

This tree with its variety grows in very great luxuriance and tolerably rapidly, and within 60 miles of Kotree it is in much greater abundance than further up the river; it here forms dense jungles and yields very fair timber. The tree itself is too valuable to be directly used for firewood, its chief timber being used for railway sleepers; the rest of the wood and branches only are converted into firewood or charcoal, and the bark and fruit reserved for tanning purposes.

A tree (as it stands) that can yield from two to three sleepers, costs one Rupee, the buyer felling and carrying it away. White ants do not injure the felled logs much, and the old wood is tolerably proof to their attacks.

The timber of the Cupressiform variety is considered the bet er, being closer in grain, and harder than that of the common outspreading tree: being also of greater length, and thus generally giving an additional sleeper.

Prosopis spicigera, 'Kunda' (Seindee,) 'Jand' (Punjabee).

This tree is not common on the Balaas; indeed it is scarcely to be seen in any quantity until we get above Sukker, and then chiefly on the mainland, where it is obtained largely, especially at one of the river wood stations called Jummalee.

Its wood is good for fuel, but alas, too readily attacked by white ants. These insects seem to relish it more than any other of the woods, and from the great loss it suffers from these destructive insects

whilst stacked, its collection for the supply of the steamers is prohibited.

For the reasons given against its being stored for fuel, its timber is likewise not used by the natives for any purpose whatever, when other can be obtained.

The fruit, however, called in Scindee "Singhar," is considered an excellent vegetable, and is largely eaten by the natives in their *thurkaries*.

Populus Euphratica, 'Bahn' (Scindee and Punjabee,) grows in great abundance on the Balaas, but more especially about a hundred miles above Kotree. It is a rapidly growing tree, producing very fair timber, with a white light wood, very useful for furniture and household-work of a light nature, but which does not stand much strain. It is a very dangerous article as fuel in steamers, or when used for the railway, as the wood, owing to its lightness, flies up through the flue when only half burnt. The officers commanding the steamers are very careful that none is ever taken on board, even by mistake, from the danger attendant on its use.

The timber for furniture costs about 5 annas a cubic foot.

Tamarix Indica, 'Laee' (Scindee,) 'Jhao' (Hind.) 'Furash' (Punjabee).

This may be considered as the chief source of firewood from Mooltan to Kotree. It grows in immense quantities, but above the union of the five rivers with the Indus, it becomes gradually replaced on the Balaa land by the *T. dioica* and it becomes more abundant on the mainland, where we find the *T. orientalis* also occurring, but as a very much larger tree. These were all in blossom in September, presenting a very heath-like appearance just before the flowers expanded. The *T. Indica* like all its congeners, grows very rapidly, producing in three or four years a deep red wood, very much like the Beef wood of Australia. At this age it is best for fuel: the white and young wood makes but poor fuel, and is also rapidly destroyed by the white ant; whereas the red wood may lie for nearly four years without injury; but as it becomes completely dried and aged, it becomes more liable to the attacks of these insects. The cost of this wood at the river stations is 15 Rupees for 100 maunds.

Tamarix dioica, 'Pilchee,' (Scindee and Punjabee,) first met with in any abundance on the Balaas near Bukree; above that station it gradually takes the place of *T. Indica*. It is greatly used for all thatching purposes, basket-work, &c.

Tamarix orientalis, 'Asree-loua' (Scindee,) is an unknown tree on the Balaas, but on the mainland it not unfrequently forms a prominent object in the landscape, generally near villages. The tree lives best in a dry and salt soil, where it very rapidly produces large timber, but this does not make such good fuel as the *T. Indica*.

The native names of these Tamarisks are much confounded even by the natives themselves. The name 'Furas' in the Punjab is applied to all, but chiefly to *T. Orientalis*. They are so very much like each other that this is not to be wondered at. Edgeworth, in his Flora Mallica, calls *T. dioica*, 'Lai,' and *T. Gallica* (= *T. Indica*) 'Pilchi.' I would consider the Scindee names as typical, from their being connected with something further than simply the tree as it grows, viz. in the one case the value of the wood for fuel, *T. Indica*, 'Laee,' 'Jhao;' in another the use of the shrub for thatching purposes and the known fact of this kind never producing wood, *T. dioica*, 'Pilchee;' and lastly with the fact that it forms a large tree, the wood of which is not so good for fuel, *T. Orientalis*, 'Asree-loua.'

Phœnix dactylifera, is occasionally to be seen on the Balaa land between Sukker and Mooltan, where it is very common on the mainland also. A splendid grove of these trees, surrounding Sukker, is seen from a long distance off. After leaving Kotree some forty miles, we see none of this tree until Sukker comes in sight, whereas round Kotree it is very abundant, and at and near Mooltan it is also very abundant.

Saccharum Munji, 'Moonj,' (Scindee and Punjabee). Thousands of acres of river land are covered with this useful grass, the value of which might be greatly raised by the introduction of machinery for converting it into pulp for the Paper Maker. And Sukker would be the place for starting such an establishment, as it grows chiefly above Sukker, to which place it could be floated down the river at little or no cost. This very floating down would aid in the treatment required by all fibres to bring them into a fit condition for working. The surrounding country yields immense quantities of an Alkali

(Sugee-muttee) with which the material could be cheaply bleached, then to be forwarded to England, to be converted there into finer pulp and paper.

The great outcry at home since the commencement of the cotton famine has been for material, capable of being converted at a cheap rate, into paper of a fine quality. Coloured materials require much bleaching, and this in England is the expensive part of the process. Now if such a material as Moonj, which costs at the place of growth little more than the labour of cutting, could be bleached thoroughly with the alkali produced on the banks of the river, this would supply the great desideratum of the paper-makers.

Esparto (*Stipa tenacissima*) has been very largely used in England within the last three years, but its great drawback is the expense of bleaching it.

The Moonj is largely employed by the native boatmen in making ropes for their boats, which they manufacture for themselves.

Saccharum spontaneum, 'Khaus' (Scindee.) This grass grows in great luxuriance. It is chiefly used for thatching purposes, and makes tolerably good grazing for cattle, although as it ages it becomes a very rough coarse grass, when the cattle seem to leave it alone. It begins to flower early in September, and its flowering has just ceased, when the *S. Moonja* commences to flower, which is about the beginning of October.

Typha (angustifolia?) 'Pun' (Scindee,) is very common in the back waters, but more especially above Sukker. I cannot say it is even common below Sukker. The leaves are largely used for making matting (chuttie) and the soft down attached to the ripe fruit is used for stuffing pillows. The pollen is said by Lindley to be converted into bread in Scind. Although I made many enquiries relative to it, I could get no information about it.

On examining the wood brought on board the steamer, (about which Capt. Davis gave me every information and assistance in his power,) I found that nearly the whole of it consisted of the wood of the *Tamarix Indica*, and the wood was called Jhao. We occasionally took on board that of the *Acacia Arabica* called 'Bubber.' But I had to procure specimens of that of the *Prosopis Spicigera* called 'Kunda,' and of the *Populus Euphratica* called 'Bahn.'

The Captain considered the billets that were large enough to be split into two, of the Jhao, when it was "as red as beef" as the best wood on the river. But his heart used to long for the wood he once got when up the Jhelum river. "*Cows*, that's the thing for driving the engines." *Olea Europea*, 'Cow' (Punjabee.)

Immense injury is done to the wood after it is collected at the wood stations, by white ants, which will, in a very few days, if not carefully looked after, destroy a stack, leaving a mass of mud in place of the original wood. White ants will not attack the Jhao, if the wood is red, to the same extent that they do the other kinds of wood.

The soil of the Islands varies very much. It consists nearly altogether of a rich alluvial deposit at Kotree, gradually becoming more sandy as we ascend the river. This change to a sandy soil is very much more marked above Sukker, after which the soil really seems to be all sand with no earthy matter. Owing to this change in its composition as we gradually get above Kotree and approach Sukker those massings of the *Acacia Arabica* that we had down the river become less numerous and thinner: until at last by the time we have reached the junction of the five rivers with the Indus, we lose them altogether, as well as the *Tamarix Indica*, which is now replaced by the *T. dioica*. Moonj gets abundant above Sukker and the Islands are very much less wooded, being more covered with grasses.

I have no doubt that much of this river land which at present really lies waste, might be, with a little care and management, covered with trees capable of yielding both timber and firewood. We should look to timber as the ultimate object; in doing so, we obtain firewood as a collateral result. In covering these islands with vegetation we aid in rendering them somewhat more permanent than they are at present, by the roots grasping and keeping together the soil.

The following may be considered the history of one of these islands that may have remained permanent.

In the month of September as the river falls, a mound of sand gradually appears, enlarging daily as the river becomes lower, and bare and barren. But as the September winds blow, they carry clouds of the seed of the *Saccharum spontaneum* from other islands; these fall on the soil and then readily germinate. In a couple of months the

S. spontaneum has sprung up, and its leaves now aid in catching the seeds of the *Tamarix* and *S. Munja*, which having ripened, are flying about at the mercy of the winds. The two latter lie dormant until the next year. In the meanwhile the *S. spontaneum* for a short time kept down by the cold season and eaten over by the cattle, has its growth stopped until March or April, when it springs up, and by September is in its full growth and blossom. The *Tamarix* and *S. Munja* being now, on the rising of the river in August, placed under favourable circumstances, begin to grow rapidly, and by the end of the second year cover the Balaa, killing out *S. spontaneum* to a great degree. Upon the island being flooded at the end of the second year, the vegetation on it catches the seeds floated down by the river, and these in their turn germinate and gradually develope a jungle. At very little expense, indeed, many of these Balaas might be sown broadcast with the seeds of timber trees, (*Acacia* or 'Sissoo' are undoubtedly the best) about the beginning of August. When the river rose it would cover the islands and deposit sufficient alluvial soil to permit their germinating and taking root. The seeds would not be carried off by the currents, as they become entangled in the grass, which after an inundation is generally seen pressed flat to the surface with a large amount of alluvial deposit keeping it down.

Developing jungles on these islands, would not only supply timber, firewood, &c., but by making the islands permanent, would to a great extent assist in forming a permanent channel for the river, the absence of which is one of the great difficulties to be overcome at present by the navigator.

Observations on certain strictures by Mr. H. F. Blanford, *on my Paper on the distribution of Indian Gasteropoda in J. A. S., No. CCLXXXIX. Page* 69.—*By* W. Theobald, *Jr.*

(Received 21st May, 1864.) (Read 1st June, 1865.)

My friend Mr. Blanford, loc. cit., after reading the above paper, among other remarks, expresses himself as follows:—"The sporadic origin of species is not held by any eminent naturalist of the present day, and Mr. Theobald had advanced no instance in its favour."

Now the peculiar distribution of a few species over an enormous area, was the reason for my preferring the supposition of a sporadic origin for them at least as the only intelligible one, and if for the majority of species, this view is not so imperatively requisite, yet for such species as *Bulimus pullus*, *B. punctatus*, *B. gracilis*, *B. cœnopictus*, and others, it naturally suggests itself, though I doubtless must have expressed myself so badly as to warrant Mr. Blanford in denying my having "advanced any instance in its favour." Rejecting however, the obvious view, as I hold it to be, of sporadic origin, it yet remains to be seen what explanation consonant with the Darwinian hypothesis, can be offered, and I shall eagerly listen to Mr. Blanford's suggestions on this point.

I see of course, that in terming the origin of any species "sporadic," I explain nothing, and that it amounts to a confession of ignorance, still this is a negative evil and leaves the ground clear for any superstructure which fresh light may enable us to add, but not so a positive assertion of a law, which, however, applicable in some cases and true to some extent, does not meet all, and appears contradicted by some. I will now advert to the first portion of Mr. Blanford's stricture to the effect that I held views which no eminent naturalist did, and certainly such a statement was not encouraging, but on returning to station within the last month, I accidentally came across a work which considerably reassured me; though how far Mr. Blanford will admit the names of A. A. Gould and Louis Agassiz to be eminent in their department, after the quotation I shall presently make, I cannot say. Any how I find in the "Principles of Zoology" by those Professors, my identical theory

laid down, on precisely the same grounds of certain peculiarities in the distribution of Fish, which appeared to me (though unhappily not to Mr. Blanford) so convincing in the case of the Land Shells of India.

So identical are the results and the proofs in either case, that I think it necessary to say, that till the present month, I had never seen the work I am about to quote from, or any writings whatever of either Gould or Agassiz, and that my views of the sporadic origin of certain species of shells were deduced from considerations touching their distribution, and in ignorance of similar arguments, derivable from the study of an entirely different class.

The following quotation from page 211 of the Principles of Zoology will prove how closely the estimate I formed of the practical effects of accidental distribution, corresponds with that held by Gould and Agassiz.

"448. Other causes may also contribute towards dispersing animals. Thus the sea-weeds are carried about by marine currents and are frequently met with far from shore, thronged with little crustaceans which are in this manner transported to great distances from the place of their birth. The drift wood which the Gulf Stream floats from the Gulf of Mexico even to the western shores of Europe is frequently perforated by the Larvæ of insects, and may probably serve as depositories for the eggs of fishes, crustacea and mollusks. It is possible also that aquatic birds may contribute in some measure to the diffusion of some species of fishes and mollusks, either by the eggs becoming attached to their feet or by means of those which they evacuate undigested after having transported them to considerable distances. *Still all these circumstances exercise but a very feeble influence upon the distribution of species in general, and each country none the less preserves its peculiar physiognomy so far as its animals are concerned.*

"449. There is only one way to account for the distribution of animals as we find them, namely to suppose they are *autochthonoi*, that is to say that they originated like plants, on the soil where they are found. *In order to explain the particular distribution of many animals, we are even led to admit that they must have been created at several points of the same zone, an inference which we must make from*

the distribution of aquatic animals, especially that of fishes. If we examine the fishes of the rivers of the United States, *peculiar species will be found in each basin, associated with others which are common to several basins.* Thus the Delaware river contains species not found in the Hudson. But on the other hand, the pickerel is found in both. Now, if all animals originated at one point and from a single stock, the pickerel must have passed from the Delaware to the Hudson or vice versâ, which it could only have done by passing along the sea shore or by leaping over large spaces of terra firma; that is to say, in both cases it would be necessary to do violence to its organisation."

This last argument must of course stand for what it is worth, and were it alone, would not be worth much, but we have here, with fish, as I have shown to be the case with Gasteropods in India, the grand fact of certain few species of enormous range, compared with the limited extent of their more numerous congeners and the absurdity of supposing that they have been thus widely distributed by any physical agency, which has left the *great majority unaffected by its operation.* Hence my reasons for leaning towards the "sporadic" theory, for some species at least, not *singly* at all events, I am glad to see, if however, in company with no other physiologist than Louis Agassiz. I cannot conclude these observations without quoting a passage from the vitriolic pen of Dr. Knox, in his work on Race, where, though he holds that "Time and developement change all things" (page 94,) yet is very bitter on the absurdity of supposing that ACCIDENT has anything to do with such changes. Knox on Race, page 90, "When I am told that there is a short-legged race of sheep somewhere in America, the product of accident, my reply is simply, I do not believe it, even although to make the story look better, it has been added that from among the few short-legged sheep *accidentally* produced in the flock, the owner was careful to extrude the long-legged ones, and so at last his whole flock became short-legged, *and he had no more trouble with it.*—It is the old fable of Hippocrates and the Macrocephali reduced to something like a scientific formula. Transferred from sheep, it has been made the basis of a theory of race of mankind, reducing all to *accident.* By accident a child darker than the rest of the family is born; when this happens in the present day, it is also by courtesy called an accident, but its nature is well

understood—not so in former times. This dark child a little darker than the others separates with a few more from the rest of the family and sojourns in a land where a hot sun embrowns them with a still deeper hue. In time they become blacker and blacker or browner and browner. Should they travel north instead of south, it is all the same; for extreme cold produces the same effect as extreme heat! This is ancient and modern physiology!"

Note relating to Sivalik Fauna.—By H. B. Medlicott.

[Received 7th September, 1864.] [Read 7th September, 1864.]

The notice I have to bring before the Society may be considered a continuation of a series of brief but important communications, commenced more than thirty years ago, and continued during some twenty years, as recorded in the volumes of the Journal of the Asiatic Society for that period. Those communications formed a current chronicle of the discovery of the *Fauna Sivalensis*. Had the account of those discoveries ever assumed a more connected and complete form, the correction I have now to make, would never have been needed, as it is but the statement of a fact, of which the evidence was in hand and in mind, although never expressed. Indeed, for the same reason, this fact can now be only indicated, its value being still unknown. This fact is—the existence of two vertebrate faunæ, possibly quite distinct, among the fossils hitherto collected from the so-called Sivalik rocks.

In a recently published number of the 'Memoirs of the Geological Survey of India, Vol. III. Part 2, I have given a somewhat detailed account of the geology of the Sub-Himalayan region in North-West India. I therein established a threefold division of the great series of deposits coming under the general title of Sub-Himalayan. Concerning the lowest of these groups (Subathu, etc.) little or no conflicting evidence presented itself. The two upper groups I described as in all respects more akin to each other, although still most clearly separable along a well marked boundary, at which the younger strata overlap the steeply denuded edges of the older, besides being

largely made up of their debris. Such evidence is so immutable to the geologist, and, when on so grand a scale, entails such grave considerations of time, that I presumed to call in question the one published statement (in Vol. III. p. 527 of the J. A. S. B. for 1834) of vertebrate Sivalik fossils having been found within the area of the older groups, not having myself succeeded in re-discovering fossils at the locality indicated. My scepticism was of course based upon the *a priori* consideration of geological time; and because, as I state at p. 105 of my Memoir, no corresponding distinction has as yet been suspected by the authors of the *Fauna Sivalensis*. I made due attempts to authenticate the observation which I had called in question by referring to the original discoverers; as, however, in every reply I received, there was some trace of ambiguity, not wishing to give further trouble to my correspondents, I published the whole case in its unsettled form, giving full directions for the application of the verdict on either side (see pp. 15, 16, 104—6, of my Memoir). I have now the pleasure to announce this verdict; and, notwithstanding the precaution I took to provide for its application, the fact cannot well be stated without a few words of explanation.

In a letter dated the 16th July, 1864, Sir Proby Cautley tells me that he has himself collected fossils on the north side of Nahan *i. e.* in the rocks of my middle group, the same in every respect as those he had found more abundantly at the south base of the Sivalik hills, east of the Jumna. The peculiar mode of occurrence of these fossils in the nodular clays ('clay-conglomerate' of Cautley), as compared with those found in the coarse gravel deposits, could not escape observation. The former were all small and fragmentary. Large masses of the clay had to be carted from the hills and broken up at leisure in search of the fossil remains. I need scarcely, however, state that the Sivalik fossils have hitherto been given and received as one undivided fauna. Every one interested in these subjects will join in the regret expressed by Sir Proby Cautley that it is now impossible to work the question out, unless upon fresh materials. He informs me that the large collection of these smaller fossils, sent by him with the others to the British Museum, is now not to be found.

To palæontologists then, we may now announce that a most interesting case awaits their investigation, namely, the comparison of well

represented vertebrate faunæ, occurring in a series of beds, closely related in point of geological conditions of deposit, etc., and yet distinctly separated (broken) in time.

The application of the fact to stratigraphical geology may now take shape. The strata at the base of the sections visible in parts of the Sivalik hills are representations of the Nahun group—the middle group of the Sub-Himalayan series. The expression of this on a map must still be arbitrary : for the true Sivalik strata (though so strongly unconformable with the 'Nahun' strata along their junction with the inner zone of these Nahun rocks,) appear to pass conformably and even by gradation into the representatives of the Nahun strata in the outer zone. It is of course to be expected that a very close study will reveal traces of this unconformability in the sections of the Sivalik hills also; but in such massive, banked strata, from twenty to two hundred feet thick, the determination of such a feature will be very dubious.

In physical geology this feature will be only another example, on a larger scale than those given in my Memoir, of the supposition I have offered in explanation of the mode of disturbance of all these Sub-Himalayan rocks—slow contortion and upheaval along narrow zones synchronously, with more or less uninterrupted deposition in the adjoining exterior area.

Contributions to Indian Malacology, No. V. Descriptions of new land shells from Arakan, Pegu, and Ava ; with notes on the distribution of described species.—*By* William T. Blanford, *A. R. S. M., F. G. S.*

[Received 11th March, 1865.]

Order,—PULMONIFERA.

Family *Helicidæ*.

Genus NANINA.

Section *Macrochlamys*.

1. N. compluvialis, n. sp.

Shell perforated, subglobosely depressed, thin, light-coloured, horny, smooth, polished, diaphanous, very minutely striated. Spire convex ; suture in a deep and rather broad groove, which becomes obsolete at the apex. Whorls $4\frac{1}{2}$, convex, sharply angulate above at the edge of the sutural groove ; the last not descending near the mouth. Aperture, oblique, irregularly lunate, of the same form as the whorls, nearly equal in height and breadth ; peristome thin, in one plane, simple ; margins distant, columellar briefly reflexed at the perforation.

	Millem.	inch.
Major diameter, ...	10	0.4
Minor ditto, ...	9	0.36
Axis, ...	$6\frac{1}{2}$	0.26

Aperture 5 millem. broad.

Habitat—Arakan hills.

This shell is closely allied to *N. convallata*, Bens. of the Tenasserim provinces, and replaces that shell in Arakan. It is distinguished by the smaller number of whorls, while the singular sutural channel is even more developed, but it varies slightly in size.

2. N. nebulosa, n. sp.

Shell minutely perforated, conoidly depressed, thin, light horny, not polished, minutely striated, and possessing a dull greasy lustre. Spire conoidal ; apex rather acute ; suture impressed. Whorls 6, convex above ; the last rather broader, subangulate above the periphery rounded beneath. Aperture slightly oblique, lunate, the breadth greater than the height ; peristome simple, thin ; columellar margin vertical, slightly reflexed.

	Millem.	inch.
Major diameter, ...	11½	0.46
Minor ditto, ...	10	0.40
Axis,.....	6	0.24

Aperture 6 millem. broad, 4½ high.

Habitat—Akoutoung on the Irawady, below Prome, Pegu.

This species may be distinguished from its numerous allies of the *Macrochlamys* section by its blunt angulation at the periphery and its dull lustre. Its nearly vertical mouth amply serves to shew its distinction from *N. honesta*, Gould, which shell moreover is more polished, and differs in several other particulars.

3. N. HYPOLEUCA, n. sp.

Shell openly perforated, depressed, very thin, smooth, polished, horny; dark brown above; lighter, frequently white below; faintly striated, obliquely above, radiately below, with extremely fine concentric microscopic markings, which are frequently obsolete. Spire very little raised; apex rather obtuse; suture impressed, sometimes sub-marginate. Whorls 5, rather convex above; the last rather broader, rounded beneath, not descending. Aperture lunate, the breadth exceeding the height, nearly vertical; peristome acute, straight; columellar margin descending with an oblique curve, scarcely reflexed.

	Millem.	inch.
Major diameter,.....	12	0.48
Minor ditto, ...	10½	0.42
Axis, ...	6	0.25

Habitat—Akoutoung, Pegu. Scarce.

Near *N. causia*, Bs., but larger, more depressed, and with far finer microscopic spiral sculpture; so fine indeed that it is difficult of detection even under a powerful microscope. *H. hypoleuca* may be recognised by its pale base, and dark horny colour above, and by its open perforation.

A small form, perhaps identical with the above, but only 5 or 6 millemetres in diameter, is common in northern Pegu. I had confounded it with *N. causia*, Bens., but Mr. Benson informs me that

that species is very different. This small form differs from *N. hypoleuca* in its more marked spiral sculpture, which, however, is still microscopic.

Section *Hemiplecta.*

4. N. UNDOSA, n. sp.

Shell narrowly umbilicated, depressed, rather solid, white (? horny when fresh,) peculiarly marked with irregularly sinuous close spiral sculpture resembling scratches, and crossed by oblique lines of growth. Spire very depressly conoid; apex obtuse; suture impressed. Whorls 5, rather rapidly increasing, somewhat convex; the last broader, rounded at the periphery and below; the spiral sculpture passing over the periphery and gradually dying out on the lower surface, which is marked by radiating striæ. Mouth diagonal, broadly lunate, equally broad and high; peristome simple, acute; margins distant, united by a callus; columellar margin oblique, shortly reflexed above.

	Millem.	inch.
Major diameter,.....	36	1.45
Minor ditto, ...	31	1.24
Axis, ...	21	0.84

Aperture 18 millem. broad.

Habitat—Shan Hills, east of Ava. Distinguished by its peculiar sculpture; which somewhat recalls that of *Nanina Humphreysiana*, Lea. All the specimens found were dead and bleached; fresh specimens possibly possess a coloured epidermis.

Section *Sesara.*

5. N. HELICIFERA, n. sp.

Shell imperforate when adult, but with a deep umbilical hollow; young specimens deeply perforate; conoidly trochiform, subcampanulate, thin, horny, sharply and arcuately costulated above, the costulation continuing over the periphery; smooth, polished and finely striated beneath. Spire conoid, sides convex; apex rather obtuse; suture impressed. Whorls 7—7½, closely wound, convex, increasing very slowly; the last angulate at the periphery in adults, sharply keeled in immature specimens, flattened beneath, more convex near the mouth, with one or two small, irregularly shaped indentations, (which are mostly opaque from a coating of white callus within the shell), on the lower surface, generally at a distance of about ½ a whorl from the

mouth. Aperture oblique, lunate, the breadth double the height, columella furnished with a spiral lamina which runs throughout the whorls, and renders the shell opaque around the umbilical excavation. Peristome simple, very slightly thickened inside, arcuate at the base of the right margin; margins distant, the columellar obliqne.

	Millem.	inch.
Major diameter,.....	10	0.4
Minor ditto, ...	9	0.36
Axis,...	7	0.28

Apertnre 4 millem. broad, 2 high.

Animal small with a very narrow foot, a very small mucus pore at the end, and a small lobe above.

Habitat—Arakan hills near Prome; more abundant on the Arakan than on the Pegu side.

This very pretty little snail, which is nowhere common, is remarkable for the screw like lamina on the columella, running up throughout the whorls. The indentation on the base of the lowest whorl is also peculiar; it varies considerably in position and form, being sometimes double, but it is almost always present. The animal bears a great resemblance to that of *Nanina pylaica*, Bs.

The subgenus *Sesara* was founded by Albers for *Nanina infrendens*, Gould, (supposed at first to be a *Helix,)* a peculiar little Molmein shell with teeth inside the peristome. I have no hesitation in uniting to this species, besides the closely allied *N. capessens*, Bens., the *Tridopsis*-like *N. pylaica*, Bs, and the present species, as well as the two following. *N. pylaica*, *N. capessens*, *N. infrendens*, and the present species are all distinguished by peculiar additions to the peristome, and form together a well marked group, all being more or less depressly trochiform, horny, with closely wound narrow whorls, arcuately costulate above, and smooth beneath.

N. helicifera was found rarely on the road between Prome and Tongoop, and somewhat further south. In the Bassein district it appears to be replaced by *N. Basseinensis.*

6. N. MAMILLARIS, n. sp.

Shell minutely perforated, very depressly trochiform, suborbicular, thin, horny; finely, closely and arcuately costulated above, the costulations passing over the periphery; smooth, shining, and radiately

striated beneath. Spire depressly conoid, with convex sides, the apex slightly acuminate and papillar; suture but little impressed. Whorls $7\frac{1}{2}$, convex, closely wound, slowly increasing; the last sharply keeled, flatly convex beneath, marked in nearly adult and sometimes in full grown specimens, with two or three small pits of variable form, opaque from corresponding internal calli, and generally arranged in an oblique line opposite to the mouth. Aperture oblique, subrhomboidally lunate, 3 times as broad as high; columella furnished in young specimens with a more or less rudimentary spiral lamina running up the whorls, which is obsolete in adult shells. Peristome thin, slightly curved forwards at the base; margins distant, columellar margin very oblique.

	Millem.	inch.
Major diameter,.....	11	0.44
Minor ditto, ...	10	0.4
Axis, ...	$6\frac{1}{2}$	0.26

Aperture $5\frac{1}{2}$ millem. broad, scarcely 2 high.

Animal similar to that of *N. helicifera*.

Habitat—Akoutoung, Pegu—not rare.

The close relation of this species to the last is unquestionable; besides resembling it in general form, texture, and sculpture, and in the characters of the animal, young specimens possess a similar columellar fold, and indentations on the lower surface somewhat resembling those of *N. helicifera*, though less deep and more opaque. Both these characters, however, appear to become obsolete in adult specimens of the present form. The two species are easily distinguished by the absence of the columellar lamina in adults of *N. mamillaris*, which may also be recognised by its acuminate apex, lower spire and flatter base.

7. N. Basseinensis, n. sp.

Shell minutely perforated, globosely trochiform, subcampanulate, thin, horny, closely, sharply and arcuately costulated above, the costulations passing over the periphery to the under surface, which is smooth, shining, and radiately striated. Spire obtusely conoid, with convex sides; apex obtuse; suture slightly impressed. Whorls 7, slightly convex, closely wound, slowly increasing; the last not descending, flatly convex beneath, more tumid near the mouth, keeled

at the periphery, the keel vanishing near the mouth. Aperture lunate, oblique, breadth more than double the height; peristome thin, curved forwards at the base; margins distant, columellar oblique.

	Millem.	inch.
Major diameter,.....	11	0.44
Minor ditto, ...	10	0.4
Axis, ...	$7\frac{1}{2}$	0.3

Aperture $5\frac{1}{2}$ millem. broad, 2 high.

Habitat—Southern portion of the Arakan range of hills near Bassein and Cape Negrais.

This shell is distinguished from *N. mamillaris* by its non-acuminate apex, higher spire and more convex base, and from *N. helicifera* by the absence of the columellar lamina, of which no trace appears in the present species. It appears to replace the last named shell in the southern portion of the Arakan hills. It is scarce, and I have met with but few specimens in good condition. I have never seen the animal, which, however, is doubtless similar to those of the two preceding species.

Section *Trochomorpha*.

8. N. CONFINIS, n. sp.

Shell minutely perforated, trochiform, very thin, whitish horny, smooth, shining. Spire conical, apex slightly obtuse, suture scarcely impressed. Whorls 7, flatly convex, marked above with 4 or 5 spiral ribs and fine oblique lines of growth; the last sharply keeled, flatly convex beneath, and very finely radiately striated. Aperture oblique, subrhomboidal, twice as broad as high; peristome thin, acute, straight; margins distant, columellar subvertical, briefly and triangularly reflexed.

	Millem.	inch.
Major diameter,.....	$10\frac{1}{2}$	0.42
Minor ditto, ...	$9\frac{1}{2}$	0.38
Axis, ...	7	0.28

Aperture 5 millem. broad, $2\frac{1}{2}$ high.

Habitat—near Thayet Myo, on the borders of British Burma; also near Ava.

A near ally of *N. arx*, Bens., from Tenasserim, which, however, may easily be recognised by the concave sides of its spire. From other

related species, as *N. infula*, Bens., *N. cacuminifera*, Bens., and *N. attegia*, Bens., *N. confinis* is distinguished by its sculpture.

9. N. CULMEN, n. sp.

Shell very minutely perforated, trochiform, very thin, horny, translucent. Spire conical, apex obtuse, suture impressed. Whorls 6, convex above and ornamented with fine raised spiral lines, and oblique striæ; the last whorl sharply keeled at the periphery, not descending, swollen and minutely decussately striated beneath. Aperture but little oblique, subquadrately lunate; height less than the breadth; peristome simple, thin; margins distant, columellar vertical, slightly reflexed above.

	Millem.	inch.
Major diameter,.....	$5\frac{3}{4}$	0.23
Minor ditto, ...	$5\frac{1}{3}$	0.21
Axis, ...	$5\frac{1}{2}$	0.22

Aperture 3 millem. broad, 2 high.

Habitat—Akoutoung and banks of the Tsanda Khyoung, Henzada district, Pegu.

Easily distinguished from *N. confinis* and *N. attegia* by its smaller size and higher spire; from *N. arx*, by the sides of the spire being straight and not concave, and from the Bengal *N. infula*, Bens., by its sculpture, and its sharper keel.

10. N. GRATULATOR, n. sp.

Shell perforated, turbinate, thin, whitish horny. Spire conical; apex obtuse; suture impressed. Whorls 5, slowly and regularly increasing, convex, spirally lirate and marked with oblique striæ of growth above; the last whorl keeled at the periphery, convex and decussately marked with concentric and radiating striæ below, not excavated around the perforation. Aperture diagonal, subtrapezoidal, breadth exceeding the height; peristome thin; margins distant, united by a callus; basal deeply sinuate; columellar vertical, forming a right angle with the basal, and briefly triangularly reflexed above; reflexed portion thickened and passing half round the perforation.

	Millem.	inch.
Major diameter,.....	5	0.2
Minor ditto, ...	$4\frac{1}{2}$	0.18
Axis, ...	4	0.16

Aperture 3 millem. broad, 2 high.

Animal with a small mucus pore, and very small lobe above.

Habitat—Irawaddy valley, Pegu.

This pretty little species abounds near Thayet Myo, and occurs throughout the Irawaddy valley in British Burmah. I do not remember meeting with it in Arakan. It is easily distinguished from all others of similar form among Indian shells, by its very oblique mouth, by the peculiar columellar margin of the peristome, and by the strong lirate sculpture. I have much doubt as to whether it should be assigned to *Trochomorpha*, the species of which group are larger, and the animals somewhat different.

Section *Kaliella?*

11. N. CONULA, n. sp.

Shell subperforate, turreted, white, horny, thin, translucent, marked with oblique sinuous subfiliform costulate striation, and, below the centre of the whorl, with very fine spiral lines, only visible under a powerful lens. Spire conical, apex rather obtuse, suture deeply sunk. Whorls 6, very convex, keeled in the centre, the keel very fine, raised, thread-like, opaque and white; the last whorl bicarinate, the second raised spiral line being below the periphery; flatly convex beneath, and marked by radiating striæ and concentric impressed lines. Aperture oblique, tumidly and subangulately lunate, about equally broad and high; peristome thin; margins distant; columellar nearly vertical, very briefly reflexed at the penultimate whorl.

	Millem.	inch.
Diameter, ...	$1\frac{3}{4}$	0.07
Height, ...	2	0.08

Habitat—Phoung ditto. Arakan.

A minute species remarkable for its keeled and convex whorls. Only 4 specimens were found.

GENUS HELIX.

Section *Plectopylis.*

12. H. KARENORUM, n. sp.

Shell sinistrorse, very widely umbilicated, discoid, flat above, solid, white, with rather irregular oblique pale chesnut streaks crossing the whorls, transversely and sinuously striated with decussating spiral

lines above and below; epidermis thin, horny. Apex minutely granulate or sub-granulate, almost imperceptibly raised above the flat spire; suture not impressed, very narrowly marginate. Whorls 6, narrow and closely wound, flat above; the last angulate above the periphery, rounded beneath, descending close to the mouth, very slightly compressed behind the same. Umbilicus very shallow, exposing all the whorls. Aperture, diagonal, truncately subcircular; peristome white, reflexed throughout, margins joined by a raised bar, from the centre of which a lamina passes up the parietal side of the whorl to the plication, which lies at about $\frac{1}{4}$ the circumference of the whorl from the mouth, and resembles that of *Helix achatina*, Gray; the parietal transverse lamina being simple and oblique above, then bifurcating, giving off the lamina which runs to the mouth, and two short basal supports. A thread-like lamina also runs along the extreme base of the parietal side of the whorl, and joins the aperture. Palatal teeth 5; the upper 3 and the lowest longitudinal, the uppermost very long and thin, the 4th vertical, corresponding to the fork in the parietal lamina.

	Millem.	inch.
Major diameter, ...	13	0.52
Minor ditto, ...	11	0.44
Axis, ...	4	0.16

Habitat—Banks of Tsanda Khyoung, near Kaintha village, in Henzada district, Pegu. Larger variety; major diameter 18 millem. minor diameter 15, height 5. A very few specimens were found on the banks of the Nungatho Khyoung, Henzada district.

This shell combines the external form of *H. leiophis*, Bens., and *H. refuga*, Gould, with the internal plication of *H. achatina*, Gray. From both the first named species, however, the present may be easily distinguished by its more perfectly discoid shape, by its smaller height, and more open umbilicus, as well as by its colouring. Externally, it is a very different shell from *H. achatina*, being of not more than half the thickness of that species. The internal plication, however, is absolutely undistinguishable.

Like many other shells in Pegu, this species has evidently a very local distribution. In the spot where it was found first, among some limestone rocks forming a low ridge skirting the right bank of the

Tsanda Khyoung, it was abundant, but it was not met with again until 3 or 4 specimens of the larger variety were found nearly 50 miles further south.

The locality given by Mr. Benson for *Helix leiophis* is Kwadouk near Thayet Myo. The shell also abounds at Akoutoung, on the Irawady, below Prome.

13. H. PERARCTA, n. sp.

Shell sinistral, widely umbilicated, discoid, rather thin, white, transversely sinuously striated, with faintly marked decussating spiral lines above and below. Apex minutely granulate, slightly raised above the flat spire, suture rather deeply impressed. Whorls 6, convex above and at the periphery, the last a little compressed behind the mouth, descending suddenly to the aperture, which is oblique and roundly lunate; peristome white, expanded all round; margins joined by a somewhat curved ridge, from the centre of which a lamella runs up the whorl towards the parietal plication, which, however, it does not join. The parietal vertical lamina is single, simple, rather short, slightly curved, with a rudimentary transverse plait at the top. Two free horizontal lamellæ occur beneath that running to the aperture, the lowest being the longest and thinnest, and running back beneath the base of the vertical lamina. Palatal teeth 6, all horizontal except the 4th and 5th, which are slightly oblique. Umbilicus open, deep, exposing all the whorls.

	Millem.	inch.
Major diameter,.....	11	0.44
Minor ditto, ...	9	0.36
Height, ...	4	0.16

Habitat—Mya Leit Doung, near Ava.

Distinguished from its allies, *H. refuga*, *H. leiophis*, and *H. Karenorum*, by its deeper suture and rounded whorls, and internally by the shorter parietal lamina, and by the 5th palatal plait being less oblique than in *leiophis*, and not backed by a second plait as in *refuga*. This species is the smallest known amongst those belonging to the Burmese types of *Plectopylis*.

14. H. FEDDENI, n. sp.

Shell sinistrorse, very widely umbilicated, discoid, flat above, thin, dull white, marked by rather irregular oblique sculpture both above

and below. Spire quite flat, apex not rising above the surface, suture impressed. Whorls $6\frac{1}{2}$—7, narrow and closely wound, slightly convex above; the last much broader, rounded at the periphery and beneath, descending abruptly close to the mouth. Umbilicus shallow, exposing all the whorls. Aperture more nearly horizontal than vertical, subcircularly lunate. Peristome slightly thickened, expanded throughout, margins joined by a rib, from the centre of which a lamina sometimes runs up to the parietal plication, but is frequently interrupted a short distance within the aperture, and is always thicker and higher near the mouth than further back. Parietal plication consisting of a vertical lamina in front, and a second, slightly oblique, just behind the first, giving out the interrupted lamina running to the aperture from the top, and a shorter horizontal lamella from the bottom; the hinder with small re-entering supports above and below. Beneath both is a narrow free thread-like horizontal lamella. Palatal teeth 5: 1st, 2nd, 3rd and 5th horizontal, 4th vertical and stouter than the others; 1st and 2nd longer than the remainder.

	Millem.	inch.
Major diameter,.....	16	0.65
Minor ditto, ...	13	0.52
Height, ...	$4\frac{1}{2}$	0.18

Habitat—Prome: rare.

Of this unquestionably distinct species but 3 or 4 specimens were found by Mr. Fedden and myself. Both the external form and plication differ from those of all allied species. It is especially distinguished by its rounded periphery, wider last whorl, and its irregular non-decussated sculpture externally, and internally by the double parietal lamina.

Section?

15. H. POLYPLEURIS, n. sp.

Shell openly umbilicated, trochiform, rather solid, white, (probably horny in living specimens,) obliquely and closely costulated. Spire conoid; apex rather obtuse; suture impressed. Whorls 6, convex, slowly increasing; the last not descending, surrounded by a raised thread-like keel, convex beneath, and somewhat sinuously radiately costulated around the deep and pervious umbilicus. Aperture oblique,

roundly lunate, almost circular; peristome thin; margins distant, columellar slightly expanded.

	Millem.	inch.
Major diameter,	4	0.16
Minor ditto,	3¾	0.15
Axis,	3	0.12

Habitat—Arakan hills : rare.

A prettily marked little species near *H. Bascauda*, Bens., from which it is distinguished by its finer and closer sculpture, more open umbilicus, and less conical spire. It is very probably a *Nanina*, but the animal was not met with.

Genus BULIMUS.

16. B. scrobiculatus, n. sp.

Shell subobtectly perforated, turritedly ovate, thin, horny, yellowish white, marked with vertical, subarcuate, rather irregular, closely set, raised lines. Spire turrited, apex obtuse, suture simple, impressed. Whorls 6, convex, the last rounded beneath. Aperture vertical, truncately ovate : peristome simple, thin ; right margin considerably curved forwards ; columellar vertical, curving to the left near the base, frequently straight, rather broadly reflexed.

	Millem.	inch.
Length,	7	0.28
Diameter,	3½	0.14
Length of aperture,	3½	0.14

Habitat—Pegu, west of the Irawady.

The nearest ally of this species is its congener *B. putus*, Bens., which inhabits the same localities, and differs in its greater tumidity and less marked sculpture. There is, however, much variation in the first named character, and despite the great difference between the two forms in general, there is some appearance of a passage. Two specimens of *B. putus* which I possess, measuring respectively 7 and 8½ millem. in length, are both 5 millem. in diameter.

Both these species shew a tendency to a passage to *Spiraxis*.

17. B. plicifer, n. sp.

Shell obtectly perforated, ovately conical, rather thin, horny, finely striated. Spire conical, apex obtuse ; suture marginate, scarcely

impressed. Whorls 5, planulately convex above, the last longer than the spire, somewhat tumid, rounded at the base. Aperture vertical, truncately oval, subpyriform; peristome simple; right margin curved forwards; columellar callous, subvertical, slightly curved, rather broadly reflexed; margins united by a callus bearing a small re-entering lamella about the centre.

	Millem.	inch.
Length, ...	9	0.36
Diameter, ...	$5\frac{1}{2}$	0.22

Aperture 5 millem. high, $2\frac{1}{2}$ broad.

Habitat—Thayet Myo, Pegu : rare.

A more tumid shell than *B. putus*, Bens., and easily distinguished from all other Indian and Burmese forms of the genus by the re-entering parietal plait.

Genus SPIRAXIS.

18. S. pusilla, n. sp.

Shell imperforate, ovate, thin, horny, yellowish white, costulately striated. Spire conically pyramidal; sides straight; apex rather acute; suture impressed. Whorls 5, convex; the last longer than the spire (ratio = 4 : 3) and rounded beneath. Aperture rather oblique, subpyriform; peristome simple, acute, much curved forwards on the right margin; columella scarcely twisted, reflexed, appressed on the whorl.

	Millem.	inch.
Length, ...	6	0.24
Diameter, ...	$3\frac{1}{2}$	0.14
Length of aperture, ...	$3\frac{1}{2}$	0.14

Habitat—Prome district, Pegu : rare.

I am not quite sure if all of the few specimens I possess of this peculiar small form came from Akoutoung, or whether some may not be from Thayet Myo. The shell resembles young specimens of *Bulimus putus*, Bens., so closely, that it can only be distinguished by the absence of any perforation.

Genus ACHATINA.

19. A. Peguensis, n. sp.

Shell oblong ovate, rather solid, dark reddish brown, horny, marked with distinct and regular impressed lines. Spire convexly conical;

apex obtuse; suture impressed, suberenulate. Whorls 6½, slightly convex; the last ascending a little towards the mouth, and exceeding ⅓ of the shell in length. Aperture vertical, truncately semicircular; peristome obtuse, slightly thickened; margins joined by a callus; columella very much curved, projecting forwards at the base, subvertically truncated within the peristome.

	Millem.	inch.
Length,	7	0.28
Diameter,	3½	0.14
Length of aperture,	2¾	0.11

Habitat—Irawady valley, Pegu : common.

A pretty little species, darker in colour than any of its allies, except perhaps *A. gemma*, Bens., and easily distinguished from all, by the columella being more arcuate, also by its more acuminate spire and blunter apex, and its much stronger sculpture.

20. A. PERTENUIS, n. sp.

Shell very slender, turrited, thin, light horny, polished, closely, minutely, and rather irregularly striated. Spire subulate, somewhat acuminate towards the blunt apex; suture impressed, suberenulate. Whorls 11—12, convex, the last about ⅕ the length of the spire. Aperture oblique, ovately pyriform, peristome thin, margins united by a thin callus, columella moderately curved, obliquely truncated.

	Millem.	inch.
Length,	20	0.8
Diameter,	4½	0.18
Length of aperture,	4	0.16

Habitat—Tongoop, Arakan.

Var major, length 26½ millem.; diameter 6; length of aperture 6. Of another specimen; length 23 millem.; diameter 5⅔; length of aperture 5¼.

Habitat—Pyenna Khyoung, Bassein district, Pegu.

A much more slender species than *A. tenuispira*, Bens., (a variety of which also abounds in parts of Pegu,) though there are signs of a passage. The present appears to replace *A. tenuispira* in Arakan and Bassein. Mr. Benson, to whom I sent a specimen, observes that it is intermediate between *A. tenuispira* and *A. hastula*, Bens.

Genus SUCCINEA.

21. S. PLICATA, n. sp.

Shell depressly subovate, very thin, irregularly, obliquely and more or less coarsely plaited, pale amber in colour, horny. Spire short; apex minutely papillar. Whorls $2\frac{1}{2}$; the last about $\frac{4}{5}$ of the entire length. Aperture oblique, curved backwards at the base, nearly oval, openly angulate above; peristome simple; columellar margin regularly bow-shaped; right margin rather straighter.

	Millem.	inch.
Length,	17	0.68
Diameter,	$9\frac{1}{2}$	0.38

Height, when laid upon the mouth, 6 millem. Aperture 14 millem. long, 8 broad.

Habitat—Tongoop, Arakan: one or two specimens, rather less coarsely sculptured, occurred also south of Bassein in Pegu.

This species approaches *S. semiserica*, Gould, but is distinguished from that and from all other Indian species by its coarse sculpture. It has also a larger spire than *S. semiserica*. It is not common: indeed species of the genus *Succinea* are generally but very locally distributed in India and Burma.

Genus CLAUSILIA.

22. C. FUSIFORMIS, n. sp.

Shell not rimate, fusiform, horny, thin, white; obliquely, very closely and finely costulately striated throughout. Spire diminishing slowly at first above the middle, then rapidly attenuate towards the acute apex; suture simple, scarcely impressed, deeper towards the apex. Whorls 9, convex above, flattened below, the last very little narrower than the penultimate. Aperture semioval, (nearly semicircular); upper parietal plait very fine; internal palatal teeth 7, the uppermost by far the longest. Peristome thin, expanded, not continuous, the margins being distant, and united by a thin callus; columellar margin straight and very long posteriorly.

	Millem.	inch.
Length,	23	0.92
Diameter,	6	0.24

Habitat—Arakan hills, west of Henzada. Very rare.

But a solitary specimen was met with belonging to this form, which is more tumid in the centre than any of its allies, *C. insignis*, Gould, &c. The non-continuity of the peristome may be due to immaturity in the specimen found. The shape of the mouth may also possibly be slightly modified in older examples, but the general form doubtless remains the same, and is alone sufficient to distinguish the species.

A solitary specimen of another new form, much smaller than the above, being only 17 millem. long, occurred at Moditoung Tsekan, on the road from Prome to Tongoop. It is unfortunately bleached and worn, though perfect.

Genus STREPTAXIS.

23. S. Burmanica, n. sp.

Shell ovately subglobose, umbilicated, thin, horny, white, marked throughout with fine and closely set sinuate costulation. Spire convex; sutures scarcely impressed. Whorls 6, the last 2 widely excentric, rounded at the periphery; the penultimate broader than the last whorl; last flattened beneath, and angulately compressed around the umbilicus. Aperture oblique, irregularly semioval, with a single re-entering lamellar parietal; peristome white, thin, expanded throughout, deeply sinuate above, at the junction with the penultimate whorl, compressed and curved forwards on the upper right margin, and sometimes furnished with a very small internal tooth-like callous projection; the two margins subparallel, distant, united by a thin callus.

	Millem.	inch.
Major diameter,	10	0.4
Minor ditto,	7	0.28
Height,	6	0.24

Habitat—Tongoop, Arakan.

This is a very near ally of the Molmein *S. Petiti*, Gould, but it is distinguished from that shell and from *S. exacuta*, Gould, by the rounded periphery and more globose form. It is larger and less slender than *S. Andamanica*, Bens., and is distinguished from all the above species, and also from the Nilgiri *S. Perrotteti*, by the greater size of the penultimate whorl in comparison with that of the antepenultimate, a character to which my attention was called by Mr. Benson.

In Dr. Gould's original description (an imperfect one) of *S. Petiti*,

as republished in Otia Conchologica, p. 183, no mention is made of the angulation of the periphery, which, however, is referred to by Pfeiffer, (Mon. Helic. I. 8). The character is certainly variable: in specimens in my own collection there is a considerable difference.

Order,—PROSOBRANCHIATA.

Family *Cyclophoridæ.*

Genus CYCLOPHORUS.

24. C. *(Lagocheilus)* leporinus.

Shell narrowly umbilicated, conically turbinate, thin, dark horny, and ornamented throughout with oblique striæ and with raised spiral lines, closer together at the periphery and within the umbilicus than elsewhere. Spire conical; apex rather acute. Whorls $5\frac{1}{2}$, rounded; the last cylindrical, not descending. Aperture oblique, subcircular, angulate above; peristome simple, thickened, subexpanded, incised at the upper angle; columellar margin curved backwards. Operculum horny, greyish white, multispiral.

	Millem.	inch.
Major diameter, ...	4	0.16
Minor ditto, ...	$3\frac{1}{2}$	0.14
Axis, ...	4	0.16

Habitat—Akoutoung, Pegu.

This form is allied to *Cyclophorus scissimargo*, Bens., and *C. tomotrema*, Bens., forming with them the group for which Mr. Theobald has proposed the name of *Lagocheilus*. There appears good reason for associating these shells as a distinct subgenus, which perhaps represents, in Burma, the group of *Cyclophori* comprising *C. halophilus* and its allies in Southern India and Ceylon. The present species is smaller and higher in the spire than either of the others. The animal of *C. leporinus* is short, dark in colour, with small black tentacles, and resembles ordinary *Cyclophori* in most characters. The only specimen obtained living and examined, possessed, however, the peculiarity of a groove down the middle of the caudal portion of the foot above.

The peristome is simple in the only perfect adult specimen which I possess, but in a broken barely adult shell, there is a rudimentary duplication. The two lips are probably united in the full grown shell.

I also met with a shell apparently belonging to this species, but not full grown, at Pyema Khyoung, south of Basscin.

An immature specimen of probably a 4th species of *Lagocheilus*, with very fine and rather close equidistant spiral sculpture, was found by me in the neighbourhood of Ava.

Genus PTEROCYCLOS.

25. Pt. Feddeni, n. sp.

Shell widely umbilicated, convexly depressed, smooth, finely striated rather thin, elegantly marked with alternating transverse zigzag stripes of white and chesnut, and with a moderately broad submedian band of darker colour. Spire nearly flat; apex but very slightly protruded; suture deep. Whorls $4\frac{1}{2}$, convex; the last rounded, descending towards the mouth. Aperture circular, slightly oblique; peristome double; the two portions separated by a shallow groove, the inner cut away into a moderate sinus above, and the outer turned up into a small vertical wing, free from the penultimate whorl. Operculum concave within, the centre flat; flatly concave without, with lamellar free edges to the whorls, thickest at the circumference.

	Millem.	inch.
Major diameter,	11	0.44
Minor ditto,	9	0.36
Axis,	5	0.2

Habitat—Thayet Myo, Pegu—rare.

A smaller and more convex shell than *Pt. cetra*, Bens. from Molmein. It is one of the most beautifully marked species of the genus; it resembles *Pt. pullatus*, Bens., in form, and in the peculiar characters of the operculum, and equals the handsomest specimens of *Pt. rupestris*, Bens., in its colouring.

Named after the discoverer, Mr. Fedden, of the Geological Survey.

Genus ALYCÆUS.

26. A. politus, n. sp.

Shell moderately umbilicated, turbinately depressed, smooth, polished, shining, amber-coloured. Spire depressly conoidal; suture deep; apex obtuse, rather redder than the remainder of the shell. Whorls $3\frac{1}{2}$, convex; the last round, scarcely descending towards the mouth, very little swollen at the side, and ornamented on the inflated portion

for a short distance with close fine costulation, which extends beneath to the umbilicus and renders the shell opaque in that spot. Constriction long, smooth, swelling considerably in front towards the mouth. Sutural tube short, about $\frac{1}{5}$ to $\frac{1}{6}$ of the periphery of the penultimate whorl. Aperture oblique, circular, deeply sinuate at the junction with the penultimate whorl, and at the lower right margin; peristome double, the inner lip projecting and continuous, outer lip retrorelict. Operculum horny, multispiral, externally concave.

	Millem.	inch.
Major diameter,	3	0.12
Minor ditto,	$2\frac{1}{4}$	0.09
Axis,	$1\frac{1}{4}$	0.05

Habitat—Phoung do, near Cape Negrais, Arakan.

Very near *A. humilis*, W. Blanf., from Pegu, but distinguished by its lower spire, wider umbilicus, more sinuous mouth, and especially by its high polish, in which it is only equalled by *A. nitidus*, W. Blanf.

27. A. GLABER, n. sp.

Shell broadly umbilicated, conoidly depressed, solid, reddish white, the upper whorls darker, rather dull in lustre, smooth, except at the swollen portion of the last whorl, which is very finely and closely costulated. Spire depressly conoid; apex rather obtuse; suture impressed. Whorls 4, convex, the last obsoletely subangulate at the periphery, moderately swollen at the side, then constricted, descending a little near the mouth. Constriction of moderate length, smooth, slightly swollen in the middle. Sutural tube of moderate length. Aperture diagonal, circular; peristome more or less distinctly duplex, thickened, moderately expanded. Operculum dark coloured, horny, externally concave, internally convex, with a prominent central nucleus.

	Millem.	inch.
Major diameter,	$7\frac{1}{2}$	0.30
Minor ditto,	6	0 24
Axis,	$4\frac{1}{2}$	0.18

Habitat—Akyab, Arakan; the hills south of the harbour.

This species closely resembles *A. Ingrami*, W. Blanf., for which I for some time mistook it, but it is distinguished by the absence of any sculpture on the upper whorls, and also by the more oblique mouth.

Genus DIPLOMMATINA.

28. D. NANA, n. sp.

Shell not rimate, dextrorse, subovate, rather solid, amber-coloured, very finely and closely filiformly costulated on the lower whorls, less closely on the upper, or, frequently, subdistantly costulated throughout. Spire conical, with sides scarcely convex above; apex rather obtuse, sometimes reddish, suture impressed. Whorls 6—6½, rounded, antepenultimate the largest, the last rising considerably upon the penultimate. Aperture vertical, ear-shaped, nearly circular, columellar margin straight for a short distance and vertical, with an internal tooth. Peristome double, both portions expanded and appressed, the inner forming a thin callus upon the penultimate whorl. Operculum ?

	Millem.	inch.
Length, ...	2¼	0.09
Diameter, ...	1	0.04

Aperture with peristome about ⅔ millem. in diameter.

Habitat—Akoutoung, Thondoung and Yenandoung in Henzada district, Pegu.

This species approaches *D. polypleuris*, Bens., more nearly than any other. It is distinguished by its more regularly ovate form, blunter apex, less swollen penultimate whorl, and more marked and distant sculpture. The latter character, however, varies. The specimens from Thondoung, a hill about 20 miles south of Akoutoung, being either closely costulate throughout, or subdistantly sculptured above, closely below; while in Akoutoung specimens, the costulation is subdistant throughout. As, however, I can trace no other distinction between the shells, and the costulation varies in different individuals from each place, I do not think there is any specific distinction.

A still more minute species than the present exists in Pegu, and I found two dead specimens at the base of the Arakan hills in the Henzada district. As these specimens were not very well preserved, I abstain from describing them for the present.

Family *Helicinidæ*.

Genus HELICINA.

29. H. ARAKANENSIS.

Shell depressly turbinate, sublenticular, rather thin, obliquely striated above, radiately and very minutely beneath, polished, flesh-coloured,

with a darker red band in the centre of the whorls above, and another on the last whorl, just below the periphery; apex yellow. Spire convexly conoid; apex acute. Whorls 4, the last compressed and sharply keeled, moderately convex at the base, furnished with a polished subgranulate central callus; columella very short. Aperture diagonal, triangular; peristome white, slightly expanded. Operculum light grey, shelly.

	Millem.	inch.
Major diameter, ...	6	0.24
Minor, ...	5	0.2
Axis, ...	$3\frac{1}{2}$	0.15

Habitat—Ramri Island, coast of Arakan. Rare.

A smaller variety, measuring—major diameter 5, minor $4\frac{1}{4}$, axis 3 millem., was abundant in the southern portion of the Bassein district.

Near *H. Merguiensis*, Pfr. and *H. Andamanica*, Bens., but smaller than either. It is mainly distinguished from the former by the absence of the close spiral striation, so marked in that species, and from the latter by different colouring, higher spire and closer sculpture.

The preceding pages contain descriptions of the greater portion of the previously unpublished species of land shells in my collections from Ava, Pegu, and Arakan; I have still a few remaining, the distinctness of which is probable, but they belong, for the most part, to critical groups, and require comparison with the original types of species, described by Mr. Benson and others. The following additional notes, on the distribution of previously described species, may serve to supplement the papers on the subject, by Mr. Theobald, in Jour. As. Soc. Bengal, Vol. XXVI. p. 245, and Vol. XXVII. p. 313.

Nanina.

Nanina petasus, Bens., is common about Thayet Myo and in the Arakan hills. My largest specimen measures 12 millemetres by 11 in its two diameters. A smaller, closely allied shell, measuring 8 by 7 millem., I was inclined to refer to Mr. Benson's *Helix aspides*, on account of the arcuate and labiate basal margin of the aperture, but I learn from the describer that it presents differences, although not sufficient to prove it a distinct species. A third still smaller form, with the thickening and curvature of the peristome exaggerated, and

a somewhat flatter spire, measures only 5 to 5¼ millem. in its largest diameter, and may be a distinct shell. It, also, is from the Arakan hills.

Nanina honesta, Gould, originally described from Tavoy, is found throughout western Pegu and Arakan, as well as at Molmein, where it was collected by Mr. Theobald. Dr. Gould's description is very imperfect; he does not even note the great obliquity of the mouth, which is the most striking character of the species. In the Arakan hills near Prome, and about Thayet Myo, a larger variety occurs, in which the angulation of the periphery entirely disappears in the adult, although the other characters are the same. The sutural margination is sometimes, though rarely, obsolete. Large specimens measure 14 by 11½ millem., and about 7 in height.

N. levicula, Bens., also first found by Mr. Theobald in the Tenasserim provinces, is very common about Thayet Myo, Prome, and Akoutoung, and occurs also as far south as the Bassein district. It is frequently whitish in colour. It is allied to *N. honesta*, but easily distinguished, besides by its smaller size, by the fewer whorls and their more rapid rate of increase, and also by the total absence of sculpture. There is much variation in size: my largest specimen measures 8½ and 7 millem. in its two diameters. The animal has a very small lobe above the mucus pore in the tail, which is truncated. The mantle is rather large. A single specimen of a shell, apparently identical, was found by me, some years ago, near Balasore in Orissa.

N. textrina was evidently described by Mr. Benson, (in the Annals and Mag. Nat. Hist. 1856, Ser. 2, Vol. XVIII. p. 252,) from an immature specimen. When adult, the peristome is white and slightly thickened within, and the body whorl internally of a milky white colour. This handsome species is found west of the Irawady, from Thayet Myo to Bassein, and varies considerably in size, in the height of the spire, and in the degree of angulation above the periphery. The greatest change takes place in the latter character; specimens from the district of Bassein being sharply angled, and even subcarinate, the angulation diminishing, however, close to the aperture; while, in specimens from Thayet Myo and Prome, the periphery is round. In height of spire, the shell varies from depressed to subturbinate; in two specimens before me, one has a major diameter of 30 millem., and height of 13; the other with a major diameter of only 27, measures

15 millem. in the axis, and this variation is seen in both rounded and subcarinate specimens. The largest specimen I possess, measures in its two diameters, 36 and 31 millemetres, and in height 18.

N. pansa, Bens., was found near Akoutoung and Thayet Myo; and also, more abundantly, in the neighbourhood of Ava.

N. (*Trochomorpha*) *attegia*, Bens., abounds at Akoutoung below Prome. It is not common elsewhere, except about Prome. The animal has a mucus pore at the end of a truncated foot, and a lobe above, as in *N. vitrinoides*, Desh. A shell which Mr. Benson considers as probably identical with *Helix diplodon*, Bens., (a Khasi hill species) occurs rarely in the Arakan hills. It is a *Nanina* with a small lobe above the mucus pore near the end of the tail, which, however, is more flattened and less truncated than in species of the *Trochomorpha* section generally.

No species of the *Ariophanta* section, so largely represented in India, has as yet been found in Pegu or Arakan;* *N. retrorsa*, Gould, being hitherto unknown N. or W. of Molmein. *Macrochlamys* and *Trochomorpha* (unless *N. textrina* and *N. pansa* belong rather to *Hemiplecta* than to the former,) comprise the great majority of the *Naninæ*. The forms belonging to the first named section are so numerous, and distinguished by such minute differences, that their study is one of great difficulty.

Helix.

Amongst the true *Helices* in Northern Pegu, several forms assigned to the section *Dorcasia*, Gray, are conspicuous. They appear to represent in Burma, *H. fallaciosa*, Fèr., *H. asperella*, Pfr., and their allies of the Indian peninsula, and they might all perhaps with greater correctness be classed together in the same section. Amongst these forms is *H. similaris*, Fèr., of which *H. scalpturita*, Bens, and *H. Zoroaster*, Theobald, appear to be varieties. These shells occur in the drier portions of the Irawady valley, and are not found below Prome, but they extend northwards to beyond Ava. The variety named by Mr. Benson *H. scalpturita* sometimes wants the coloured

* Nor is this section, so far as I know, represented in the Himalayas. *N. Himalayana*, Lea, being almost certainly *N. interrupta*, Bens., and the assigned locality due to an error; while *H. cyclotrema*, Bens., lately described from the hills N. of Tirhoot, is a sinistrorse member of the *asperella* group, and closely allied to that species, as may be seen from its expanded lip and granulate surface. The animal is doubtless a true *Helix*, and not a *Nanina*.

bands, and passes into a shell closely resembling *H. Peguensis*, Bens., a more solid form, shells approaching which closely in every character except in being less solid, were found on the Shan hills, east of Ava. Mr. Benson considers these shells distinct from *H. Peguensis*, but there can be little doubt of their forming a link. The typical variety of *H. scalpturita* abounds near Mandélé. *H. Zoroaster*, Theobald, is a large *H. similaris*, and occurs abundantly at Thayet Myo and less so at Prome. *H. bolus*, Bens., abundant near Thayet Myo and Prome, is sometimes marked by a coloured band like that of *H. similaris*, and varies greatly in the height of the spire. The type is a well marked form, far more globose than the others, but yet it passes, by imperceptible gradations, into *similaris*. *H. delibrata*, Bens. is also allied to *similaris* although classed in a different section or subgenus by both Albers and Pfeiffer; it unites *Dorcasia* with the *Trachea* group, (*H. asperella* and its allies). *H. delibrata* is not rare throughout Arakan; it occurs at Akyab, and in Pegu it is found at Akoutoung and other places; when fresh it has a subhispid epidermis, and frequently a rufous band above the periphery, like *similaris* and *asperella*.

Somewhat allied to the *similaris* group, but yet forming a distinct and well marked section, are *H. tapeina*, Bens., and its allies *H. rotatoria*, v. d. Busch, *H. Oldhami*, Bens., and *H. Huttoni*, Pfr. To these, two other species have been added by Mr. Theobald, viz.: *H. Phayrei* and *H. Akoutongensis*. The type appears almost peculiar to the Malay countries, one species only, *H. Huttoni*, occurring upon the Himalayas and other Indian mountains, and none in the plains of India.

H. Oldhami, Bens. is a well marked and easily distinguished form, with almost flat spire, very wide umbilicus, and the last whorl subangulate above the periphery and swollen beneath. The epidermis, when in good order, is subhispid, as in several other species of the group. This form was first found by Dr. Oldham at Mya Leit Doung, a few miles south-east of Ava, and I afterwards met with it in the Arakan hills, on the road between Prome and Tongoop.

The other species pass into each other in the most perplexing manner, and there scarcely appears any choice between increasing their number indefinitely, and classing all together as varieties of one species.

The little form known as *H. Huttoni*, Pfr., is perhaps more easily distinguished than most of the others, as it is singularly constant in

form. It is usually smaller than *tapeina* or *rotatoria*, and may generally be recognised by its blunt periphery and the convexity both of the spire and base. Still, forms of *H. tapeina* approach it so closely that they may be said to pass into it. I found specimens of *H. Huttoni* in only one spot in Burma, viz. on Puppa hill, an isolated peak, nearly 5,000 feet high, in Upper Burma. The occurrence of a Himalayan shell which is found as high as 6,000 and 7,000 feet in Sikkim, upon this solitary hill, where it is accompanied by peculiar species, as *Alycæus Vulcani*, W. Blanf. and *Diplommatina Puppensis*, W. Blanf., and with a flora comprising plants, such as *Pteris aquilina*, belonging to a temperate climate, is very remarkable; especially as the same species was found by myself on the Nilgiri hills of Southern India, at an elevation of above 6,000 feet, and by Mr. F. Layard on the mountains of Ceylon. It is found both in the eastern and western Himalayas, and has probably once enjoyed a far more general range in India than at present. Its occurrence, with so little variation, in isolated situations, is in favour of its being a distinct and natural species, a rank to which, morphologically considered, its claims are small.

At Mya Leit Doung, the high limestone peak 15 miles south-east of Amarapoora, already referred to, and the locality whence *Cyclophorus cryptomphalus*, Bens., *C. hispidulus*, W. Blanf., *Diplommatina exilis*, W. Blanf., *Georissa frustrillum*, Bens. sp., *Hypselostoma Bensonianum*, W. Blanf., *Helix perarcta*, W. Blanf., and other peculiar species have been obtained, I found Mr. Theobald's *Helix Phayrei*, which appears to have some claims to be considered a distinct species. Mr. Theobald's description (J. A. S. B., 1859, Vol. XXVIII. p. 306) is very imperfect, and the following may serve to give a better idea of the shell.

H. Phayrei, Theobald.

Shell moderately umbilicated, orbiculately conoid, rather solid, white, with a horny shining epidermis; obliquely, coarsely and flexuously plicately striated beneath the epidermis, bluntly angulate at the periphery. Spire depressly conoid; apex obtuse; suture scarcely impressed. Whorls 6, slightly convex, slowly increasing; the last descending towards the aperture, where the angulation of the periphery dies out; convex beneath, compressed around the deep umbilicus, which exposes all the whorls. Aperture subcircularly lunate, diagonal; peristome white, slightly expanded throughout; margins

approaching each other, and united by a callus. Major diameter 18, minor 15½, axis 8 millemetres.

Habitat—Mya Leit Doung, Ava.

This differs from all allied forms in its much coarser flexuous sculpture, and from most of them by its blunt angulation at the periphery. It is also, so far as I know, the largest form, belonging to this group, which occurs in Burma.*

H. tapeina is said by Mr. Benson to be distinguished from *rotatoria*, amongst other characters, by the greater regularity of the sculpture in the former shell, which contrasts with the irregularly flexuous striation of the latter.† I have never seen a typical specimen of *H. rotatoria*, which was originally described from Java, but Mr. Benson has identified with it a shell which abounds at Thayet Myo, Prome and Akoutoung, and a variety of which, with a flat spire, Mr. Theobald has called *H. Akoutongensis*. Of *H. tapeina* I possess specimens collected by Mr. Theobald at the original locality, the Khasi hills. These have a slightly more regular sculpture, an angulate periphery instead of the sharp compressed keel of the Pegu form, and a rounder mouth, but the spire is sometimes higher, sometimes not, and I can see no distinction in the umbilicus. In all the distinctive characters, varieties shewing gradation, occur in Burma.

Leaving the question of specific distinction, the distribution of varieties of these shells in the Irawady valley, so far as I have searched, is the following.

On the Shan hills, east of the valley in which lie Mandélé, the present capital of Ava, and the older capitals, Amarapoora and Ava itself, I found a lenticular sharply keeled form, less swollen beneath, and, in general, higher in the spire than the Akoutoung form of *rotatoria*, with the sides of the spire straight, not convex. The epidermis, when in good order, and especially in young specimens, is hispid; the sculpture rather variable, but flexuous. This latter is also the case with the Akoutoung and Thayet Myo form of *rotatoria*.

* In a letter received since the above was written, Mr. Benson informs me that *H. Phayrei* only differs from his *type* of *H. tapeina* in its coarser sculpture. My specimens of the latter shell have a more angulate periphery.

† In Pfeiffer's Monogr. Helic. Viv., however, *H. tapeina* (Vol. III. p. 254) is said to be "Subtiliter granulato-striata," while *H. rotatoria* (Vol. I. p. 203) is described simply as "oblique striata." The former is said to differ from the latter in sculpture, higher spire, narrower umbilicus and rounder aperture.

In the Tsagain hills, west of the Irawady, opposite Ava, I obtained two forms, one bluntly angled at the periphery and approaching *H. Oldhami*, in which however the spire is lower and the umbilicus more open. The sculpture, form of the whorls and of the mouth, (which is rounded with connivent margins and expanded throughout,) and the angulation of the periphery, are preeisely similar to the same characters in my specimens of *H. tapeina:* the umbilicus is slightly broader, and the spire lower, sometimes as flat as in *Akoutongensis*. The dimensions are $15\frac{1}{2}$ and 14 millem. in the two diameters; height 6. The other form is extremely sharply keeled and lenticular, with an angulate lunate mouth, and a narrower umbilicus than the last, or even than the Cherra *tapeina*, but it has the same simple seulpture, differing in this from the Shan hills form, which it otherwise resembles. It measures $17\frac{1}{2}$ millem. by 16, and 9 in height.

The next loeality to the south in the Irawady valley at whieh I obtained forms of this type was at Thayet Myo. I have already referred to the variety prevailing there, as well as at Prome and Akoutoung. As a rule, the shells are small, thin, horny, and more or less hispid, very variable in the height of the spire, sharply keeled and with very fine, flexous striation. The major diameter is about 10 to 12 millem. on an average.

At Henzada, and in its neighbourhood, another form prevails. It is also met with at Akoutoung, but is rare, and it passes into the flatter form there prevailing. The Henzada shell has a mueh higher spire with very convex sides, and is, in fact, subeampanulate, the base, on the other hand, being flattened. It is sharply keeled, quite as sharply as the Akoutoung form, but it has the sculpture rather of *H. tapeina* than of *rotatoria*, and the epidermis, instead of being subhispid as in the latter shell, is merely granulate. A form, intermediate both in height of spire and in seulpture between the Henzada and Akoutoung varieties, was found in the Arakan hills, between Prome and Tongoop.

In the Bassein distriet, all the shells of this type are much the same. They have a sharp keel, moderate spire with convex sides, obtuse apex, and but little eonvexity beneath. They possess a granulate epidermis and the sculpture of *H. tapeina*.

The speeimens with the highest spires, from Henzada, approximate

in form to the Cambodia *H. repanda*, Pfr., and may perhaps be identical.

It will be seen how variable the forms are. The spire varies from flat to almost bell-shaped, the periphery from sharply keeled to angulate, the whorls from subconvex to flat or nearly so; nor is there greater constancy in the form of the mouth, the sculpture, the epidermis, or the breadth of the umbilicus. Distinct as many of the varieties appear to be, they all pass gradually into each other, and with the exceptions already described, I believe all the forms are most safely classed as varieties of one species. Whether this should be called *rotatoria* or *tapeina* is difficult to say, without more precise acquaintance with the types of those shells.*

Not far from the *tapeina* group must be classed *H. castra*, Bens., which, despite its thin horny shell and sharp peristome, is not a *Nanina*, but a true *Helix*. It occurs throughout the Arakan hills, wherever I have searched, but is everywhere scarce. It has the widest range in the Indian area of any known *Helix*, being found in the Himalayas, in Orissa, in Ceylon, and throughout Burma as far south as the Tenasserim provinces.

H. climacterica, Bens. is very probably a *Nanina*, but I have not had an opportunity of observing the animal. The shell was found by Captain Ingram on the road from Prome to Tongoop, and I found it again in the hills, at the southern extremity of the Henzada district, and in Bassein. It occurred also in Long island, in the Bassein river. It is much smaller in general than the typical Khasi hill shell; I possess specimens, apparently fully grown, but measuring only 13 or 14 millemetres in their major diameter.

H. hariola, Bens. is a true *Helix*, and is found chiefly on trees near Thayet Myo and Prome. It is a rare shell. Near Ava it is replaced by a large sharply carinate form, which I found abundant at Thingadan, on the Irawady, about 80 miles north of Mandélé. This shell so closely resembles *H. capitium*, Bens., that I am much disposed to consider them identical, a view in which Mr. Benson, however, does not agree. At Puppa hill, near Pagan, already referred to as the

* Mr. Benson, to whom I sent specimens, considers all the forms above mentioned to be varieties of *rotatoria*, but some, especially that from the Tsagain hills, appear to me to be at least as nearly allied to *tapeina*.

locality where *H. Huttoni*, Pfr., is found, I met with an intermediate variety, between the carinate form and the typical *H. hariola*.

The *Plectopylis* group is represented near Ava by *H. perarcta*, described above, and further south by *H. leiophis*, Bens. This shell occurs near Thayet Myo, but I found it abundantly only at Akoutoung. Another form, which may be a small variety of *leiophis*, but which shews some differences in the internal plication, also occurs near Thayet Myo. At Prome, close to the Pagoda, I found *H. Feddeni*, (described above) which, however, appeared very rare, as I only obtained two perfect specimens, despite much search. 20 or 30 miles south of Akoutoung, I found *H. Karenorum* in abundance, and 2 or 3 specimens of the large variety of the same shell still further south in the Arakan hills, nearly due west of Henzada. Elsewhere in the Henzada district and throughout Bassein, no species of the Burmese form of *Plectopylis* was met with, but the Himalayan and Khasi *H. plectostoma*, Bens. abounded south of the town of Bassein in several places, Pyema Khyoung, Long Island, &c. It was also found by Captain Ingram in Arakan, near Tongoop.

Bulimus.

A variety of the sinistrorse *Bulimus Sinensis*, Bens., measuring 26 millem. in length and 15 in diameter, occurs near Prome. It has generally two dark stripes round the body whorl, but some specimens have other stripes, usually 3, above the periphery. Occasional specimens were met with further south. At Tongoop in Arakan, I found a much smaller variety, measuring only 20 millem. in length, and $12\frac{1}{2}$ in diameter. At Akyab I also found this small variety; some shells being entirely yellow without any stripes, like Mr. Theobald's Mergui specimens.

B. putus, Bens. is rather common at Akoutoung, less so at Thayet Myo, and scarce to the south: I found it, however, occasionally, in the Bassein district.

B. pullus, Gray, occurs near Ava; but not, so far as I am aware, in Pegu. Specimens of *B. cœnopictus*, Hutton, were also met with in Upper Burma. *B. gracilis*, Hutton, occurs throughout Burma apparently. I have found a rather dwarf variety in Ava, Pegu and Arakan, and have received it from Molmein.

Achatina.

Achatina tenuispira, Bens., of small size, is common at Akoutoung and further south. A small variety of *A. crassilabris*, Bens., occurs in Arakan, and another form, perhaps distinct, but closely allied, was found in the Shan hills near Ava. The species of *Achatina* do not appear to be numerous in Burma; they attain their maximum in the Indian area in the Western Ghats, and the hills of South India and Ceylon, and their numbers diminish to the eastward.

Vitrina.

Vitrina præstans, Gould, differing in no respect from the Molmein shell, and *V. gigas*, Bens., equally identical with the Khasi form, are both met with throughout the Arakan hills, though sparingly. A smaller species, which I had looked upon as the young of *V. gigas*, has been correctly separated by Mr. Theobald, and will doubtless be described by him.

Ennea and *Pupa.*

Ennea bicolor was met with near Tongoop in Arakan, and at one or two places in Pegu. As in many other localities throughout its wide range, it is a scarce shell.

Pupa Avanica, Bens. occurs near Ava. I found it abundantly on a small hill, a few miles north of Mandélé.

Streptaxis.

Besides the species above described from Arakan, a smaller form occurs in Pegu, which I consider a variety of *S. Andamanica*, Bens., the only difference I can detect being in the sculpture, which is somewhat finer in the Pegu shells.

Hypselostoma.

I have nothing to add to the particulars of the distribution of the two species of *Hypselostoma* beyond those given in a preceding number of these contributions.

CYCLOSTOMACEA.

Cyclophorus.

In the Shan hills east of Ava, I found two forms of large turbinate *Cyclophori*, one apparently a variety of *C. speciosus*, Phil., the other so closely allied that I doubt if it is wise to describe it as distinct. *C. speciosus* does not appear to occur in Northern Pegu, but I found

it at Rangoon, close to the Pagoda, abundantly south of Bassein, and at Tongoop in Arakan. At Akyab I found some dead specimens, which may possibly belong to this species, but they are thinner, with a rather narrower umbilicus, and less broadly expanded peristome, and one specimen is subangulate at the periphery. In these characters they appear to be intermediate between the Burmese *C. speciosus*, Phil., and the Khasi hill *C. Pearsoni*, Bens.

At the base of the Shan hills, and also at Mya Leit Doung, I found the small species referred by Mr. Benson to *C. cornu venatorium*, Sow. Some living specimens at the former locality shewed the operculum to be normal.

At Mya Leit Doung occurs also *C. cryptomphalus*, Bens. of which I obtained fresh specimens, with the colour and epidermis perfect. When in this state, it is the handsomest of the Burmese *Cyclophori*, and equal in beauty of colouring to *C. Siamensis*, Sow., the dark blackish brown colour of the upper surface of the shell contrasting finely with the irregular zigzag white lines. The mouth, in my specimens, shews no distinct duplication: it is much thickened and expanded, as in *C. speciosus* or *C. Siamensis*.

C. fulguratus, Pfr., I did not find further north than Puppa hill. At Thayet Myo and Prome it is very abundant, and it occurs more sparingly throughout the Prome and Henzada districts, together with *C. Theobaldianus*, Bens. and *C. patens*, W. Blanf. *C fulguratus* is a handsome shell, varying greatly in size, my largest specimens from Thondoung, south of Thayet Myo, measuring 38 millem. by 30, the smallest, a dwarf specimen, also from Thayet Myo, only 20 millem. by 15½.

Mr. Theobald, in a paper published in this Journal for 1863, (XXXIII. p. 376,) classes my *C. patens* as a variety of *C. fulguratus*. The types of both species occur together at Thayet Myo, and are very distinct, *C. patens* having a broad, rather thin disk-like expanded peristome, while the lip of *C. fulguratus* is much thicker but only moderately expanded. *C. patens* also is much smoother. However, intermediate forms may possibly occur, as they do between many other Burmese species.

At Tongoop in Arakan, and on Ramri island, I found a variety of the large *C. aurantiacus*, Schum. It approaches *C. Theobaldianus*

Bens., but has flatter whorls, a sharper keel, a more acute apex, and rather less strongly marked sculpture.

A small turbinate species of *Cyclophorus*, which I found at a considerable height on the Arakan hills between Prome and Tongoop, with a rounded periphery and very narrow umbilicus, requires comparison with *C. scurra*, Bens. Another form, with a subangulate periphery, was met with in Bassein district, and a third, rather larger, but otherwise identical, in Ramri island. All of these may be varieties of the same shell. All possess a very narrow umbilicus, a thin white expanded lip, and minute sculpture.

None of the small discoid Cyclophori, so far as I am aware, occur in Pegu. *C. hispidulus*, W. Blanf., I described in a previous paper as occurring at Mya Leit Doung, Ava. *C. calyx*, Bens. is stated by Mr. Theobald to occur at Akoutoung, Pegu, and that locality has been quoted for it by Mr. Benson in describing the shell, and repeated by Pfeiffer in Suppl. Mon. Pneum. p. 56. I think some mistake must have been made by Mr. Theobald in arranging and labelling the very extensive collections which he made in 1854-55, for the shell abounds in Molmein, while, although I have repeatedly searched all round the Akoutoung hills, I have not met with it.

Leptopoma.

In a previous paper (J. A. S. B. for 1862) reference was made to the occurrence of the Tenasserim *L. aspirans*, Bens., in Arakan, near Tongoop, and in the Bassein district of Pegu. It was found in great abundance in Long Island in the Bassein river. I also found specimens close to Akyab, in the hills on the opposite (south) side of the harbour. Some of these last are rather larger than the typical form, and measure 14 by $10\frac{1}{2}$ millemetres in the two diameters and 12 in height; they are also smoother, wanting the raised spiral lines, and the last whorl is rounded or subangulate near the mouth: but other specimens are scarcely distinguishable from typical shells from Tenasserim, among which also some of the above characters, and especially the sculpture, are variable.

Pterocyclos.

Pt. pullatus, Bens., has only been found near Akoutoung. In Arakan, near Tongoop, and again at Akyab, I found a species closely allied to *Pt. parvus*, Pearson. The Akyab specimens possess their

opercula, which is flat like that of *Pt. pullatus*, and not convex as in *Pt. rupestris*, &c. These shells also closely resemble a species collected by Mr. Theobald at Cherra Poonjee, and referred by Mr. Benson to *Pt. Albersi*, Pfr., which has a convex operculum, and a peculiarly shaped wing. The specimens from Tongoop and its neighbourhood had a much thicker epidermis than those from Akyab, and were larger, but otherwise similar.*

No form of *Cyclotus* is known from Burma. I have shewn, in a paper published in the Annals and Magazine of Natural History for June, 1864, that the *Cyclophorus calyx* group approaches very closely to the true *Cycloti*, and represents them; while the *Cycloti* of India (e. g. *C. subdiscoideus*, Sow.) are allied to *Cyclostoma*, having the peculiar cleft foot and mode of reptation of that genus. I have proposed to place them in a new genus, *Cyclotopsis*.

Alycæus.

Much concerning the distribution of the numerous species of this genus has been communicated in previous papers. A brief recapitulation may be useful.

A. Avæ, W. Blanf., is the only form as yet found on the Shan hills, east of Ava. *A. Vulcani*, W. Blanf., occurs at Puppa hill, Pagán. About Thayet Myo, *A. sculptilis*, Bens., is abundant, especially on the hills a few miles south of the town, where also *A. armillatus*, Bens., was found in very small numbers, its minute size doubtless rendering the search for it difficult. A few specimens of a small variety of *A. umbonalis*, Bens., first appeared here. They have a "retro-relict" outer peristome, and coarse sculpture on the upper whorls. The typical variety is rather common at Akoutoung, the original locality. I found this species again at one spot, a little north of Bassein, near the village of Kani. The older specimens obtained there, and others from the base of the Arakan hills, west of Prome, had the outer peristome retro-relict as in the Thayet Myo variety, a peculiarity I never observed in the typical Akoutoung form.

* Since the above was written, I have heard from Mr. Benson, who has kindly compared the species with *Pt. parvus*. In the latter, the wing runs up the penultimate whorl, while the wing and sinus of the Akyab and Tongoop species resemble those of *Pt. pullatus*. In other respects the form resembles *Pt. parvus*. It may be distinguished as *Pt. Arakanensis*, n. sp. I have not specimens at hand, so cannot add a complete description.

At Akoutoung I also found *A. humilis*, W. Blanf., and at the same place, at Thondoung and at Yenandoung, two hills about 20 miles further south, I found a variety of *A. Ingrami*, W. Blanf., rather larger than the type from Tongoop in Arakan, and measuring 7 millem. in the larger diameter.

Another form of the same shell, with a less distinct subangulation of the periphery, and rather closer sculpture on the upper whorls, occurred at Moditoung, on the Prome and Tongoop road, with *A. graphicus*, W. Blanf, *A. succineus*, W. Blanf., neither of which has been found elsewhere, and one form of *A. vestitus*, W. Blanf.: *A. nitidus*, W. Blanf. and *A. polygonoma*, W. Blanf., were first found on the same road, but nearer to Tongoop. The latter I afterwards obtained in two or three places south of Bassein, the specimens being a little larger (6 and 5 millem. in their two diameters) than those first found. *A. vestitus* has only been found in the Arakan hills on the confines of the Henzada and Prome districts.

Adding to these the two new species above described, *A. politus* from near Cape Negrais, and *A. glaber* from Akyab, we have 14 species described from Ava, Pegu, and Arakan, besides 3 more from Molmein and Tenasserim, altogether nearly half the known species of the genus.

Pupina.

A species of *Pupina* occurs at Thayet Myo, Prome, Akoutoung, &c., closely resembling *P. artata*, Bens. from Molmein, but rather stouter in form and with a somewhat thicker peristome, which is frequently but not always orange in colour, instead of white. These differences do not appear, however, to warrant specific distinction, especially as there is much variation in the form of typical specimens of *P. artata*. A variety from Ava is closer to the type. A small form, probably another variety, occurred upon the Arakan hills near Prome. It is only $4\frac{1}{2}$ millem. long, but the specimens are unfortunately not quite fresh. My own specimens of *P. artata* from Molmein are but 6 millem. long. The operculum in fresh specimens is horny, not testaceous, the white appearance being produced by weathering, and I suspect the apparently paucispiral character to be due to the rapid increase of the interior whorls, which rest one upon the other, as in

Cataulus. Near the periphery, the whorls are more numerous, but their boundaries are indistinct.

I have in this and other papers, already given all the details connected with the occurrence of the four species of *Diplommatina* as yet described from Burma. The only known *Helicina* from Northern Burma is also described above.

Georissa.

I have described (Ann. and Mag. Nat. Hist. for June 1864) as a distinct genus, under this name, the species of Burmese and Khasi shells referred to *Hydrocena* by Mr. Benson, both the animal and operculum differing from those in that genus. But one species is known to exist in Pegu, *G. pyxis*, Bens., and I have met with that in many places west of the Irawady, from Thayet Myo to south of Bassein. *G. Frustrillum*, Bens., I only met with at the original locality, Mya Leit Doung, Ava.

It is evident that two very distinct zoological provinces exist in Burma, exclusive of Martaban and Tenasserim, which form a third, characterized by the appearance of several Malayan generic types, such as *Raphaulus*, *Hybocystis* and *Rhiostoma*, and others apparently peculiar, as *Sophina*. The two northern provinces are: 1st, Arakan, with the southern part of Pegu near the sea, enjoying a very humid climate. 2nd, Upper Burma, with, in many parts, a very dry climate. The boundary in the Irawady valley may be drawn roughly above Henzada, although species belonging to each fauna, as is usually the case, pass over the border. The first province, besides a considerable number of peculiar species, is especially characterized by forms common, on the one hand, to the Khasi hills, and even to the Himalayas, and, on the other hand, to Tenasserim. Examples of the first are *Helix plectostoma*, Bens., *H. delibrata*, Bens., *H. castra*, Bens., &c.; of the second, *Cyclophorus aurantiacus*, Schum., *C. speciosus*, Phil., *Leptopoma aspirans*, Bens., *Nanina honesta*, Gould, &c. In the Ava province, on the other hand, the forms which have also been found in India are mostly inhabitants of the plains, such as *Helix similaris*, Fèr., *Bulimus pullus*, Gray, and *B. cœnopictus*, Hutt. The genus *Hypselostoma* has as yet only been found within this province, or close to its borders. It is rich in species of *Plectopylis*, and in varieties or

allies of *H. similaris*. The Arakan Yoma north of Henzada separates the two provinces; the southern portion of the range, which is very low, rarely exceeding 1000 feet, is solely occupied by species belonging to the Arakan fauna. These provinces are also characterized by distinct forms of mammals and birds, and there is a great difference in their vegetation.

In a list of Burmese shells, published by Mr. Theobald in J. A. S. B. for 1857, (Vol. XXVI. p. 251) occur the names of *H. petila*, Bens., and *H. mensula*, Bens., from Thayet Myo, and *H. precaria*, Bens. from Tenasserim. These shells have never been described, and Mr. Theobald in this, as in other instances, has published lists of manuscript names communicated to him, some of which have subsequently proved to have been given in error. It is, I think, to be regretted, that in a recent paper J. A. S. B. for 1863, Vol. XXXII. p. 374, Mr. Theobald has again included one of these abandoned names, viz. *H. petila*, and he has also published the names of several of the species described above, and similarly communicated to him in manuscript. One of those thus published, *Alycæus sceptieus*, has proved, on more careful comparison, and when additional specimens from other localities were procured, to be only a variety of *A. Ingrami*, and not a distinct species. Several of the names in Mr. Theobald's paper are incorrectly given, e. g. *Helix helieofera* for *H. helicifera*, *H. caussia* for *H. causia*, *H. pausa* for *H. pansa* but these are probably errors of printing. The practice of including, amongst lists of species, manuscript names, without any reference to the fact of their being unpublished, and consequently of no authority, is much to be deprecated, as tending to confusion and the multiplication of synonyms.*

Postscript.—Since the above paper was penned, now nearly 6 months ago, I have received Mr. Theobald's "*Notes on some Indian and Burmese Helicidæ, &c.*" published in this Journal for last year, pp.

* Besides the shells above mentioned in the Burmese list, the names of many other undescribed species occur in the paper, while many described species are omitted.

238, &c., which calls for a few remarks. Although I differ in many points from Mr. Theobald's views as put forward in this paper and in the earlier one of 1863, especially those on the origin, migration, and distribution of specific forms, I see no object to be attained in answering at length opinions long since refuted, as I believe, by far more competent authorities and far abler writers. The works of Edward Forbes, Owen, Lyell and a host of others besides Darwin, will serve to shew the arguments relied upon by the great majority of living naturalists, to prove the doctrine of "specific centres," that is the theory that all members of the same species, whether existing or dead, have descended, not necessarily from one pair, but from one parent stock, living in one spot. To call this, however, the Darwinian theory, as Mr. Theobald appears to do, would be paralleled by calling the earth's rotation round the sun the Newtonian theory. In each case the earlier theory is only a necessary step in the line of argument, and the hypothesis of the origin of species by means of Natural Selection is no more involved in the doctrine of specific centres, than was the theory of universal gravitation in that of the rotation of the planets around the sun.

If I refer briefly to one remark of Mr. Theobald's, (that in his first paper, J. A. S. B. for 1863, Vol. XXXII. p. 376) it is because it appears to me the only argument of any importance which he has advanced in favour of his opinions. The question of the distribution of fresh water shells and especially of the bivalves, with their limited powers of progression, is a well worn argument in favor of the sporadic origin of species; that is, of the descent of each species from many parent stocks, existing in distinct and separate localities. But if all the facts of the case are fairly stated, there appears much, even in this instance, in favour of the doctrine of specific centres. The facts are briefly these. Many species of *Unio*, e. g. *U. marginalis*, Lam. exist throughout a large tract of country, in almost every river and stream, and even in many ponds and marshes, although these rivers, &c. have no fresh water communication with each other whatever, and the animal is incapable of living in the sea, or of traversing the land. On the other hand, the area inhabited by this species is continuous; that is to say, the same species does not occur in tropical Asia and tropical America, for instance. Other species are restricted

to a single river and its feeders, as is the case, so far as is known, with *U. olivarius*, Lea. In other cases again, as in *U. cæruleus*, Lea, and its allies, one form is found over a considerable area, as Bengal, and in separate rivers, and is replaced at a distance, as in Scind and Western India, by forms which may either be considered as distinct species, or as local varieties, according to the value attached to specific rank. In the intermediate country of Central India, we find intermediate forms. Now it is surely more philosophical to assume that we are only partially acquainted with the phenomena attending the means of distribution enjoyed by animals of low organisation, especially in the young state,* than to arrogate to ourselves complete knowledge of the subject, and to assert that no means of passage exist. If we suppose that facilities for migration exist, or have existed, with which we are unacquainted, all the facts above detailed are at once accounted for in the simplest manner, whereas on the theory that the species were originally created throughout the whole area, no explanation whatever is afforded of the limitation of that area, no cause shewn why the same species does not exist in other areas where the conditions are equally favourable for its existence, and still less is any explanation afforded of the gradual divergence of varieties at a distance from the typical form. Let it be distinctly noted that the case of mollusks and of other animals inhabiting fresh water is an exceptional one; in the vast majority of the members of the animal and vegetable kingdom, the phenomena are far more strongly in favour of the theory of specific centres.

On another question, more especially treated in Mr. Theobald's second paper, viz.: the impracticability of drawing a line between species and varieties in many cases, I entirely coincide; indeed in the preceding pages will be found remarks upon the varieties of *H. similaris* and its allies, and of *H. rotatoria* and its allies, similar in purpose to those of Mr. Theobald. I must, however, object to the practice of publishing names, whether of varieties or species, without any description, or with such extremely inadequate details, as in the case of *Helix Arakanensis* and *H. geiton*. I can only say that,

* It should not be forgotten that the ciliated fry of the Unionidæ have very considerable power of locomotion, and that even the adults are amongst the most vagrant of bivalve shells.

although I probably possess the former, I am totally unable to tell, from Mr. Theobald's account, to which of the numerous varieties of *H. rotatoria* he has applied the name. Again, in this paper as in former ones, manuscript names are introduced without any reference to the fact of their being unpublished; and, in two cases at least, I believe I can shew that these names would never have appeared, had they not been cited by Mr. Theobald.

1st. *H. unicincta* was a manuscript name of Mr. Benson's for a shell from Western India, described by Pfeiffer as *H. propinqua*. Mr. Benson's name of course was never published, nor would it have seen the light but for Mr. Theobald, who, in his paper in 1863, gave *H. unicincta* as a species excluded from his list, without referring to the fact that no such name existed except in manuscript. In the present paper, *H. propinqua*, Pfr., is first given as a distinct species, and a few lines further on quoted as a synonym of *H. unicincta;* thus giving precedence to the manuscript name, in opposition to the laws of scientific nomenclature.

2nd. *H. anopleuris* was a manuscript name given by Mr. Benson to some shells sent by Mr. Theobald to England, I believe in 1860 or 1861. Mr. Theobald having kindly furnished me with specimens of the same shell, I found, on comparing them with the types of *H. ornatissima*, Bens., of which I had a good series, (the shell was first collected by my brother and myself and described from our specimens) that the species were identical in every respect. I wrote to Mr. Benson to tell him my opinion and on recomparing the forms, he found that he had been misled by an abnormal peculiarity in the solitary specimen of *H. ornatissima* which he had retained.

Another name mentioned by Mr. Theobald, *Helix submissa*, Bens., is equally, so far as I am aware, undescribed.

In the group placed by Mr. Theobald next after that in which the above shells are included, there is evidently a misprint, in the five shells from *H. infrendens*, Gould, to *H. sanis*, Bens., being classed together. I have no doubt Mr. Theobald's intention was to class together the three first, and, as a separate species, the two last.*

* I am authorized by Mr. Theobald to notify that this error was due to a misinterpretation of his manuscript. His intention was that suggested in the text. Ed.

As regards the new species described, *Limax viridis*, if it has no internal shell, and none is mentioned, can scarcely be a *Limax*. The characters given are mostly unimportant, while essential characters, such as the position of the mantle and breathing pore, surface of the mantle and body, carination or roundness of the back, form of the jaw and lingual teeth, are omitted. What advantage is gained by publishing names for a genus and two species of slugs, of which Mr. Theobald has unfortunately no notes, is not clear. *Vitrina Peguensis* is the shell referred to above as undoubtedly a well marked and distinct species. *Streptaxis Blanfordi* and *Pupina Blanfordi* are also mentioned above, they being, I believe, varieties of *S. Andamanica*, Bens., and *P. artata*, Bens., respectively. *Streptaxis Burmanica* I have described above, and as my description is more detailed, and taken from a better and more typical specimen than Mr. Theobald's, I have retained it. On the other species I have nothing to add.

In Mr. Theobald's 1863 paper, he referred my *Cyclophorus patens*, as I have before stated, to *C. fulguratus*. I can scarcely believe that he is now serious in proposing to unite these shells, because one is scarce and the other abundant, although that is the sole reason assigned. Even in this point, however, Mr. Theobald is not quite correct. I have found *C. patens* in some places the more common shell of the two.

On the question of the restriction of the genus *Nanina*, I can only say that Mr. Theobald's ideas are totally at variance with those of Pfeiffer, Adams, Gray, Albers, and other authorities. On the other hand he is probably correct in his opinion that *H. pansa* and some other shells do not belong to the section *Macrochlamys* of Benson, with which I had classed them.

The specimens had just the resemblance of drift wood imbedded in the sandstone. The dip was at a very high angle to the north, so that the beds were passed in succession going up the ravine, and had there been any thick seams, they must have been seen. Three hundred yards up the bed of the nulla, the softer sandstone was succeeded by one much harder, of a light colour and coarse texture. The lignite was found in this also, and the longest and thickest string yet seen was at this point. Yet, from the appearances of it and from so little lying in the water-courses, I did not think anything approaching to a seam was likely to be found; and, not having time to spare, I did not follow the ravine any higher. An inspection of the ravines to the east or west might bring to light larger masses of this lignite. The dip at this furthest point was N. E. by N. 70°. In the cliffs on the west, a very good section was obtained, and the highest beds, that appear upon the surface to be an unstratified talus, I now saw were horizontally bedded and resting quite unconformably on the sandstones below. These horizontal beds, of which about 150 feet was exposed, are composed of sandy clay and semi-angular gravel, with scattered large, partly water-worn masses of rock, some of large size. I append a section (Plate IV.) to illustrate the Buxa formations, which, I trust, will make my description plainer. I did not succeed in finding any fossils:—a longer search would perhaps have ended successfully,—so that it is impossible to say in what formation this isolated mass of sandstone will find a place.* The plateau of the Buxa position is probably the highest level of the horizontally stratified gravels. I believe some specimens of the lignite have already been forwarded to the Superintendent of the Geological Survey. Some specimens in which the woody texture is well displayed shall be sent by first opportunity.

* See a remark on this head in the Proc. As. Soc. for May, 1865, p. 91.

Note on Lagomys Curzoniæ, Hodgson.—*By* Dr. F. Stoliczka.

[Received 7th December, 1864.—Read 7th December, 1864.]

In the catalogue of the Mammalia of the Asiatic Museum, Mr. Blyth mentions *Lagomys Curzoniæ*, Hodgs. as a desideratum.* Mr. Adams quotes a "Lagomys, sp.?" as occurring plentifully in Ladak, (Proc. Zool. Soc. Lond. 1858, p. 520) and Major Cunningham also speaks of a "smaller species of hare, or *Lagomys*" as extremely common all over Tibet. (Cunningham's Ladak, p. 204.)

On my visit this year to the eastern provinces of Ladak I was fortunate enough to procure several specimens of what I believe to be *Lagomys Curzoniæ*, Hodgs. (Vide Journ. Asiat. Soc. Beng. 1857, Vol. XXVI, p. 207 and Ann. Mag. Nat. Hist. 1858, I. p. 80.) but Mr. Hodgson's description of this animal is very brief, so that it is hardly possible to recognise the species among the numerous members of this genus. The following description is founded on four specimens, of three of which the exact measurements are given below.

General hue of the upper body pale buff fulvous, with very slight rufous tint and tipped with dark brown; below whitish, with translucent dusky blue. The larger hairs of the fur measure about $\frac{7}{8}$th of an inch; the lower part, for more than half their length, of a dark, slaty blue colour, with silky lustre; the next portion pale fulvous and the tip dark brown or black. The fur is full and very soft, as Hodgson remarks, and can be readily distinguished from that of *L. rufescens*, Gray. Chiefly in old specimens, there are, on the sides of the upper portion of the body, a few long hairs intermingled, which measure up to one and a quarter inches; these are almost or entirely of a black colour.

On the lower part of the body the hairs are, for two-thirds of their length, dark slaty blue, and the rest pale.

The head measures nearly always one-fifth of the total length of the animal. The hairs on it are much shorter, and tinged with a dark rufous tint above; on the sides of the snout they are pale grey, in front of the eyes and below, pale white, while on the sides of the head itself there is a slight rufous tint marked, which is a little stronger all round the neck, and extends somewhat farther back on the upper body. The hairs round the neck are rather longer, but only half their length

* 1863, p. 133, foot note.

of a slaty colour, the rest being pale rufous; but a few of them are tipped with black.

The end of the snout, and of the upper and lower lips are dark blackish. The hairs of the moustaches are very long; some of them measuring three inches: the upper ones are chiefly black, the lower white, or half black, half white. The ears are comparatively rather large, oval, terminating with a very obtuse point; they are well covered with hair, thickest on the outside: the hairs on the inner surface being pale yellow, those on the outer much longer and softer, and distinctly rufous. The feet and soles are in accordance with the general hue, of a pale fulvous colour, only still lighter, and slightly, and only partially tinged with a rusty tint; the toes are black, claws long and dark brown.

The young animal does not differ in colour very much from the old one. It is usually much paler and the difference between the hue on the upper and lower portion of the body is far less distinctly marked. The slaty hue of the inner fur is also more translucent and the rufous tint on the head and the hinder part of the ears not so strong.

The measurements of three specimens from Rupshu, the eastern province of Ladak, are as follow:—

	a.	*b.*	*c.*	
Total length of the animal, ...	7.50	9.00	9.50	inches.
Length of the skull, ...	1.90	2.25	2.37	,,
Proportion of the length of the skull to the total length, ...	0.26	0.25	0.25	
Width of the skull, ...	0.87	1.25	1.25	,,
Proportion of width to length of the skull, ...	0.46	0.55	0.52	
Length from the snout to the eye, ...	0.75	1.00	1.00	,,
Length from the eye to the ear, ...	0.93	1.12	1.12	,,
Length of the ear, ...	0.62	1.06	1.00	,,
Width of the ear,...	0.56	0.87	0.81	,,
Proportion of width to length of the ear, ...	0.90	0.82	0.81	
Length of fore foot and nails, ...	0.87	1.12	1.12	,,
Length of hind foot and nails, ...	1.25	1.50	1.43	,,

(*a.*) Young specimen from above the Gyagar lake in Rupshu.

(*b.*) An old, full grown specimen from near Kozak on the Chomoriri lake in Rupshu.

(*c.*) Judging from the teeth, this seems to be a very old specimen, from the east side of the Lanak pass, west of Haule.

This latter specimen has the fur considerably worn off and injured. I found in the skin of this and some other specimens, which I shot in the Puga valley, a great number of larvæ of an *Œstrus*, which causes the injury and a sort of roughness of the fur. As the tips of the hair get worn off, the hue becomes in some places dark spotted, which is caused by the slaty colour of the interior portions.

It will be seen from the given measurements, that the skull of the young animal is in proportion to the entire body, a little longer and broader than that of the adult, and the ears are also somewhat larger. These proportions may be often observed in Mammalia of different ages.

Lagomys Curzoniæ is one of the largest known species of the genus. Our largest specimen measures $9\frac{1}{2}$ inches, which is only one line less, than the greatest measurement of *Lagomys alpinus*, Pallas. (Vide Waterhouse Mammalia, Vol. II., Rodentia, p. 16.) Mr. Hodgson's specimens were much smaller and probably younger. I observed several which were not longer than seven inches, but most of them were about nine inches long.

The people of Korzok called *L. Curzoniæ*, *Phise-karin*, which means as I was informed, *tail-less Phise*. *Phise* or *Pheese* is the name of *Phaiomys Cucurus*, Schreber, which lives here associated with the *Lagomys* and *Arctomys*. The name *Phise-karin*, I was told, is Tibetan, and the Ladak name for *L. Curzoniæ* is *Sabra*. Hodgson gives the name *abra ;* it is, however, well known, that the letter *s* before many words is in some parts of Tibet pronounced, in others not so.

The first place, where I met with *L. Curzoniæ*, was a little above the junction of the Chomoriri with the Para valley at a height of about 15,500 feet above the level of the sea. It does not live usually at a lower elevation than this ; and if otherwise, as in the lower parts of the Puga valley (14,500 feet,) it is always scarce. Round the Chomoriri lake, where there is comparatively plenty of vegetation, it is associated with *Phaiomys Cucurus*, Blyth, and *Arctomys bobac*,

Schreber.* The first never frequents a great elevation above the bottom of the valleys and is especially numerous in the neighbourhood of streams. *Arctomys bobac* (called by the Tibetans *Phya*) makes its very deep burrows mostly on the sides of the valleys and near their bottom; it ascends, however, the slopes of the hills in this portion of Ladak to a height of 17,800 feet. This greatest elevation, at which I observed it, was near the Samunda-là, south-east of the Chomoriri; while the lowest was in the Para valley about 15,400 feet. It lives probably lower than this.

L. Curzoniæ ranges, however, somewhat higher. I noticed it on the top of the Lanak pass at an elevation of 18,672 feet, where only two minute plants existed, *Stracheya Tibetica*, Bth. and *Capsella Thomsoni*, Hf. both flowering in August.† It is found associated with *Corcus tibetanus*, Hodgs., *Gyps fulvus*, Gmel. and a new species of *Procarduelis*, among birds; an *Argynnis*, among butterflies and some common flies, forming the highest observed animal life in these hills. In fact it is difficult to design a limit to the height up to which *L. Curzoniæ* lives. I believe, it ranges as high as any trace of vegetation exists, which would be here about 19,000 feet, or very near it. Between the two given limits of the Para valley and 19,000 feet, it is seen in great abundance all over the eastern portion of Ladak. It is certainly the species of Adams and Cunningham, as there is to my knowledge, no other *Lagomys* here, at least none so common. Its geographical range must extend farther to the east and south-east, as Mr. Hodgson obtained his specimens from the district of Chumbi, (north-west of Sikkim?). I have not observed it South of the Bara-latse range, either in Spiti or in the south-eastern part of Lahoul, the Chandra valley; although *Phaiomys Cucurus* does occur in both provinces and even in *Kulu*. In Spiti, *Lagomys Curzoniæ* is represented by the smaller *L. Roylei*, Ogilby, which there lives between 12,500 (above Lari) and 16,000 feet, but usually about 13,000 feet.

* Mr. Blyth (Cat. of the Mammalia of the Asiatic Museum, 1863, p. 109) unites and, I think, with good reason, Mr. Hodgson's *Arctomys tibetanus* and *hemachalanus*, [*Himalayanus* was not used by the first author] as well as *Arct. fulvus*, Evers., with the species, which became first known through the travels of Pallas in Northern Asia, and which Schreber named *A. bobac*.

† Dr. Thomson (Travels, p. 144) mentions three plants on the Lanak pass, a little *Arenaria* or *Stellaria* and two Cruciferæ.

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Notes on Central Asia.—*By* M. SEMENOF. *(Communicated by Lieut.-Colonel* J. T. WALKER, *R. E.)*

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[In the year 1856, M. Semënof was deputed by the Imperial Geographical Society of Russia, on a mission of exploration into Central Asia.—On his return to St. Petersburg, he published a translation of Ritter's "Erdkunde von Asien" into Russian, and gave in the preface to the 2nd volume, an account of the results of his own explorations.—The following notes are taken from this preface. At my request they were translated from Russian into English by Mr. R. Michel, F. R. G. S., whose name will be familiar to all who are acquainted with the numerous papers on the geography and trade of Central Asia, which have appeared of late years in the Journal of the Royal Geographical Society of London. J. T. W.]

The second volume of the Russian translation of Ritter's "Asia" comprises a description of the North Western portion of the tableland of Asia, *i. e.* that extensive region which stretches between the Altai and the Celestial mountains, from the Eastern extremity of the latter at Hami (Komul), to the Watershed of lake Balkhash.

The range of country under consideration embraces the whole of the extinct kingdom of Djungaria, or the Chinese Province of Tian-

Shan-bey-Lu (the region to the northward of the Celestial mountains, consisting of the districts of Ili, Tarbagatai, Gobdo, &c.) and likewise the Russian districts of Alatavsk, Kopal and Ayaguz, which now constitute the new Semipalatinsk region. The whole of this country, including, both Chinese and Russian Djungaria, forms that most obscure and unknown portion of the interior of Asia which contains within it the very centre of the Asiatic continent, namely the gigantic mountain group of the Tengri-Tag, (a part of the Celestial mountains) situated at equal distances from the Black Sea, on the West, and the Yellow Sea on the East, the Obi Bight on the North and the Bay of Bengal on the South, and lying in the centre of the straight line connecting Cape Severovostochui in Siberia with Cape Comorin in India.

This region offers, moreover, special interest in physical as well as in ethnographical and historical aspects. Physically, it forms a distinct limit between the highland and the depressed portions of Asia, and is remarkable for the contrast it presents between its gigantic mountain groups of the Bogdo and Tengri-Tag in the Celestial range, which tower far above the limits of eternal snows and are crowned with large alpine glaciers, and the low sandy and sterile steppe of the Bedpak-Dala, on the South West of lake Balkhash, which, in common with all the other sandy wastes of the Aralo-Caspian depression, bears the character of a bed of an inland sea, dried up during a very recent geological period. In ethnographical respects this region offers a contrast no less marked, between two numerically preponderating central Asiatic races—the Mongolian and Turkish,—whose rulers are Chinese and Russians, strangers from the far East and West, occupying, in the same alluvial plain of the Balkhash, small populated oases in the midst of an indigenous population alien to themselves in speech and habits, and who are powerful not by reason of their numerical superiority, but by the weight of their civilisation, and the magnitude of their respective Empires, the most colossal on the face of the globe. Lastly, from an historical point of view this country presents features of a no less interesting character. It has served from time immemorial as the point of departure for migrating races from the highlands of Asia, the cradle whence they sprang, to the low arid steppes of the Aralo-Caspian depression, and to the still more distant and

better favoured regions of the West. It was here, namely, in Djungaria, and on the fertile and smiling banks of the Ili and Irtysh, that the migrating hordes lingered for some time, both, as it were, to venture out into the unknown plain stretching before them far away into the sandy ocean that separates Europe from Asia, until a new tide of popular migration forced them at last to strike their tents, and depart westwards from their mountainous halting grounds. It is also in the valleys of Djungaria that a few existing rude monuments, crude traditions, geographical names, and remnants of tribes who, in many cases, have lost their native dialect by intermixture with other races (the result of which appears in the name of Kassak or Kerghiz Kaisak), serve the scientific explorer as the only links for identifying the obscure and fragmentary allusions concerning these migrated hordes, which occur in Chinese and Russian chronicles.

Although the physical and ethnographical characteristics of Central Asia have attracted the constant attention of some of the most learned men, such as Humboldt, Ritter, Abel Remusat, and Klaproth, the researches of these leaders of science could only be based on the most meagre data, namely on the dry and one-sided Chinese narratives which found a place in Chinese literature, from the period of the dismemberment of the Djungarian kingdom in the middle of the last century, and also on the inaccurate, brief and conflicting accounts and itineraries of a few Asiatics, who succeeded in visiting Djungaria and Little Bokhara with caravans. All these materials were collected and carefully collated by Ritter and Humboldt; nevertheless this region remained up to the most recent period, like the interior of Africa, completely inaccessible to European science.

Even Marco Polo, the most enterprising and reliable traveller of the middle ages, did not visit this region, but proceeded eastwards to China by a route that lay southward of the Celestial range. A few other travellers, it is true, passed through Djungaria; these were Plano Carpini (1246), Andre Songjumel (1249) and Wilhelm Rubriquis (1252); and they probably journeyed by way of lake Faisan to Karakorum the capital of the Mongol Khans.

The same route was traversed by some of the subjugated Western princes, such as Yaroslof and Alexander Nevski of Russia and Getum of Armenia (likewise in the middle of the thirteenth century) for the pur-

pose of paying homage to the great Khan; they, however, either left no description of their journey, or else their accounts are so meagre and confused, as for instance, the narrative of Prince Getum, that very few of the places mentioned in them can be identified. Much later, in 1654, Fedor Isakonitch Baikof, the envoy of the Russian Tsar Aleksei Fedorovitch, proceeded past lake Faisan, and the upper course of the Black Irtysh, and traversed the whole of Djungaria, reaching the Chinese wall at Huhu-Hoton from whence he advanced to Pekin.

Although Baikof's marche-route (of course not in the form it is inserted in Wilson's work from which it was derived by Ritter, but in the shape we find it in Spasskis' "Sibirski Vestnik") can, in the present state of our knowledge of the geography of Central Asia, be pretty readily applied to certain localities, still the information it contains is of a meagre character, and is greatly inferior to native Chinese accounts.

The Southern border of the country now under consideration, *i. e.* the gigantic Celestial range, has not been explored by any European traveller up to the present day. The destruction, however, of the kingdom of Djungaria, by the Chinese, led to its being surveyed under the superintendence of the European missionaries Felix d'Arocha and Hallerstein, by whom astronomical points were determined, not alone in the towns of Djungaria and Little Bukhara, but also at the very foot of the Celestial range, as at Hongor Olen the modern Konur-Ulen, and on the Southern shore of lake Issyk-Kul. As the Jesuits have left no record whatever of their having visited any part of the Celestial range, it must be naturally concluded that they themselves did not diverge from the highroads of Central Asia, but detached a party of Chinese topographers, instructed by themselves, to the base of the Celestial mountains.

The first learned Russian traveller who penetrated into the part of Inner Asia described in the present volume, was the botanist Sivers, who in his hazardous and venturesome journey to the Tarbagatai, in 1793, advanced as far as 47° N. Latitude. During the succeeding forty years, not one of the scientific explorers of Western Siberia succeeded in passing beyond the point previously reached by Sivers.

The journey of K. A. Meyer in 1826, did not extend beyond the Arkat mountains, Chingiz-tán, and the Karkara district of the Kirghiz Steppe. The travels of Humboldt, and his associates, in 1828, did

not embrace even Djungaria. Their extreme limit was the Chinese picket of Baty, on the Irtysh, in 49° N. Latitude, and Humboldt's greatest service in connexion with the geography of the interior of Asia consists in the critical elaboration of the materials relating to this subject in his classical "Asie Centrale."

Some of these materials, namely the itineraries of Asiatic traders, who had visited different parts of Asia with caravans, were diligently collected at Semipalatinsk by Humboldt, and another portion of his materials was derived from Chinese sources that had been elaborated by the European *Sinologists*, Abel Remusat, Klaproth, Schott, Neumann, St. Julien, Father Hyacinth, and others.

Among the few unscientific eye-witnesses who, in the pursuit of trade, penetrated into Inner Asia, were some Russians, and among these in point of lucidity, and accuracy of information, the first place is undoubtedly occupied by the interpreter Putinsef, who, in 1811, visited Kuldja and Chuguchak, the most flourishing towns of Djungaria. The narrative of this journey was published in the "Siberski Vestnik" translated by Klaproth, and served Ritter as one of the most valuable sources in elucidating the geography of this region. In addition to Putinsef, we may mention the miner Snegiref, who, towards the end of the last century, proceeded from the Altai to the neighbourhood of Chuguchak, in search of gold; also the noble Madatof, who, in the early part of the present century, successfully reached India, starting from Semipalatinsk, and traversing lake Issyk-Kul, the Celestial mountains and Little Bokhara. A short account of Snegiref's journey was printed in the "Siberski Vestnik," but with Madatof's expedition I am acquainted only through official documents preserved in the archives at Omsk, and as no original narrative was discovered by me, it must be presumed that none ever existed. I also found a short marche-route at Semipalatinsk, drawn up by the merchant Bubeninof, who, in 1821, proceeded from Semipalatinsk to Kashgar. This itinerary will be printed in due season, but from its brevity and scantiness of information, it is in no respect more valuable than the itineraries already printed and digested by Humboldt and Ritter.

Such was the unsatisfactory condition of our knowledge of the geography of Central Asia in 1831, at the time of the appearance of that part of Ritter's work which relates to it. It was only in

the fourth decade of the present century that we became more familiar with Central Asia, from the side of the Djungarian and Kirghiz steppes, after the foundation of the Russian town Ayaguz, on the upper course of one of the rivers of the Balkhash basin, and after the submission of a portion of the great Hordes under Sultan Sûk, son of Ablai Khan. These events gradually rendered not only lake Balkhash, but also the mountainous districts of Djungaria, more accessible to travellers.

In 1834 the astronomer Fedorof was enabled to reach the embouchure of the Lepsa, and determine its geographical position, under 46° 2½′ North Latitude. He also succeeded in visiting the southern shore of lake Faisan and in making a trigonometrical measurement of Tarbagatai. A little later, the relations of Russia with the Kirghiz Hordes became more satisfactory, and in 1840, 1841 and 1842 the learned travellers Karelin and Schrenk, penetrated into the mountainous portions of Djungaria or the Snow-clad Djungarian Alatau. Karelin explored the wild valleys of the upper courses of the Lepsa, Sarkan and Baskan rivers, as high as the snow-line.

Alexander Schrenk visited, and it may be said discovered to science, the lake Ala-Kul, crossed over the Djungarian Alatau to the Chinese side, attained the upper course of the Tentek, and reached the snow line on several occasions. The extreme limits of his journey on the plain bordering lake Alakul, were the Chinese town of Chuguchak, in Alpine Djungaria,—the hills skirting the banks of the Koksu river, and the river Chu (or Tzu) in the hungry Betpak--Dalor desert, South West of lake Balkhash. Subsequently the voluntary submission of the remaining portion of the so-called Great Kirghiz Horde, in 1844, led to the Russian occupation of that rich and fertile portion of Djungaria, which is known under the name of the Semipalatinsk region, from the seven tributaries of the Balkhash that water it. The Russian town of Kopal was founded by Governor General Prince Gorchakof, in 1846, on a fertile plateau at the base of a snow-capped spur of the Djungarian Alatau. The establishment of this town ensured the development of the already existing relations of Russia with the neighbouring Chinese province of Ili. Although rapidly increasing, the trade with the Western Chinese region, through the towns of Kuldja, and more especially Chuguchak, encountered

obstacles in its legitimate development from its transitive and contraband character, as the Chinese of the Western region (Si-yui) were only able to have secret dealings with the Russians under a semblance of trafficing with the Kirghizes. It was this disadvantageous state of things, that led to the mission, with objects partly diplomatic and partly geological, of E. P. Kovalefski accompanied by Vlangagli, an officer of mining Engineers.

This expedition started from Kuldja, and skirting the Russian side of the Djungarian Alatau, traversed the valley of the Koksu, as far as the upper sources of this river, while, on the Chinese side, it reached the town of Kuldja, on the Ili. The most important results of this mission in commercial, as well as in scientific respects, were the establishment of Russian trading factories at Kuldja and Chuguchak. The opening up of the Western Chinese region contributed largely to the increase of our knowledge of the geography of Asia, inasmuch as it threw two learned Chinese scholars into the commercial centres of Djungaria in the capacity of consuls. The local researches of these sinologists has opened a wide field to science. Mr. Fakharof, one of the consuls, has already collected materials of great value relating to the physical geography and cartography of Inner Asia; these materials he has obtained during his stay at Pekin, from rare geographical works (namely the reports of the Survey made during the reign of Tsian-Sun) and from information supplied him by natives of the Western region. The foundation of the town of Kopal, which was in a satisfactory and flourishing condition, owing to the rapid development of agriculture aided by artificial irrigation, could not, however, secure the great Hordes, now under Russian dominion, against the bold attacks of the Buruts, or the so-called Black or Dikokamenni Kirghizes, who infested the valley of lake Issyk-Kul, and the neighbourhood of Tekes on one of the sources of the Ili. This was naturally to be expected from the position of Kopal which stood on the northern confines of the Hordes, whose southern boundary, beyond the Ili, remained completely unprotected. The unguarded condition of the frontier of the Russian Empire on this quarter induced Governor General Hasford to occupy the so-called Trans-Ili country extending between the river Ili, and the snow-line of the gigantic Trans-Ili Alatau, with a view of securing the left flank of the Kirghiz Steppe

which was under Russian protection, by making it conterminous with the peaceful frontier of China and the natural snowy mountain boundary. This well conceived plan was carried out with complete success. In 1853 the first Russian detachment, under the command of Colonel Gulkofski, was despatched beyond the Ili; it, however, met with serious opposition from a strong body of Kirghizes belonging to the hostile tribes of the great horde who supported themselves on Fort Trichubek on the river Kesen. But in the following year the whole of the region was occupied by a force under Lieut.-Colonel Peremyshelski, who razed the Kirghiz fort to the ground; after this some of the tribes submitted to Russia, while the most inimical fled into Kokanian territory, and to the banks of the Talas and Syr-Darya.

The Russian detachment passed the winter in the sheltered valley of the Talgar, and in the ensuing year of 1855, General Hasford founded Fort Vernoé, at the base of the Trans-Ili Alatau, at the head of the Almatynka valley, which is picturesquely wooded with apple and apricot trees.

The occupation of the fertile Trans-Ili region, well adapted for agricultural and gardening purposes, and in all respects bountifully endowed by nature, had the effect of protecting the great Hordes from the attacks of the Buruts, but placed its nearest tribes in the same position as that occupied ten years previously by the Great Kirghiz Horde. The powerful and numerous tribe of the Bogus, who occupied the picturesque valleys and table-land between the Celestial mountains and the Trans-Ili Alatau, received neither countenance nor support from the Chinese, to whom they were nominally dependent, in resisting the fierce attacks of the Sary Bogish tribe; they had at the same time to repel, on another quarter, the depredatory incursions of some of their neighbours of the great horde. Consequently, soon after the occupation of the Trans-Ili region by the Russians, the High Manap of the Bogu tribe, the old Burambai, claimed the assistance of General Hasford against the attacks of the neighbouring tribes, and voluntarily tendered the submission of himself and his tribe to the Russian government. This led to the despatch of the first Russian detachment from Vernoé to lake Issyk-Kul, for the purpose of pacifying the two contending tribes, and making a reconnaissance of the hitherto unex-

plored valley of lake Issyk-Kul. Colonel Khomentofski, the officer in command of this force, and General Siverhelm who was in charge of the Survey of the newly organized Semipalatinsk region, were the first educated Russians who beheld this extensive lake and the snowy summits of the Celestial range. Unfortunately this detachment in consequence of its critical position amidst the wandering mountain tribes, the animosity of one of which against the Russians was decided, while the friendliness of the other was open to much suspicion, was soon recalled, and the surveying parties were unable to penetrate into the interior of the Celestial mountains. The southernmost point attained at the foot of the Tian Shan, by Ensign Yayooski the topographer attached to the expedition, was where the Faûkû rushes out if its narrow defile on the Issyk-kul plateau.

In the same year of 1856 I was sent by the Imperial Russian Geographical Society on an expedition to explore those more accessible portions of Central Asia, which had previously been but little visited. Naturally the great object of attraction for me on this journey was the Tian-Shan or the Celestial range. The signification of this stupendous chain in position the most retired in the whole continent of Asia, had already been pointed out by Ritter and Humboldt; but the labyrinth of the Celestial mountains had not as yet been penetrated by any scientific traveller.* All the learned and critical researches of Ritter and

* Atkinson, the English artist, in his travels, which were published in 1858, gives an account of his journey from the river Kurchum, in the Southern Altai, across the Black Irtysh to lake Ubsa-noor, thence southwards, past Ulusutai, to the neighbourhood of the Chinese town of Barkul, at the base of the Tian-Shan; travelling then parallel with this chain, though at a considerable distance from it, as far as the meridian of Bogdo O'la mountain, and finally proceeding in a North Westerly direction, past lake Kyzyl-bash. until he reached lake Ala-kul in Russian territory. Unfortunately so extraordinary a journey, unprecedented in the history of the exploration of the Asiatic Continent, has had no beneficial scientific results. The narrative, which occupies 115 pages of text, so little characterises the explored region, that it might with equal fitness be applied to any portion of the Kirghiz Steppe. The critical enquirer finds nothing throughout the whole narrative, to satisfy him of the genuineness of the described journey, which extends over no less a distance than 3,000 miles of Chinese territory. This is the more striking as undoubted proofs of the actual performance of journeys of which descriptions have been given, may easily be found in the short itineraries and accounts of travellers of different ages and nations; as for instance in the travels of Huc and Gabet, in the marche-routes of Tartar traders, collected by Humboldt, and in the more ancient accounts of Baikof, Marco Polo, the Armenian prince Getum, in the marche-route of the army of Gulagu Khan, (compiled by one of his officers in the 13th century) and lastly in the narrative of the travels of the Buddhist Missionaries Fa-Hian

Humboldt respecting this range partook, even by the admission of the latter, of the character of conjectural geography, founded on a comparison of the obscure and confused narratives and descriptions

and Huan-Tsan, in the 4th and 7th centuries. Concise though these accounts doubtless are, the learned critic soon discovers in them such local peculiarities as can only be descriptive of particular spots and localities, and as we become more intimate with the geography of the country to which such accounts apply, the more readily and clearly do we identify the points given in these marche-routes. To our great regret we do not find this to be the case in that part of Atkinsou's work which relates to Chinese Djuugaria. From the commencement, in calling the Tian-Shan Sayan-Shan, he confounds, in name at least, the two principal monntain systems of Inner Asia; and in all the other portions of his narrative, where he does not confine himself to descriptions of the Steppes, the chase of wild animals, and the social cnstoms of the nomads (descriptions which would apply with equal force and truth to the whole of Central Asia) but wishes to communicate something more definite and locally characteristic, he falls iuto uumerous iucongruities. Thus, to cite some examples, he speaks of the Kara-Tyn snowy range, at the upper course of the Black Irtysh, as of a level steppe intersected by low ridges; again, from the Tannu mountains, situated at a distance of 120 miles to the N. E. of Ubsa-noor, he sees the Bogdo-Ola in the Tian-Shau, which is about 750 miles away from this point. Lastly from the plain at the base of the Celestial range, he simultaneously sees not only the Bogdo mountain, but also the Baishan or Pé—Shan (emitting smoke by Atkinson's account), which is about 300 miles beyond to the westward, notwithstanding that the snowy Bogdo-Ola group stands out as is well kuown, considerably in advance of the main chain of the Celestial mountains, and the Baishan mountains rise on their southern slope, that is to say beyond its gigantic snowy ridge, in the neighbourhood of the Little Bukharian town of Kucha. Similarly as little confidence do those inconsistencies inspire which occur in his account of the time occupied in performing the various journeys, and in his description of the distribution of the nomad Kirghiz population, throughout Chinese Djungaria. As regards ourselves personally, the iuvoluntary doubts respecting the abovementioned portion of Atkinson's travels are still further strengthened from information we gathered on the spot regarding his journeys, from the Cossacks who accompanied him, and from the commanders who provided him with escorts. Atkinson, during his many years' residence in Siberia, visited the neighbourhood of Kopal, that had theu just been founded, many valleys of the Djungarian Alatan, the lake Ala-Kul, Tarbagatai, the rivers Narym and Kurchum in the Southern Altai, the Teletsk Lake, Tunkinsk mouutains of the Sayau range, Irkutsk Kiakhta, &c. but as regards his travels over an extent of more than 4000 *verts* in Chinese territory, *accompanied by three Narym or Kurchum Cossacks*, I regret to say that I not only could not gather anything to confirm this fact, but I was conviuced of its utter impossibility, from existing local conditions on the Russian as well as on the Chinese side. On the Russian, because the protracted detachment of these Cossacks, or their voluntary absence from the corps, is a fact that would leave behind it some record in the official archives, while on the Chinese side, the journey lasting more than six months, of a party unacquainted with the local dialect, and passing through inhabited districts, along established routes, and across the picket and frontier lines, could scarcely escape the vigilant eyes of the Chinese authorities. Under all these circumstances, and in the absence in Atkinson's narrative of any new data relating to Chiuese Djungaria, this work cannot be considered as an acquisition to science, until the author adduces more definite information and stronger proofs, in corroboration of his accounts which iuvoluntarily inspire certain mistrust.

of Chinese and other Asiatic travellers, commencing from the Buddhist Missionaries Fa-Hyan and Huyan-Tsan of the 4th and 7th centuries, to the brief itineraries of the Semipalatinsk Tartar traders of the present century. Numerous questions, replete with interest to the science of geography, could only be possibly solved by actual investigation on the spot. The configuration of the country, the direction of the upheaval of the mountain chain, its mean height, the altitude of its mountain passes, the height of the snow-line, the distribution of animal and vegetable organisms, the existence of Alpine glaciers or of volcanic action,—points all requiring either investigation, or confirmation. So far back as 1851 and 1852, during my stay at Berlin, I acquainted Humboldt and Ritter of my intention of proceeding into the interior of Asia as far as the Tian-Shan range. They both encouraged me in my difficult enterprise, but did not conceal their doubts as to the possibility of penetrating so far into the interior of the Asiatic Continent. The result of my deliberations with these leaders of science, strengthened me in my determination of attempting to reach the eternal snow-line of the Tian-Shan at all hazards. Humboldt attached so much importance to the investigation, even a cursory one, of this range, that I could not look at the undertaking but in the light of a holy mission, marked out for me by the Nestor of European savans.

By the end of the summer of 1856 under the auspices, and with the co-operation of the Russian Geographical Society, I was already in Vernoé. Unfortunately, however, I arrived two months after the visit of a Russian detachment to lake Issyk-Kul.

With a small escort of twelve cossacks, I succeeded, on the $\frac{9}{21}$ September, in reaching the eastern extremity of the lake, and had an opportunity of surveying from point Kuké-Kul-usun, the imposing range of the Tian-Shan, from the Djirgalau to the opposite extremity of the lake. To visit the chain itself was that moment impossible. My escort being so small, I was obliged to proceed very carefully, and passed the night among inaccessible defiles, anticipating every moment to be attacked by hostile bands of Kara-Kirghizes.

Returning to Vernoé, and procuring a larger escort (40 cossacks) I proceeded through the wild Bûam defile, at the upper course of the Chû, and emerged on the base of the Celestial range, near the Western

extremity of the lake Issyk-Kul. Here I came upon numerous encampments of the hostile Sary-Bagysh tribe, who shortly before my arrival, had had a fierce engagement with a Russian detachment; which had been sent out from Vernoé, to punish these mountaineers, for acts of violence and plunder. Notwithstanding that, I met with a hospitable reception from the Sary-Bagyshes who were commemorating the death of many of their kinsmen who had fallen in the recent conflict, I was not able to penetrate beyond the first exposed rocky spurs of the Celestial range, nor to visit its wild defiles, being apprehensive of treachery from the revengeful mountaineers, who had lately been so severely punished by the Russians.

However, in the spring of 1857, thanks to the escort kindly furnished me by Governor-General Hasford, who displayed great zeal and energy in furthering the organisation and exploration of the newly acquired region, I was enabled to realise all my plans. The deadly strife between the two Kara-Kirghiz tribes was then at its height, and the valleys of the Tian-Shan seemed quite inaccessible. A happy combination of circumstances, however, removed this apparently insurmountable obstacle to my journey.

A rumour, that had spread with extraordinary rapidity, through almost the whole of the Mustag (the Turk name for the western portion of the Tian-Shan) of the approach of a strong Russian detachment, armed with terrible instruments of destruction,* for the purpose of assisting the Manap Burambai, produced a sudden panic among the Sary-Bagysh tribe, inducing them to relinquish, not only the camping grounds they had seized from the Bogus, but even their own native pasturages, from the upper course of the Djirgalan, along the whole border of Issyk-Kul, for an extent of more than 200 *versts* and to migrate to the upper course of the Syr-Daria (Marym). The Bogu tribe who had been previously attacked by the Bagyshes in the spring of 1857, and driven into Chinese limits, expected their complete destruction; the sudden flight of their enemies dispelled their fears and enabled them to re-occupy their former camping grounds, and

* The exaggerated accounts respecting the strength of my escort were owing to my having really reached Burambaisaúls accompanied by 800 horsemen; but these consisted of a body of Kirghizes of the Great Horde under the Sultan Tezek who had voluntarily joined my detachment. My own personal escort consisted of only 25 cossacks.

even to reap the harvest that had been left standing in the fields by the Sary-Bagyshes. Attributing this favourable turn in their affairs to my approach, they rendered me every assistance for my journey. With such material assistance, I was able in July of 1857 to wind round Issyk-Kul from the south side and to reach the summit of the imposing and terrible Faŭkŭ-Davan mountain pass; I also succeeded in gaining the sources of the Narym, which forms the system of the Syr-Daria or Jaxartes. Shortly after, I penetrated in a more easterly meridian, much farther into the heart of the Celestial range, and ascended one of the most elevated mountain groups of Inner Asia, that of the Tengri-Tag, which is crowned with a circle of alpine glaciers, and covered with a dazzling mantle of eternal snows. In the glaciers of the Tengri-Tag I discovered the source of the Sary-Djaza, which belongs to the system of the Tarym-gol or Ergeŭ the most remote of the considerable rivers of the Asiatic Continent.

On my return to St. Petersburg in 1858, the Imperial Russian Geographical Society, taking into consideration the great scarcity of astronomical points in the region I visited, organised at my recommendation, and with the co-operation of the Military Topographical Depôt, a new expedition, under Captain Golubef, for the purpose of determining astronomical points in Russian Djungaria, and on the Lake Issyk-Kul. By last accounts, Golubef had ascertained the position of three points in the valley of Issyk-Kul lake (on the Tekes river, and at the eastern and western extremities of the lake respectively), but he had not succeeded in penetrating into the interior of the Tian-Shan, owing to adverse circumstances, as the southern shore of the lake of Issyk-Kul was at that time occupied by the hostile Sary-Bagysh tribe; under such a state of things it would of course have been extremely rash to advance into the mountains, leaving hostile tribes in his rear.

All the journeys and researches, since the year 1834, enumerated above, have considerably advanced our knowledge of the portion of Asia which we are now considering, and have removed it from the region of hypothetical speculation, to a certain basis of scientific investigation. On this account, therefore, the 2nd volume of the Russian version of Ritter's Asia ought to be accompanied by copious and well established addenda. Unfortunately all the materials that

might be used for such an amplification are as yet but little digested. The travels of Fëdorof, Kardin, Schrenk, my own, the observations of Golubef, the data collected and elaborated by Fakharof, have not yet appeared in print, and only short notices of them have been presented. I am consequently necessarily obliged to withhold the supplementary matter to the 2nd volume, at all events until the publication of my travels which is now delayed by all my time and attention being engaged on questions of pressing and vital importance to Russia.

With regard to the 3rd volume of the Russian edition of Ritter's Asia, containing a description of the Russian Altai, the not unimportant materials relating to these mountains, which were collected by me on my journey, have been partly digested since my return, and I am therefore in a position to proceed at once with the publication of this volume with its supplementary portion. I think it necessary to allude briefly in this place to some of the general results of my visits to the Celestial mountains. They embrace three questions of the utmost importance to the geography of Asia, namely the height of the snow-line in the Celestial range, the existence of alpine glaciers, and the existence of volcanic phenomena in this region.

On the first of these points I consider it incumbent on myself to dwell at length in reply to the doubts expressed by Humboldt as to the correctness of the elevation of the snow-line in the Celestial range, as determined by me. The height I fixed it at, namely 11,000 to 11,500 feet, was ascertained by Humboldt from a letter I wrote to Ritter, which attracted his particular notice. This letter was published in the "Zeitschrift für Erdkunde" with some explanatory remarks by Humboldt. The method I adopted for ascertaining the height of the snow-line was not known to Humboldt, who grounded his supposition of an over-estimation of the elevation of the snow-line on certain theoretical and analogical considerations.

Inaccuracies in the determination of the height of the snow-line may arise from two sources first from what is taken to be the snow-line, and secondly from an imperfect method of measuring heights.

In the first instance the observer may be deceived either by taking dissolvable for eternal snows, or by fixing their limit of height in

sheltered ravines or defiles which are hardly reached by the rays of the sun. Had I fallen into these errors in my determination the results-would have been to lower instead of to raise the height of the snow-line, as compared to its true limits. But these sources of error were fully anticipated and averted; my observations were made at points where regular layers of eternal snow occurred, and moreover on mountain-ridges and not in hollow depressions, in some of which I really did find eternal snows in some cases several hundred feet below the limit of 11,000.

With regard to the other point, I must observe that the method of determining heights by the temperature of boiling water, is certainly one which is far from being perfect; and leads only to approximate results; but the inaccuracy of these results becomes more inappreciable, the greater the height which is being measured. For inconsiderable elevations this method of measurement cannot be adopted. I may, however, observe that the other method, namely that of commercial determination, can scarcely be expected to give more accurate results when the conditions are unfavourable, as for instance on a journey through an extremely wild and dangerous region, where the traveller is obliged to form his own track, and stands every moment in danger of an attack; under such circumstances all simultaneous observations of the barometer, at the base and summit of mountains, or a series of observations at any one point, are quite out of the question. Experience has also shewn me the complete impossibility of keeping the barometers (I had two with me) from breaking, in a country so mountainous as that I traversed, where, on each expedition, the pack horses and camels stumbled repeatedly, and were occasionally dashed to pieces by falling over precipices. Hence travellers (Humboldt amongst the rest on his famous journey in the Andes and the Cordilleras) have invariably had recourse to the method of determining heights by the temperature of boiling water. The results obtained in this manner are regarded by science merely as approximations, until they are superseded by more accurate data, obtained when the region is more accessible to scientific exploration.

Although incomplete, these results are nevertheless of undoubted value to science, as the magnitude of probable errors even under such an imperfect method, cannot exceed certain limits.

But Humboldt could not have taken exception to the method used in measuring the height of the snow-line, in the Tian-Shan, because he at that time did not know what means were used for this purpose, and also because he himself adopted the same method on his journey in the New World, which was so prolific of scientific results. Humboldt's doubts respecting the probability of the height of the Tian-Shan snow-line (as fixed by me), being considerable, were based on considerations of comparative geography, and their soundness or otherwise may be easily tested, for they were founded on a comparison of their height of snow-line, 11,000 to 11,500 feet, with its well ascertained limits in nearly the same meridian (in the Altai, 6,600 feet) or in the same parallel, (the Pyrennces, 8,400 feet and the Caucasus, 10,170 feet).

In examining the observations made by any traveller respecting the elevations of the snow-line, the most accurate scientific criticism must test their correctness, by the following theoretical investigations.

The height of the snow-line in a given range, must be calculated theoretically on the basis of a comparison with other ranges, on the same meridian, and the same parallel; the obtained results should then be compared with the figures arrived at by actual observation, and it must then be carefully considered whether the discrepancy that may occur can be at all attributed to considerations of climate, and local peculiarities.

Humboldt, in his classical work "Asie Centrale," supplies us with the requisite figures for arriving at a definite conclusion.

In the same meridian with the Celestial mountains we find that the height of the snow-line is as follows,

In the Altai (Tigerski Belki)
Lat. 51° North, ... 6,600 feet.
On the Northern slope of the Himalayan range,
Lat. 32° North,..... 15,600 feet.

The Celestial mountains extend at the part visited by me, between Lat. 41° and 42° North which is consequently mid-way between the Altai and Himalayas. Taking the mean of the figures given above we shall get 11,100 feet for the height of the snow-line of the Celestial

range. In the same zone, parallel with the Celestial mountains the height of the snow-line is as follows :

In the Pyrennees ; (between Lat. 42½° and 43° North), ... 8,400 ft.
On mounts Elburuz and Kazbek in the Caucasus (43° N. Lat.) ..... 10,170 ft.
On mount Ararat (Lat. 39° North), ... 13,300 ft.
In the Rocky mountains of N. America (Lat. 43° N.) ..... 11,700 ft.

Humboldt, in his observations on my letter to Ritter, refers exclusively to the Pyrennees and to the Elburuz mountains. With regard to the first they cannot be taken at all into account in determining the height of the snow-line in the Celestial range, as they are situated in a moist sea atmosphere, where the snow-line must be considerably lower than in the continental climate of the interior of Asia. The Caucasus, however, supplies a better point of comparison, if treated with proper discrimination. The height of the snow-line of the Kazbek and Elburuz occurs at 10,170 feet, under a latitude of more than 1½° to the northward that that of the Tian-Shan, and with a climate considerably more humid. On mount Ararat, where the surrounding atmosphere is drier, and the latitude 2½° more to the south, we find that the height of the snow-line is 13,300 feet above the level of the sea. If a range of mountains existed between the Elburuz and mount Ararat, under climatic conditions of an intermediate character as compared to those characterising mounts Ararat and Elburuz, and situated under the same parallel as the Celestial range, the height of the snow-line of these mountains would be determinable at 11,300 feet. All these figures, computed theoretically by comparing the heights of the snow-line on different parallels of the same meridian with the Celestial mountains, and on different meridians of the same parallel, coincide very nearly with my determinations. The considerable elevation of the snow-line of the Celestial mountains is to be explained by the peculiarity of their geographical position, and the character of the surrounding atmosphere. It is generally admitted as a fact that a dry atmosphere has the effect of elevating the line of eternal snow very considerably. Thus for instance the snow-line on the southern slope of the Himalayas occurs at 12,180 feet, while on the northern side it rises to 15,600 feet. This anomaly is only to be accounted for by the southern side of the range being exposed to winds

charged with the humid vapours of the Indian Ocean, which settle on the cold mountain slopes in the form of snow, while the winds on the northern slopes of Thibet are completely free from moisture. The extraordinary dryness of the atmosphere of the Celestial mountains, compared to the Altai and Caucasus, is strikingly exemplified by the following instances. In the neighbourhood of Riddersk, in the Altai mountains, the dew falls so heavily that the horseman is completely drenched, when riding through the high grass, while in the sombre forests of the North-Western Altai, called locally Taigi, the atmosphere is still more humid, and rain, during some summers, falls incessantly. Now during the two years I spent in the Celestial mountains and Trans-Ili-Altaû I positively saw no dew; notwithstanding that the summer of 1857 was remarkably wet, and the Altai was rendered impassable from this cause, the fall of rain was very small. In addition, the very vegetation of the Tian-Shan bears evidence to the dryness of the surrounding air.

While the slopes of the Caucasus are clothed with dark and impenetrable forests, which proved so troublesome in the military operations of the Russians, the wooded surfaces of the Tian-Shan are of limited extent, and rhododendrons, which are so widely spread in the moist climates of the southern slope of the Himalayas and of the Caucasus, do not grow at all in the Celestial range.

If to this extraordinary dryness of the air in the Celestial mountains, be added the intense heating of the broad plateau by the scorching rays of the sun, accompanied by cloudless skies and a rare atmosphere, a natural explanation will then be found for the height of the snow-line being at 11,000—11,500 feet. The few measurements of heights made by other travellers in Djungaria, and moreover by other methods, serve to confirm the accuracy of my figures. Fëdorof determined *trigonometrically*, that is by the most accurate process, the altitude of the highest point in the Tarbagatai at about 9,900 feet. The Tarbagatai range extends under Lat. 47° N. and is consequently nearer by 1° of latitude to the Tigeretski Belki, than to the Celestial range. Computing the elevation of the snow-line of the Tarbagatai theoretically, by a comparison of the heights in the Altai and Tian-Shan, we should obtain a result of about 8,600 feet, while in reality the true elevation is considerably greater, as throughout the Tarbagatai range the existing

snows with the exception of two patches, are only sporadic, and the snow-line is not below 9,500 feet. This case proves that the snow-line rises rapidly from the Altai to the Tarbagatai, owing to the greater dryness of a continental atmosphere. Lastly, the barometrical observations of Schrenck, in the Djungarian Alataŭ, in Lat. 45° N., fixed the limits of eternal snows at 10,700 feet. Calculating then the height of the snow-line in the Tian-Shan by a comparison of that of the northern slope of the Himalayan, and of the Tarbagatai ranges, we obtain 11,700 feet and 11,950 feet, if we take in the Djungarian Alataŭ.

In this manner all the facts of the case, not alone those supplied us by comparative geography and climatology, but likewise those derived from the exact observations of other travellers, tend to confirm my figures, and prove them to be rather understated than magnified; Humboldt's doubts therefore as to the possibility of the snow-line of the Tian-Shan exceeding 11,000 feet elevation, are disposed of not only on theoretical considerations, but also by ocular demonstration. The interesting questions relating to the existence of fine alpine glaciers in the Tian-Shan, which is in intimate connection with that of the height of the snow-line, I solved in complete accordance with the previously expressed opinions of Humboldt and Ritter. I set out without any foregone conclusions on this point, but having experienced the remarkable dryness of the air in the Tian-Shan mountains, and having ascertained, on ascending the Faŭkŭ Davan, that the height of the snow-line was higher than 11,000 feet, involuntary doubts entered my mind as to the possibility of the existence of real glaciers in the Tian-Shan. These doubts were, however, soon dispelled. At the sources of the river system of the Sary-Djaza, I came across five magnificent alpine glaciers and a "Mer de glace" exceeding in size that of Chamounix. Notwithstanding some of the peculiarities of the Tian-Shan glaciers, owing principally to their prevalence at not more than about 2,500 feet below the limit of the snow-line, while in Switzerland they descend as low as 5,000 feet, their existence in the form anticipated by Ritter and Humboldt, on the strength of Chinese accounts, was fully confirmed.

It now remained for me to prove, by actual observation on the spot, the existence or otherwise of volcanic phenomena in Djungaria, and

in the Celestial mountains, to which Humboldt in his works so often alludes. I started on my journey firmly persuaded that I should find the conjectured volcanoes, or at all events some volcanic forms, and I sought diligently (as Schrenck did on lake Ala-kul) to establish the correctness of Humboldt's surmises, with respect to the existence of volcanic phenomena in Central Asia, by which confirmation I knew a traveller would gain greater credit than by an incomplete refutation of the hypothesis. I was even aware that Humboldt was rather displeased with the researches of Schrenk who clearly showed that the island of Aral-Tûbe on lake Ala-kul was not of volcanic origin. The opinions entertained by Humboldt on the subject of the existence of volcanoes in Djungaria were favourite ones with him, and I regret that I was not able to confirm his cherished theory. Kullok peak, another of Humboldt's mistaken volcanoes, was found to have no volcanic origin whatever. The hot springs, and the non-congelation of the waters of lake Issyk-Kul, were not accompanied by any volcanic forms in the Tian-Shan, and furthermore all the native accounts of phenomena which from their descriptions might be supposed to be volcanic, proved unfounded, and were at once disposed of on my examination of the localities where they were declared to occur. The result therefore of my researches on this point was that I became convinced of the complete absence of volcanoes, distinct volcanic phenomena, or even volcanic forms throughout the Celestial mountains. It is true that there existed in Djungaria at one period some "Solfaters" or smoking cavities from which there was a discharge and deposit of sulphur, and that some of these fissures, out of which the Chinese obtain sulphur, emit smoke even at the present day. But a careful inspection of one of the extinguished pits satisfied me, that at all events in *that* case, there was no volcanic affinity.

In the neighbourhood of the pits which I discovered in the Katû mountains, and in the Ili valley, I could trace no volcanic forms, but ironstone occurred, and owed its formation, as far as I could judge, to the pyrites that were widely spread in the vicinity; there was at the same time a discharge of sulphur emitted in the form of vapour out of numerous fissures and which left a deposit on the sides. It is to be taken into consideration that I found a coal formation largely developed throughout the Ili basin, and that coal is obtained by the Chinese in

the neighbourhood of Kuldja, in large quantities, from very deep seams. The whole process of the formation of sulphur can then in my opinion be reasonably explained by the combustion of some coal seams in this basin, which would at once set at rest the question of supposed volcanic agency.

I cannot positively affirm that the origin of the other smoking pits of Djungaria, and particularly Humboldt's famous "Solfater" of Urumchi, is susceptible of the same explanation, although the analogy between all the Djungarian "Solfaters" would appear to be confirmed, native accounts excepted, by the circumstance that the Chinese, who are very expert in recognising such sulphur formations, procure sulphur from the "Solfaters" of Katû which I visited.

With still less certainty can I deny the existence of volcanic phenomena or volcanic forms farther eastwards in the Celestial mountains. Humboldt in his observations on the letter I addressed to Ritter, which was published in the "Zeitschrift für Erdkunde" says that the Sangai, rising in the centre of the Ando-Cordilleras range, the most active of all the volcanoes in the world, forms around itself an island of trachyte, not more than two geographical miles in diameter. From this I must of course conclude that the observation of a single portion of the Tian-Shan visited by me cannot serve as a positive evidence of the absence of volcanoes and volcanic forms in other parts of this mountain system. My conclusions on this question generally have already been made public, in the letter here referred to, but I must likewise observe in addition, that all Asiatic accounts of phenomena which might be volcanic in appearance, should be treated by men of science with great circumspection, as many of these accounts have already proved fallacious. I would here also remark that the impression produced on me personally by Djungaria and the Tian-Shan leaves great doubts in my mind as to the existence of volcanoes in this part of Asia, and as I am the only traveller who has visited the Tian-Shan, I cannot accept the belief in their existence, as an axiom requiring no proof or confirmation.

My conclusion on this point, though negative, is one of the most important results of my journey.

If, in aspiring after the truth, I have been compelled to express opinions on two points of such vast importance to the geography of

Asia, which differ completely from those entertained by Humboldt; whose faith in the existence of volcanoes in the Celestial mountains was as firm as that of Columbus in the existence of the New World, it does not necessarily follow that I cast a shade (in itself impossible) on the spirit of the great scientific genius of the age. Science is the eternal aspiration of the whole human race towards truth, and truth can only be grasped at out of a multitude of errors and misconceptions. No one moreover is more liable to fall into such errors than the pioneers of thought, who marshal their fellow creatures to the great goal of truth, and call into existence words of new thoughts and conceptions.

These giant minds are followed by a train of disciples, for whom the path of investigation, and the final solution of great scientific problems, is rendered comparatively easy. Thus there are the men of genius in science, or the master minds, who conceive great thoughts, and the workmen who follow up such of these thoughts as are susceptible of elaboration. Each has his separate functions, but on the most humble labourer in the field of science devolves the sacred duty of pointing out and rectifying any error into which the eminent master may have fallen. And in such a case, the obscure advocate of truth should not be crushed by all the height and authority of genius, science being a problem open to solution to all humanity, and recognising no individuality or oligarchical superiority. The science of geography has lately been deprived of two of its most brilliant leaders—Humboldt and Ritter. To follow in their footsteps, to extend the circle of their researches, to strive after that eternal truth which they eagerly sought during their mortal careers, to correct the few errors which are interspersed through the wide field of their enquiries, these are the duties of every votary of science, even of the most humble grade, and will serve as the best testimony of admiration and respect to our great masters. May the present effort be taken as such an expression, and as one of the many proofs, that dying, Humboldt and Ritter have bequeathed to humanity a living record of their great genius.

Notes of a trip up the Salween—*By Rev.* C. Parish.

[Received 30th June, 1865.]

In March last, as I had never travelled on the Martaban side of the Salween, and as I had been promised by Captain Harrison, the Deputy Commissioner of Shway-gyeen, that, if I would pay him a visit, he would accompany me through the Fir forests of the Yoonzalin, which I have long wished to see; I availed myself of a month's privilege leave to take a trip northwards. Col. Fytche was going, at the same time, on his official tour to Shway-gyeen. His company was an additional inducement to go in that direction.

The road to Shway-gyeen lies through Beling and Sittoung, and affords good riding ground all the way in the dry season, as it keeps to the plain, leaving the mountains on the right hand, that is, on the east. These mountains, which, N. E. of Shway-gyeen, cover a great breadth of country, divide themselves towards the south into two narrow ranges, one of which separates the Yoonzalin and Salween rivers, terminating at their point of confluence: the other and longer range terminates at Martaban, and is the watershed between the Sittoung and Beling rivers on the west, and the lower Salween on the east. Westward of the latter range stretches a vast plain; and it is along this plain, parallel with the mountains, though at some little distance from them, that the road from Martaban to Shway-gyeen lies.

While at Beling, on the way, I rode out in company with Col. Fytche and Capt. Harrison to a place called *Kothanaiong*, about 7 miles off, to see the Amherstia trees there. This place had often been mentioned as one where the Amherstia was to be seen in great perfection, and where, indeed, it might perhaps be wild. I was well rewarded, for a prettier little spot I never visited. The Amherstias, growing in a well-shaded place and watered by a perennial stream which tumbles down a steep granite hill, and is ingeniously directed hither and thither in large bamboo troughs, were, indeed, to be seen in the wildest luxuriance of growth. But *Kothanaiong* is a sacred spot. Here are Pagodas, Pongyee-houses, Zayats all around. A flight of stone steps leads from the bottom to the top of the overhanging

hill, which is about 600 feet high, and on which are more sacred buildings. The Amherstias, seen only round the principal Pagoda, were undoubtedly planted, although they are left now to take care of themselves, and have a wild appearance. Evidently, this is not a native habitat of the tree.

From Beling we went on to a place called *Kyik-hto*. Eastward of this place and distant about 14 miles, is a remarkable mountain, called *Kyik-hteo*. Capt. Harrison, one of the very few Europeans who had been there, assured me that it was well worth a visit, as there was, on the summit, a very singular hanging rock, surmounted by a Pagoda. We went accordingly, riding the 14 miles to the foot of the mountain in the morning, and walking up it in the middle of the day. We reached the top 3,650 feet at 3.30 P. M. The view from the summit is very fine, as all views from great heights are; but the many granite boulders which are scattered about, some of them perched and balanced in the strangest manner on the most prominent peaks, constitute the most remarkable feature of this mountain. On all the most striking of these boulders small Pagodas have been built; in several instances, I should say, at the extreme risk of life to the builders. As the only way of conveying a true idea of the appearance of these rocks, I send a rough sketch of two or three of them.

There are two principal ones.—The one at the very summit is called Kyik-hteo "*par excellence*;" the other, some little way down the hill is, *Kyik-hteo galay*, or, "*little Kyik-hteo*." We could not ascertain for certain what their names signify, further than that "*Kyik*" is "rock" or "mountain-peak." I have observed that the Burmese never know the meaning of the names which the mountains and prominent rocks in the country bear; the names being older than the Burman occupation of it. They are, I believe, generally *Talaing*, but sometimes *Karen*. The chief rock of all, which gives the name to the mountain, is simply a wonder. It is a huge rounded granite boulder perched on a projecting and shelving tabular rock at the very summit. This tabular rock is itself reached by a small foot-bridge, for it is separated by several feet from the mountain by a rent or chasm; and on the farther side it drops down perpendicularly, I do not know how many hundred feet, into a valley below. On the extreme verge of this flat sloping rock-table, and actually over-

hanging it by nearly half, is perched this wonderful boulder, which is about 30 feet high, and is surmounted by a small Pagoda about 15 feet high. A rude bamboo ladder is leant against it on the inside, which enables an adventurous person to ascend. Every native will do this, but we, being both heavier and more awkward, preferred to remain at the bottom.

Viewed on one side, it is difficult to understand why this rock does not slide off its shelving support into the valley below! As one looks at it, it appears as if, assisted with a little grease and a slight push, it *must* go! But there it hangs, as it had hung, and I suppose, will hang yet,—one might indeed almost say, there it *slides* and will *slide*,—for many an age: "Labitur et labetur in omne volubilis ævum;" unless some earthquake (and a very slight one surely would do it) should rudely shake it from its precarious foundation. This place is annually visited for the purpose of worship by people from all parts of the country round; many, I am informed, going to it even from Moulmein. Many were already there, and very many more shortly expected, as was shewn by the temporary booths of grass which had been erected, and were calculated to hold several thousand people. Altogether, this is a remarkable place, very little known, and well worthy of the trouble of visiting it from a long distance.

I was disappointed, however, here, in a botanical point of view. I expected great things from a high mountain in a totally new part of the country; but I gathered scarcely anything. There were no Orchids at all. The Ferns, if any, were dried up; one or two new Acanthaceous plants alone rewarded my search. At this season the mountain is arid, and vegetation on it scanty. On the top there is little else besides long grass.

We passed the night on the top; and descended on the opposite, or north side the next morning. Our ponies had been sent round, and were found waiting for us at the appointed place; and a ride of 18 miles brought us by evening into Sittoung. From Sittoung to Shway-gyeen the distance is about 40 miles. After two or three days spent at Shway-gyeen in making preparation, Capt. Harrison and I started upon our walking trip to the Yoonzalin district.

The Yoonzalin river is a tributary of the Salween and takes its rise in (about) Lat. 18° 30′ and flows in a very tortuous course, but in

a general southerly direction until it joins the Salween at Kankareet, a little below the Hat-gyee. It drains a very mountainous district, and during the rainy season, rolls down a considerable body of water, but during the dry weather, it is a shallow rocky stream, full of rapids and scours. It takes small boats 15 or 20 days to ascend from Kankareet to Pahpoon, about two-thirds of its course. It took us 5 days to descend that distance.

The valley of the Yoonzalin is an extremely wild and almost uninhabited district. All the way from Bangatah in the valley of the Sittoung to Paapoon we did not meet with a single village. The Karens, the only inhabitants, are very few and scattered; and they have been so harried during the last few years, by the incursions of the Shan Pretender who styled himself *Ming-loung*, on the one side; and by us, in our attempts to drive him out, on the other, that they have hidden themselves away in the most inaccessible places. Occasionally only we saw a stray house or two perched up on the top of some distant mountain, or on its almost perpendicular side, with no visible way of approach from the spot where we stood. When the inhabitants become reassured and gain confidence in the permanency of peace, they will no doubt increase, and settle down in more accessible places.

I will not attempt any description of the scenery of this district, because mountain scenery in one place is very like mountain scenery in another place; and because I have rarely found that attempted descriptions of the kind convey any definite picture to the mind. All that needs be said is, that it was extremely wild and beautiful, and afforded all that endless variety of view which a chaos of mountains rudely thrown together, might be expected to afford. Neither shall I give the length of the stages which we performed, nor the names of the places where we halted; for these places were not villages, only well known spots conveniently chosen for the purpose, as combining the advantages of level ground and water. And the stages, if measured by miles, might appear small; though measured by labour, by no means so. A more laborious, at the same time thoroughly enjoyable, walking tour I never took. It is ceaseless ascent and descent, to the extent of several thousand feet a day, all the way. There are two words in Burmese for hill: *Toung*, and *Kŏn*. A *Toung*, hereabouts, is

a good stiff hill, in fact, a regular mountain. The word *Kŏn* seemed to be applied to any thing under 1000 feet. Two or three *Kŏns* go for nothing, no account is taken of them in the prospective march, if you should ask what it is like. After two or three days, one learnt oneself to despise a *mound* of 1000 feet. In this sort of travelling, one counts hours not miles; and, beginning to walk at 5.30 or 6 A. M., a man has generally had enough of it by 11 or 12 o'clock, and rejoices to hear that the "*tsikan*" or halting-place is near at hand. And this is the country through which some enterprising person has, I believe, proposed to make a Railroad to China!

The extremely low temperature of the upper part of the Yoonzalin district is remarkable. Immediately you get in among the mountains, even before crossing the watershed which divides the Sittoung and Yoonzalin, it becomes very much colder. It was the beginning of March; yet, at a place called Thayet-penkindat, on the west of the watershed, the nights and mornings were uncomfortably cold, and the water in the stream excessively so. Before reaching this place, an elevation of at least 4,000 feet, has to be made from Bangatah. Thayet-penkindat is the name given to a stockade which we have placed here. It is beautifully situated at the head of a fine valley, and is 2206 feet above the sea, and closely surrounded by mountains 2000 or 3000 feet higher. The stockade is guarded by a Police force, and the site appears to be well chosen, as it is situated at the entrance of the Pass into this part of the Yoonzalin. This Pass is called *Kyouk-taga* or *Rock-gate*, and is a narrow defile, two or three miles long. The head of this pass is 3343 feet above the sea.* A small stream runs through it, and the vegetation consequently is very rank. I was told that I should probably find some new ferns here, but though there were many species, there was nothing which I had not seen before. Near the head of the pass, however, I discovered a new species of Bulbophyllum, and one or two other orchids.

Through this pass, we were in the Yoonzalin district, and, to my great delight, the next day, among the Fir trees. The sight and the fragrance of a Fir forest to me, who had not seen one for a long time, was most refreshing. The trees are all of one kind, *Pinus longifolia*,

* The heights given have been furnished by Col. Blake, and are from his own measurements by an aneroid.

and cover the mountains from top to bottom. In many places it is the only tree visible. It attains a considerable height, 80 to 100 feet, and are, (the full grown ones) 8 to 9 feet in girth. The temperature of the tract or belt of country where the Fir grows, as I said just now, is extremely low. In the month of January, Capt. Harrison informs me, (for he had been here in that month) there is hoar frost, and a thin covering of ice forms on a basin of water by the morning. Even in March we found the nights and mornings so cold, that we were glad of thick over-coats and a blazing fire of Pine logs. At 11 and 12 o'clock in the day, and while walking in the sun, the heat was not unpleasant. The vegetation gave indications of low temperature. I gathered violets in the valleys. *Rubus* was met with; and instead of the *Acanthaceæ* and *Zingiberaceæ*, which cover the hills to the south but which were not seen here at all, *Compositæ* (among them a large *Carduus*) abounded; many of them attaining to the dimension of large shrubs. The *Compositæ*, however, were not confined to the Fir tract. Of Epiphytic *Orchideæ*, there were none: though I dare say that, in the rainy season, the terrestrial kinds would be numerous. As the forests were dry, ferns were scarce, though I was gratified at finding that singular little tree fern "*Brainea insignis*" in large quantities. I had never met with it before. I gathered also *Adiantum flabellulatum* and *Lindsæa tenuifolia*.

Immediately we crossed the watershed to the eastward, though still among the mountains, the Fir trees ceased, and it became very hot; and so it continued when we turned southward and crossed again into the Yoonzalin valley. It is only in the upper Yoonzalin that the temperature is so remarkably low, and that the Fir forests exist. Strange, however, to say, the Fir reappears in the Tenasserim provinces at Myawaddee, on the Thoung-yeen, some 50 miles due east of Moulmein, and thence stretches southwards for several miles, as I have myself seen. The tree there does not form forests, but is sparsely scattered among other trees; nor does it grow so large. But, and this is most remarkable, in the Thoung-yeen valley, it is found on hills only about 1000 or 1500 feet high, and descends nearly to the river; therefore in many places, cannot be more than 300 or 400 feet above the level of the sea; and this in N. Lat. 16.° !

Shortly after passing out of the Fir forests I was delighted to come

upon a truly splendid Bauhinia, which I discovered for the first time last year in the Thoung-yeen valley. Then, however, I met with but one tree—here now I found many, and all in flower. The flowers are very large, about 4 inches in diameter, of the purest white, save the single coloured petal which is streaked with purple and gold. It far surpasses *B. Richardiana* in beauty, for the petals of that plant are very narrow, consequently the flower looks poor, whereas, those of the species I am describing, are broad and meet at their margins, and this adds immensely to its beauty. The flowers also are of the sweetest fragrance, and are produced in profuse abundance all over the tree. I hope to get seeds of it. I left particular instructions with the headman of that part of the district, to gather some when ripe and forward them to Capt. Harrison, who kindly promised to remember me in the matter.

The most northerly point to which we went was *Kanlado*, another police station, and our frontier out-post. It is but some 15 miles from our boundary on the North, and not far from the Salween. There is a strong block-house here besides a stockade. It is situated on the top of a small cleared hill, and 1881 feet above the sea; it is surrounded on all sides by higher hills. This is the lively abode of the officer who has the honour of serving Her Majesty in the capacity of Assistant Commissioner of the Yoonzalin district. He, at least, if no one else, will rejoice at the completion of the projected Railway; but he is likely to be the only passenger!

The vegetation of the hills round Kanlado is very different from that which is seen in the Tenasserim Provinces. The forests consist almost wholly of what the Burmese call *Engyen* a species of *Shorea*, a middle-sized tree, at this season of the year in flower and without a leaf. The forests consequently have a bare wintry look, a condition of jungle never seen in the Tenasserim Provinces, where the whole country is densely green throughout the year. There are, of course, a few other trees mixed with the *Shorea*, such as *Careya*, *Dillenia*, *Eugenia*, and *Anneslea fragrans;* but not in sufficient quantities to alter the character of the jungle which is given by the prevailing *Shorea*. Orchids grow sparingly on the trees here, but some good kinds; *Dendrobium Dalhousianum*, *formosum*, and *eburneum*. The only other locality known for the last plant is the valley of the Shoung-

yeen. Besides these, I collected two or three other species familiar to me, but not yet described or named. There was nothing absolutely new to me here; indeed, the whole expedition only yielded two new Orchideæ; the *Bulbophyllum* already mentioned as found in the *Kyouk-taga;* and a *Dendrobium* with the flowers of *D. aggregatum*, but with short, erect cylindrical pseudo-bulbs.

From *Kanlado*, after a day's halt, we bent our steps southwards and homewards; as my limited time would not allow me to go further, not even to visit the banks of the *Salween* which is within an easy day's march of *Kanlado* on the east. About half way between *Kanlado* and *Pahpoon*, we turned aside from our path to visit a waterfall on the Yoonzalin river. I had often noticed on a map made by a local surveyor, professing to be a map of this district, high up on this river, the words, "*Waterfall*, 400 *feet;*" but I could never find any one who had seen the waterfall. Now, a waterfall of 400 feet is a very unusual feature in the scenery of any country and a grand sight; and I had long formed a secret resolution to find out this waterfall some day, and verify the statement as to its height. We were now at the very part of the country whence, if visited at all, it must be visited. I determined, therefore, not to return home without seeing it. Capt. Harrison, happily, was of the same mind; so, notwithstanding the assurance of the natives that the place was very difficult of access, and the mountain side very steep and slippery, we sent on a party in advance to find out a way for us and to clear the jungle sufficiently to make it passable. Arrived at the point of our road whence it was necessary to diverge from it to go in search of the waterfall, we struck off, and had certainly as hard a morning's work before we reached the object of our search, as any man could desire: but we reached it about noon, and that was enough.

On arrival we were at once gratified and disappointed: gratified at finding ourselves in a most romantic spot, and at the preparation made for us: disappointed at seeing no waterfall, although we were told that all that was to be seen lay before us.

We had come prepared to rough it and sleep on the ground; we were, therefore, agreeably surprised at finding a very capacious and exceedingly pretty structure built, and all ready for us. The site was selected with great taste, for on stepping up out of the thick jungle

by a small ladder on to our house, and on going to the front of a broad balcony or verandah ornamented with a balustrade, the whole made of bamboo, we found that the boughs of the trees had been cut away in front, and that we stood over a large circular pool of water into which the Yoonzalin poured itself on one side, and out of which it flowed on the other, and we had the best view that it was possible to have. We were in a perfect punch-bowl, shut in by almost perpendicular mountains on all sides. Before us lay the still pool, 60 feet deep and about 150 yards across: we heard the roar of the water rushing in and rushing out, but, so hemmed in with rocks is the spot that we could neither see the course of the river above or below. As I said, we were charmed with the place, but where was the waterfall of 400 feet? The reply was, that this was the "*Yaytagon*" (so the Burmese call a waterfall) and that there was nothing more to be seen than this! A raft of bamboos was made for us, and on it we went close up to the "*embouchure*" of the stream, the mouth of the passage through which the water from above pours into the pool. It was a singular sight. The whole of the waters of the Yoonzalin at this point are poured through a long, straight, and very narrow *street* of rock. The passage, or *street* as I call it, through the rock is *perfectly* straight, about 14 feet wide only, and having exactly the same width throughout its whole length, which is about 20 or 30 yards. The rock, granite, rises on either side of this passage to the height, in the centre, of about 50 feet in perpendicular walls with smooth faces, as straight and smooth as if measured with a plumb line, and cut with a hay-knife. As the water enters the upper end of this passage at a right angle, we could see no more of the river than the length of the passage, but we could hear the roar of the water as it boiled and bubbled in its tortuous and bouldered channel above. But though lashed into foam above, so smooth and polished is the narrow passage that the water glides through it with a surface like glass, and sinks at once to the bottom of the pool, causing little or no commotion in it. I climbed to the top of the overhanging rock on one side to get a sight of the river above, but it takes so many short and sudden turns and the gorge in the mountains is so narrow, that I could see but a few yards upwards. Thinking that we had seen all that was to be seen, and having already spent a day and a half here, we determined to set out

on our return the next morning; but towards evening, some of our party, who had been exploring, came and informed us that they had discovered a way to get up the rocks on the opposite side, and that having ascended that way they had come upon a waterfall. As we wished not to leave the place without being able to speak positively on the subject of the fall, and thinking that there might yet be one higher up the stream but hid from our view, we resolved to stop another day, and explore on the morrow. We did so, and climbed the way pointed out to us; and thus, taking the passage before mentioned in the rear, we got a good view of the river for a mile or so above it. As far as the eye could see, the course of the river lay through an extremely narrow valley and was impeded the whole way by huge granite boulders. The fall of level also was considerable; and near the spot where we stood, it took a sudden perpendicular leap of some 30 feet, into a deep and very confined square hole, which at once turned the water at a right angle, whence it rushed on, and after 2 or 3 similar sharp turns within the length of a hundred yards, dashed through the beforementioned passage into the pool. We had now seen all certainly and could positively assert that the greatest perpendicular fall the Yoonzalin makes here, is not more than 30 feet. Though disappointed of a *grand* sight, we yet considered ourselves well repaid for our toil by the general beauty of the spot and by the very remarkable character of that natural feature in the scenery which I have attempted to describe; the narrow street with perpendicular walls through which the whole river, as well when at its height in the rainy season, as in dry weather, has to make its way. Several persons have thought that Pine logs might, in the rains, be floated down this river to Moulmein: but no one who had visited the Yay-tagon would allow it to be possible. No log could, I am convinced, pass this part of the river's course without being broken to pieces. It is unfortunate that all the Pine forests should be above the fall.

There was one drawback to our full enjoyment at this place. There is a pest here in the shape of a very small fly, met with happily no where else, which attacks every exposed part of the body most virulently. Its puncture immediately raises a blood pustule and causes considerable irritation for several days afterwards. I could scarcely sketch for these tormentors; and when we bathed, especially, their

attacks were so vigorous, that we wasted no unneeessary time in putting off and in resuming our garments. On the third day after our arrival we started for "*Pahpoon.*" It was not far from "*Pahpoon*" that, for the first time in the whole journey, we heard the ery of the Gibbon. Its ery was totally different from that of the Gibbon of the Tenasserim Provinees. The latter is a wailing, plaintive, and, to me, not disagreeable ery: but the eries of the Gibbon here were most diseordant, and not unlike that of a pack of jackals. They can hardly be the same speeies.

From Pahpoon, an obseure village on the Yoonzalin, we dropped down to Moulmein in boats. On the second day after leaving Pahpoon I notieed unexpeetedly on the bank of the river, in one of the wildest spots, a fine *Amherstia* in full flower, about 30 feet high. I saw but one; for it was the middle of the day and hot; I had been, therefore lying down in the boat under eover, heedless of what I passed. I looked out of the boat easually, and saw this tree; so there *may* have been others which I did not see, both on the bank and in the adjaeent jungle. I am sorry to say that my companion Capt. Harrison was a long way behind in another boat, so that I could not point it out to him; and he did not notiee it, beeause, not earing for the charaeter of the vegetation, he did not look out from his boat at all.

Now, my reasons for saying that this was a bonâ fide wild tree are these: in all this district, the valley of the Yoonzalin,—there are no Pagodas or Pon-gyee houses, or spots saered to the Burmese where they have erected buildings. The inhabitants of the distriet, in fact, are Karens and not Burmese; and these Karens are exeeedingly few and seattered. After leaving Pahpoon, we did not see a single village on the banks all the way until we eame to the junetion of the Yoonzalin with the Salween. There are, indeed, no doubt, a few villages a little way from the bank, here and there hidden among the trees, but these generally eonsist of but 2 or 3 houses: neither are they settled villages, for the eustom of the Karens is to ehange the site of their houses eontinually. Besides the regular Karens, not being Buddhists, do not build Pagodas, nor do they ever trouble themselves to plant ornamental trees, as the Burmese always do in their saered places. Besides, the spot where this Amherstia was seen, was not at all a likely plaee for an Amherstia to have been planted by any one; but

one of the wildest places imaginable. Had it been on a rising ground on a high bank alone, or on any prominent point on the river, I should have suspected that a hand had planted it : but it was on a low and sloping part of the bank, struggling for life with *Calamus*, *Bauhinia* and tall grasses and such other tangled stuff as forms the common vegetation of our river banks in the wildest places; and behind again was dense jungle of the tallest trees. However, notwithstanding all this, had it been seen in a fairly peopled district, I should have doubted; but in such a wild uninhabited country as the Yoonzalin is, I see no reason for suspecting that it was not a genuine native.* Had Wallich's first tree been here, I am satisfied that the idea of its *not* being wild would never for a moment have occurred to him. I am perfectly satisfied that the tree seen by me was a wild one. That the Amherstia in a wild state may be very scarce is not improbable, but that it should not exist any longer in that state, though possible, is, to say the least, very unlikely. Probably it is confined to a small area; and I am inclined to think still, as I always have thought, that its habitat is the banks of the Salween, and of the Yoonzalin, which runs nearly parallel with the Salween in about the latitude where I suppose it grows. Very few Europeans, who would care to notice the vegetation of the country, have ascended either the Yoonzalin, or the Salween above the Great Rapid, that is to say, have been continuously along its banks, so that a rare tree may, not improbably, exist there, although it has not been seen on the latter river at all, nor on the former, except by myself, as I have described.

I append a rough but tolerably accurate map of the country.

* The *Amherstia* has never been found wild before. Wallich discovered it, i. e. first saw it, at a place called *Pagât*, some twenty or thirty miles up the Salween. The trees which he saw are still there, at least some of them, and are manifestly planted trees, being near an artificial tank, at the entrance to some sacred caves.

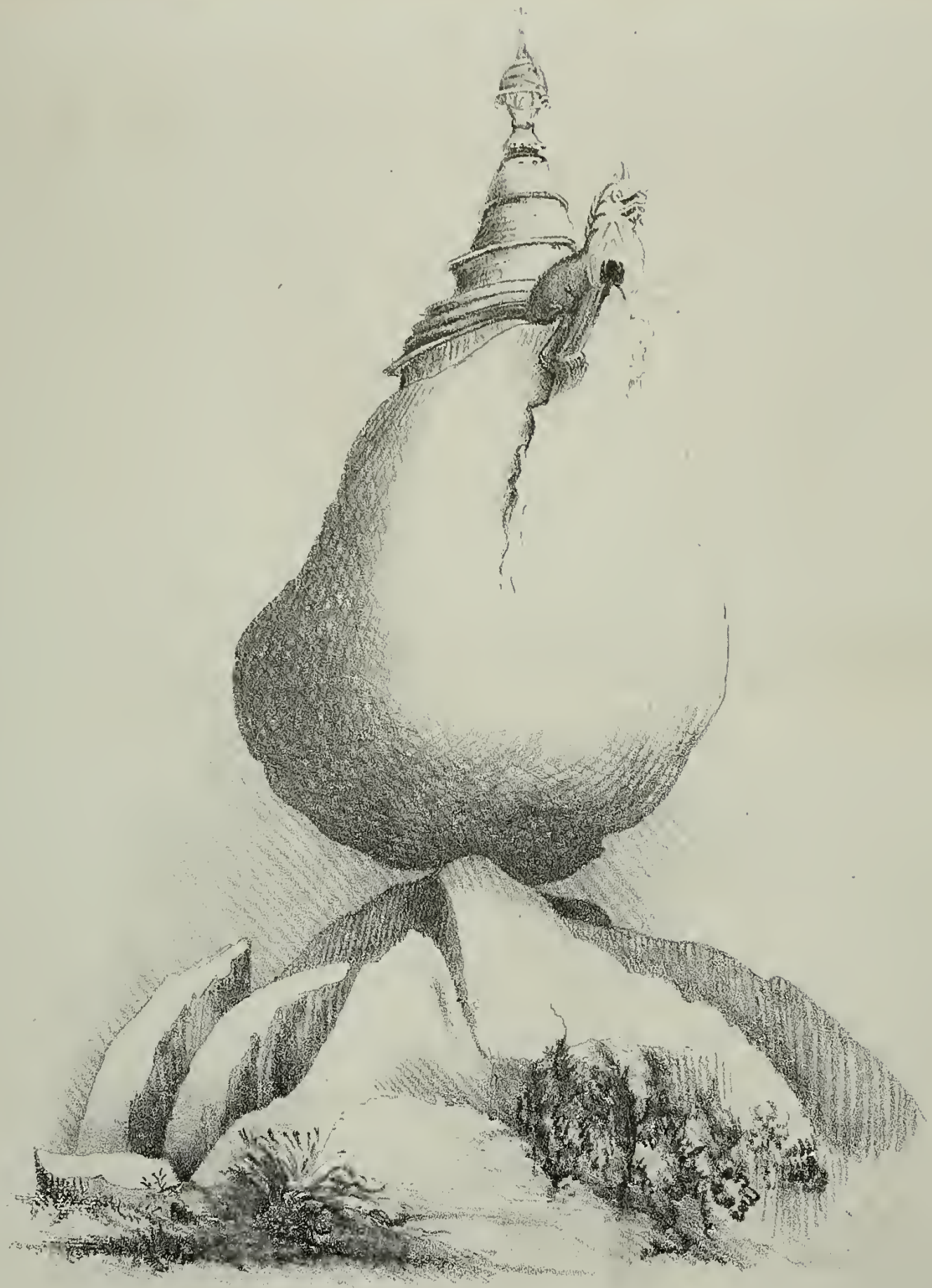
I have long had an idea that the native habitat of the *Amherstia* would be found to be somewhere high up the Salween. This is not at all unlikely, because very little, indeed almost nothing, is known of the banks of this river above the *Hât-gyee*, or *Great Rapid*, which is about 100 miles up the river.

Sketched by C. Parish.

On stone by Kristohurry Doss

BOULDER TEMPLE AT KYIK-HTEO.

LITH. BY H. M. SMITH & CO. CALCUTTA, OCT. 1865



Sketched by C. Parish.

On stone by Kristohurry Doss.

KYIK-HTEO-GALAY BOULDER PAGODA.

LITH BY H. M SMITH. S. G. O. CALCUTTA. OCT 1865.

Sketched by C. Parish.

KYIK-HTEO BOULDER PAGODA.

On Stone by Kristohurry Dass

LITH BY H. M. SMITH, S. C. O. CALCUTTA OCT. 1864

Notes of Observations on the Boksas of the Bijnour District.—By Dr. J. L. Stewart.

[Received 10th January, 1865.]

Travellers in Central America tell us that the phrase *quien sabe* ("who knows?") stops them at every step, when they seek to inquire into the past history of the natives, and some analogous expression is probably in frequent use, in similar circumstances, among all barbarous or half-civilized races who have no literature. In this country *quien sabe* is fully represented by *khabar nahin* and *Khuda jáne*, and of these I have had much more than was pleasant, in trying to discover something of the past history of the Boksas of the Bijnour district. My attention was first directed to the existence and peculiarities of these people, while making some investigations as to the food of the inhabitants of the district, and various circumstances subsequently led me to be somewhat curious about them. And although I have miserably failed in making out anything definite as to whence the Boksas came or from whom they sprung, a few facts have been elicited regarding the habits, mode of life and health of those who inhabit the Bijnour Forest and the Patli Doon, which may have some interest as relating to a section of this tribe, the last of which, it seems not unlikely, will be seen by a few more generations.

This information was only acquired by a good deal of patient digging among these Boksas themselves, during several weeks of the cold season of 1862-63 when I visited a considerable number of their villages, and conversed with many of their inhabitants, including some of the most intelligent headmen among them.

No detailed description of the Boksas, or of any section of them, has hitherto been published, but there are many scattered notices of those who inhabit the eastern portion of the Rohilkhund forests, in the reports and papers of Traill, Batten, Jones and Madden; and Sir H. M. Elliot, in his supplement to the Glossary, gives some interesting traditions as to their origin. Frequent reference will be made to these notices hereafter, but, meantime, a few general facts gleaned from these and other sources may be given regarding the distribution and characteristics of the eastern Boksas. Since our occupation of

Rohilkhund they would appear not to have extended in any numbers to the eastward of Kilpoory, beyond which the Tharoos, a similar race begin to prevail, and their chief settlements were near Guddurpoor and Roodurpoor. On the rearrangement of the canal system of that part of the Rohilkhund Taráí, the Boksas were concentrated to the north of Guddurpoor, where their settlement is now known by the name of Boksár. Nearly 300 years ago this term was applied to a tract a little further to the eastward, in which, at that time, probably the greater number of the tribe resided. Captain Jones, about 1845, gave the number of inhabitants of (the present) Boksár as 2,293, and I have no information, subsequent to that date, shewing what proportion of the Boksas of the neighbourhood may still inhabit scattered villages.

The Boksas inhabiting the forest to the east of the Ramgunga, who are called by those of Bijnour *Púrbiá Boksas*, and sometimes *Khalsí*, are described as mild, inoffensive and truthful, but indolent, fickle and unthrifty, and extremely ignorant; and, ere they were taken in hand by British officers, they are said to have been kept in grinding poverty by the usurers and their own Pudhán. They are stated also to have shewn an invincible disinclination to settle down for more than two years on one spot, yet never to emigrate outside of the Forest and Taráí, to be excessively partial to the flesh of game, especially wild pigs, and to exhibit a "wonderful immunity from the effects of malaria."

The Tharoos or Tharwi above alluded to, present many points of resemblance to the Boksas, though neither will acknowledge any connection with the other. But the former cover a much greater extent of country than the latter, as from the point a little west of the Sardah where the two tribes dovetail, the settlements of the Tharoos stretch eastward through the forests of northern Oudh and Goruckpore to the river Gunduck.

I can find no evidence that on the east the Tharoos meet the Meches, who are called by Dr. Hooker "decidedly Indo-Chinese," and who occupy a similar position abreast of Darjeeling, to that held by Tharoos and Boksas to the west, and to whom they appear to possess a considerable resemblance.

The fact of different segments of the Sub-Siwalik forest being

inhabited by three tribes which acknowledge no relationship, and which, at the same time, have many peculiarities in common, is deserving of more attention than it appears to have hitherto attracted.

To the westward of the Ganges, there are some Boksa villages inside the Siwaliks, in the Dehra Doon, but I can discover nothing certain regarding their numbers, nor as to whether any of the tribe inhabit the forest outside the Siwaliks in the Saharunpore district. These western Boksas are called by those of Bijnour, *Mehras* or *Meri*, and are acknowledged by them as in every respect of the same caste with themselves. But isolated statements by members of such ignorant tribes can hardly be accepted without check, for the Pátlí Doon Boksas repudiated all *barádárí* with the *Meri*, as well as with the *Púrbiá*, whom they asserted to be nothing but Tharwí, and to eat frogs and lizards.

We need not, however, suppose *their* ignorance to be strikingly exceptional, for, at an early period of my inquiries, I was informed, upon what would ordinarily be called "good authority" in the Bijnour district, that the Boksas were chiefly remarkable for living in houses built on poles, for the indifference of their women to decent clothing, and for mainly earning a livelihood by gold-washing. As will be seen by and bye, there is some little truth in the last statement, while the two first are baseless. But this is beaten by the characteristics attributed to the Boksas of Dehra Doon by the other inhabitants of the district, who say that the former are famous for dealings in witchcraft, for successful treatment of insanity and syphilis, and for their pot-bellies, all which peculiarities probably originate in the imagination of the narrators.

The number of inhabited Boksa villages in the Bijnour district outside the Siwáliks, including two in the Patli Doon within the outer hills, is fifteen, of which the thirteen outside are pretty equally distributed over the Forest, but are rather more numerous towards its western end. Of these, four are situated near the base of the Siwáliks on the inner edge of the Forest, five on canals at some distance from either border of the latter, and four—all in the eastern part—on or near its outer edge in the Tarái proper. It is out of my power to give aught like a correct census of these, but the number of inhabitants in single villages, ranges

from twenty to at least two or three hundred in one or two of them. Having found out the exact number of persons in a few families, and made a good many inquiries, about most of the villages, bearing on the point of population, I should put down the total number of Boksas in this tract as at least two thousand, and possibly nearer three thousand.

Of the fifteen villages, eleven were visited. All are built on the same plan of one straight street generally of considerable width (in some cases as much as forty to fifty feet) and kept very clean, in both respects, differing remarkably from the ordinary villages of the plains. The huts are placed end to end with intervals after every group of three or four, and the walls are, for the most part, built of wattle (of split bamboo) and dab, but sometimes of *chhuppar*, of which latter the roofs also are constructed. The houses are windowless, but each has a door in front and another behind, the latter affording access to the sheds for cattle, &c. The doorways and roofs are very low, and the floors of beaten earth are considerably raised above the general level of the ground, and are kept scrupulously clean. The only "furniture" in the houses, besides an occasional *charpái*, or more frequently small *chhappars* (which are often used to sleep on, as cheaper than the former), consists of a few cooking vessels and one or two barrel-shaped utensils three or four feet high and fully as much round, made of wattle and dab, and used for storing grain.

There is no change made in the houses or household arrangements during the rains, so that these western Boksas do not at any time "live in houses built on poles," as is stated to be the case with those opposite Kumaon.

The members of the tribe are of short stature and very spare in habit, in both respects, somewhat exceeding the ordinary Hindoo peasant of the district, from whom, however, they do not differ much in general build or in complexion. No measurements of their crania were made, but so far as ordinary inspection goes, their features are marked by several of the Turanian peculiarities. Thus, the eyes are small, the opening of the eyelids being narrow, linear and horizontal (the inner angle not inclined downwards so far as I observed), the face is very broad across the cheekbones, and the nose is depressed, thus increasing the apparent flatness of the face, the jaw is

prognathous and the lower lip thick, and the moustache and beard are *very* scanty. Some of these peculiarities are much more marked in certain individuals than in others, but most of them were noticeable in almost every man's face I saw, and it seems certain that a Boksa will at once recognize another to belong to his tribe even if he never saw him before, although some persons (Kumaonis) said they could not recognize one of the tribe until he *spoke*.

The features of the few women that I had an opportunity of seeing closely, were comely enough and of the same general character as those of the men; but, as might be expected, in the children of both sexes and even in a descendant the above peculiarities were but little noticeable. Indeed, some lads were remarked in whose features could be discovered no difference from those of the ordinary peasant of the district. I cannot say, whether or not, it was owing to the Boksa peculiarities of feature striking one less after a time, but in the western part of the forest, which was visited last, "features hardly so marked here" are noted more than once.

As will be seen presently, I am inclined to lay considerable stress on the fact of the Boksas having features with so many points of resemblance to the Turanian type so well-marked, that they have in a general way been commented on by all previous observers.

The dress of the men is the same as that of the ordinary native of the North West Provinces, but, except in one or two cases where the Pudhán may be presumed to have put on his "Sunday clothes" for inspection, none of them wore turbans over the thin cotton cap which generally covers the head. The little boys run about *in puris*, or nearly so, the girls wear a scanty rag. The women's dress consists of a petticoat, generally blue or of an orange-red, with a dirty-white or orange-red *chaddar*.

The proper names, in use by the Boksas, are almost always the same as those of Hindoos generally, with a few exceptions such as *Pálú*, *Dhanni*, *Mangú* and *Kalka*, which may be supposed to have been corrupted from Hindoo names. All of those, who were questioned on the subject, were quite positive that their language is quite the same as that of the other inhabitants of the district, and I heard of no words peculiar to these people, with the exception of some names of trees. The most remarkable of these is *Kandár* for the *Sal* tree,

which, however, was only heard locally. Singular enough, the Tharoos as Madden mentions, apply a special name *Koron*, to that tree. But little stress, however, can be laid on any, specially in the names of plants, which, with the natives of other parts of India, are often found to alter within a few miles, even among the same or closely allied tribes.

There are some peculiarities in the *boli* of the Boksas by which one of them is at once recognized by members of their own or other tribes. Thus *n* is constantly substituted for *l*, as *sán* for *sál* and *naṭh* for *laṭh*, and less frequently changed into *r*, and *n* into *l*, as *ḍári* for *ḍáli* and *thalela* for *thanela*. Two of these changes are often met together, as *Baglana*, which is very often substituted for *Bagnala*, the name of their chief village. One is struck also by a dialectic manner of pronunciation, which alters the short *a*, and occasionally the long *a* of Hindustani, into a sound approaching that of the French *æu*. Thus, Boksa is called Boksuh, and *achha súkha rahtá hai* is pronounced *achhuh súkhuh rahtuh hai*.

The earliest historical indication of the existence of the Boksas consists in the circumstance of a certain division of the Chourássi Mull in Rohilkhund, nearly 300 years ago, having been called *Boksár*, a term which is now, as then, applied to a tract of country thickly inhabited by them (as well as to the tribe, and sometimes to a single village of the *Boksas*). With regard to the traditional origin of the race, the clear and connected statements given by Elliot and Batten on this head are by no means borne out by the discrepant and, in some cases, absurd scraps of information which only these western Boksas, and the three *purohits* who are their spiritual guides, can impart. The writers mentioned, state that the traditions of the Boksas make them out to be Powár Rajputs descended from Oodya Jeet, (or his relative Jug Deo) and his followers, who in the 12th century left his native place in Rajputána on account of family quarrels and came, either mediately or directly, to settle here.

In reply to the inquiries I made on these points, instead of frequently, or at all getting a connected account like the above, the only assertions that most of these Boksas agreed in, were two, viz., that they are of Rajput origin, although they confess that the Rajputs of the plains hold them impure on account of their less cleanly

habits, &c., and that they had come from the Dakkan, but even in this they were not unanimous. When they came to details, and many professed to know none, their statements were more varied than satisfactory. Thus, several of them agreed that they came from Dhâranaggari, which, however, one man declared was close to Kangra Devi. One stated that they came from Delhi, and another that they had been driven from their original home in the Dakkan by the Marhattas; one *pudhán* stated that they came from Chittorgurh, "beyond Delhi" in the wars of the old Rajas, and the most intelligent *pudhán* of all, the only man among them that I met who could read, affirmed that they originally came from "Boondee Kolah" having been exiled thence "by the king." On this subject I found the three *purohits* quite as ignorant as the members of their flocks.

A still more curious statement, than any of these was made by an intelligent old Bengali Baboo, who has held a village in the Boksa district for many years. He solemnly affirmed that, before the commencement of British rule, the Boksas were Mussulmans in faith and ceremonials, and that, *in his time*, they had Hosseini Brahmins as *purohits*, and used verses of the Koran in their *puja*. This is a very suspicious story, at the same time it is difficult to see what motive the man could have had in narrating it.

It is not easy to reconcile the clear statements made to Elliot, especially regarding the origin of the tribe, with the above discordant and fragmentary information which alone is current among the western Boksas, and the explanation of the difficulty may be the following. If the story about Oodya Jeet is the true one, it would be more likely to be retained by the numerous and concentrated Boksas to the east of the Ramganga, than by the few and scattered members of the tribe to the west. Or, if that tradition is, as there seems reason to suspect, a mere concretion, resulting possibly from the original conversion of the tribe by Rajputs, and their centuries of contact with Hindoo castes and traditions, it may, in a similar way, have more readily assumed a definite form, where the tribe was most numerous and united.

Still less than my inclination to theorize definitely, are my qualifications to dogmatize on such a subject, but the suspicion has grown on me, since commencing inquiries regarding these people, that their origin may be very different from what has ordinarily

been supposed. It seems exceedingly unlikely that, had they been a tribe of Rajput extraction whom mere accident had driven to take refuge in this inhospitable tract six or seven hundred years ago, they would have, for such a length of time, remained so isolated as they undoubtedly have been, from other sections of Rajputs. But this is a minor difficulty, compared with the necessity to account for the very decided Turanian characteristics of feature which have been mentioned in detail, and which appear to be quite incompatible with a descent from any Indo-European race.

It may be objected that the language of the Boksas, barring slight dialectic differences, is identical with that of the ordinary inhabitants of this part of this country. But, not to lay too much stress on the circumstance that, in a case of this kind, positive is much more valuable than negative evidence, it is a recognized principle in ethnology, that the physical structure of a tribe, and the nature of their language, may change at very different rates, the possible alterations, in each, depending on very different conditions, and supposing that the Boksa originally sprang from a source different from that of the ordinary Hindustani, and that the physical circumstances in which he is placed are not such as, even in the course of centuries, greatly to alter the peculiarities of feature, &c., by which he was at first distinguished, it is difficult to conceive any position in which his language would be more likely to be rapidly and, at last, completely changed, than that in which he is now placed. Scattered in scanty colonies, over a very narrow strip of country, the language of the inhabitants, on both sides of which (we assume), differs wholly from that in use by him,—when each successive political or social convulsion in the neighbouring tracts, and, for hundreds of years, we know that these were neither few nor slight, was seen to be followed by an influx of these outsiders, what more likely than that his language should, at last, become completely assimilated to that of the latter?

The fact of the Boksas holding the Hindoo faith, and performing its rites, seems to me to present no stumbling-block in the way of adopting the view that they are of non-Aryan derivation. A race so few in number, and occupying so circumscribed a position, surrounded by Hindoos, and brought into close and frequent contact with them, would be likely to adopt the dominant religion almost as readily as

the dominant tongue. It is evident that, if my supposition is correct, all the traditions which assign to the Boksas a Rajput origin are baseless, but precedent are not wanting of tribes, assuming traditions in accordance with the history of their new co-religionists. Indeed, such traditions sometimes arise even where the smaller tribe has not adopted the religion of those who surround it. This is the case of the Nilgiri Todas whose ancestors are now represented to have been the palanquin-bearers of Kunya-Swámi, a Hindoo deity, though the Todas, far from being Hindoos, seem to have no religious beliefs or ceremonies whatever.

To the question, whence the Boksas came, and, if they are of Turanian origin, to which of the great tribes of that race are they nearly allied, the information at my disposal does not enable me to offer any definite answer. It may be, that they sprang from the same source as the Bheels, Gonds, Coles, and other so-called "hill tribes" of Peninsular India, relics of the original Tamulian inhabitants of the country, still subsisting in the out-of-the-way corners into which they were driven by the Aryan influx. But it appears to be indicated by the fact of a series of analogous tribes occupying segments of the Sub-Himalayan forest-belt from Assam to the Jumna, and seems on the whole more probable, that the Boksas are the furthest authors of the stock whence sprung the aborigines of the northern part of the Malayan peninsula. In any case, if they are really non-Aryan, the complete substitution of Hindustani for their original language, and the thorough assimilation of their faith and customs to those of the surrounding race may form insuperable obstacles to their true relationships ever being found out. Here, however, I shall leave this subject to be discussed by those who are better qualified to handle it, in order to revert to less theoretical matters.

The Boksas conform to the Hindoo religion in an ignorant, unmeaning way, and the usual rites of that faith are performed on the occasion of births, marriages, and deaths. Marriage, as among the Hindoos, takes place at 8 to 10 years, and at this ceremony the *purohit* receives a fee of about four annas. After a birth, he gets from four annas to one rupee four annas. The bodies of the dead are burned at the Ramgunga, or other neighbouring large stream, and the *phúl* (ashes) are carried to Hurdwár, there to be consigned to Gunga ji, by a Brahmin

who gets a rupee or two for his trouble. Besides his special fees, each *purohit* receives a general contribution from every village in his beat, apparently amounting to about 5 maunds of grain each crop, which is allocated among families according to their means.

In small matters also the Boksas adhere to Hindoo customs. Thus, they do not wear their shoes (when they have any to wear) during cooking, and they kill animals to be used as food, by *jhaṭka* a blow or cut on the back of the neck, and not by the throat-cutting *halál-karna* of the Mussulmans.

A good many of the tribe are said to profess special devotion to particular deities, the only ones named to me being the spouse of Siva; under her designations Bhowani and Devi, with Baba Kalu and Surwar Sakhi. Of the personality of the last, I could learn nothing. Kalu Saiyid is a local saint, who, curious enough, they state to have been a Mussulman, as indeed the appellation Saiyid, if it be not a corruption, would indicate. Some traditions about his life and death are current, and before his shrine, at the entrance to the main pass through the Siwaliks into the Patli Doon, Hindoos of all sects make offerings, and his name "*Kalu Saiyid ki jai*" is invoked in the neighbourhood of the tomb on entering upon an undertaking, or when engaged in severe exertion such as heaving up a load, &c.

The Boksas only marry among their own tribe, but there does not appear to be any restriction within its limits. In this tract they will have nothing to say to intermarriage with the Tharoos (who, they declare, "eat frogs and lizards"), and there is some authority for believing that Elliot must have been misinformed, when told that some of the eastern Boksas, "in Kilpoory and Subna, occasionally intermarry with the Tharoos." The wife always follows the *paṭh* of her husband, and the children that of their father, in regard to a difference to be presently mentioned.

Their *purohits* are Gour Brahmins who hold the office hereditarily. They do not live among their flock, but outside the forest tract, one residing at Afzulghur, towards the eastern end, and two in Nujeebabad towards the western end of the *hathi*. One of those of Nujeebabad has the six most westerly villages in his charge, the other has the three in the centre, and the Afzulghur man has the four easternmost with the Patli Doon villages. I conversed with all

of these *purohits*, and found two of them apparently most ignorant and stupid, while the third was fairly intelligent, sensible and communicative.

A considerable proportion of the tribe follow *Nának Mathá*, *i. e.* have adopted the Guru of the Sikhs as theirs, indeed they are called Sikh by their brethren, and not *Nának sháhís* as followers of Nának are in Hindustan generally. The ordinary Boksa does not "take Nának's name" at all. In some of the villages, including Bugnalli which is by far the largest of all, the proportion of Sikhs to the others is very nearly or quite equal, but in some especially of the western villages, there are few or no Sikhs.

Among so rude a people as the Boksas, it would be vain to expect to find any elaborate set of religious tenets either held or understood by such a sect as these Sikhs, and accordingly their one distinctive mark is avoidance of spirituous liquor, opium and *charras*, which the Boksas in general use freely. The Sikhs will not even smell spirits voluntarily, nor will they use the hookah or eat in the house of one who has smoked on the same day. It is said that the *purohits* also adhere to the latter rule. Tobacco is lawful to the followers of Nának, and they, and the rest of the tribe intermarry without restriction, the wife and children as above mentioned invariably following the man's sect.

The Boksas bear an excellent moral character. I have no definite information as to their intimate domestic and social relations, but for three years at least, not one of the tribe had been a party in either a civil or criminal suit in the district courts. Any disputes that occur are referred to the village elders, and in extraordinary cases, it would appear that the *pudhán* of one of the more important villages (Bagnulli or Chuttroowali) is called to adjudicate, but such quarrels of any moment are extremely rare.

Their indolence and ignorance are fully as remarkable as their inoffensiveness. They have a strong objection to all labour which is not absolutely essential to provide means for subsistence; for example, near some villages immense quantities of manure, of which they well know the value, were lying unused, the trouble of taking it to their fields being too much for them; and they assigned as the reason for not collecting Kíno *(Mrakkigond)* in the forest that it would be *barṛi mehnat*, although it is really very light work.

They seem to have no spirit of inquisitiveness whatever, even in regard to points in which one would naturally suppose they might be interested. Thus it was frequently found, that they did not know who was the *purohit* of villages within half-a-dozen miles of their own: and several said that there were *no* Boksas beyond Nawabpoora, which is the most easterly village of *this* section of the tribe. As a specimen of their combined ignorance and credulity, I may mention, that a *pudhán* of one of the largest villages having brought up his sick child, for some time declined to answer any questions, believing that by merely feeling its pulse the details of the disease would be discovered, and that any information from him would be superfluous.

They have among them no arts or manufactures whatever, all clothes, leather, &c., being imported; nor do they, so far as could be learned, use a single medicinal substance. I only met one Boksa who could read, and heard of one other.

They are much more frank in manner than the villager of the plains of the North West Provinces, speaking their mind pretty freely, and they appear to have some sense of humour, which if the latter possesses, it never comes out in his intercourse with Europeans. One of the Boksas when asked what remuneration he got for being *pudhán*, answered with a grin "Nothing but *dikkat*;" the question, "What will you get, for having guided me, if you do not wait till my servants come up?" elicited "Plenty of *kántá* on my way back;" an old fellow on seeing me examining under the ribs of some of the others for spleen, complacently patting his lank abdomen said with a droll expression such as is often seen to accompany some stroke of "Scotch wut," "Do you think I've got spleen?" And I had a hearty laugh, one intensely cold morning, when on my suddenly stopping to ask the old guide who, with chattering teeth, was panting up an acclivity after me, some question about their traditions, he replied "I may remember by and bye, but its so *bara jáara* just now, I can recollect nothing."

Their only amusement seems to be the pursuit of game, terrestrial and aquatic, and they complained bitterly that the recent carrying out of the Disarming Act had deprived them of a chief means of livelihood. They are excessively greedy after animal food, and

Mr. Batten informs me Boksas have told him, that without wild pigs a Boksa would die. This statement has probably something to do with their fondness for sporting, but, independent of this, wild pig is said to be almost a passion with them.

The Boksas are undoubtedly restless in their habits, and there are more migrations from village to village than would appear to be absolutely necessary. Still, this propensity doubtless shows more strongly when contrasted with the generally extreme adhesiveness of the Hindustani agriculturist to his native village. Here, among the western Boksas, there is nothing like the "Never stay in a place more than two years" which Jones and others state to be the case with their eastern confreres. On the contrary, most of the former appear never to shift their village at all, and the most extensive changes going on of late years among them, seem to arise from the Government orders to clear the Patli Doon.

With the minor development of the nomadic instinct, shown by their restlessness, they evince unconquerable adhesiveness to their *natale solum* among the swamps and jungles. I could not hear of a single instance of a Boksa having emigrated from the forest belt, and they mentioned the existence of a tradition that no Boksa had ever gone abroad for service.

Although they are so fond of flesh, they keep no goats or sheep, and in only one instance did I find that a few fowls were kept. Agriculture may be said to be almost their sole employment, but one or two others, which are followed by a few of them at times, may be here noted.

A very small number of them ever engage in cutting bamboos or timber for export, and the collection of drugs and gums, which are largely produced and gathered in the forest, affords employment to almost none of the tribe. In some parts, however, they collect a few of these (viz. gum of *jingan*, *Odina wodier*, and *sohanjan*, *Hyperanthera pterygosperma*, *kamela* powder from the *Rottlera tinctoria*, *aorila*, fruit of *Emblica officinalis*, and *harra* immature fruit of *Terminalia chebula*) for sale to the *bunyas*, who come hither to buy such things. I have already here mentioned, that the collection of the *kino* of the *dhak* they object to as being too laborious, and probably we must attribute to sheer laziness the fact, that they do so

little in availing themselves of the natural produets, whieh are literally scattered around them.

But the most important and interesting of the extra-agrieultural avocations the Boksas cver cngage in, is gold-washing, and it deserves a somewhat more extended notice. Within the last 25 or 30 years, the first part of the eourse of the Ganges, outside the Himalaya, furnished gold from its sands, but at present the Sona *naddi* in the Patli Doon, and the Ramgunga, bclow the junction of the former, are the only streams in this neighbourhood, whose sands are regularly or frequently washed. Little is done on the Ramgunga outside the Siwaliks, but there appeared every indication that the gold-washing was a regular employmcnt of thc Boksas on the Sona *naddi*, and there is reason to believe, that the proceeds derived from that minor Eldorado had a good deal to do with the manifest reluctanee of these people to leave the Patli Doon, on the oeeasion of its being shut up for the preservation of the timber. In the aggregate, however, the amount annually collceted does not seem to have been very large, for some years ago, the sum paid to Government by the contractor of the Doon as gold-ducs was only 25 rupees yearly.

The Boksas say that there is nothing in the appearance, of the gold-bearing sand to let them know if it will be produetive or not, and only "prospecting" by a trial will shew this. Thc sand itself is dug from the bed of the stream at many placcs cxtending over several milcs, and the superficial layer generally contains much less gold than some of those a few inches below. In the sand, there secms to be a good deal of ferruginous matter, and there are iron-markings along many parts of the borders of the little stream, which here runs down an intra-Siwalik valley similar to, but very much smaller than the Dehra Doon. Thc soil, in and near the bed of the stream, is mostly gravcl, and soft gray sandstonc, similar to that of the Siwaliks, frequcntly erops out.

Thrce or four people, often members of one family, work in a gang, eaeh having a separatc part of the proeess assigned to him. A shovclful of the sand is first put upon a little close-sct bamboo screen or sievc, placcd over the upper hinder part of a flat *toon*-wood cradle *(sand)*, thc lower end of which is opcn, and which has handles by whieh its

upper end can be tilted. Water is then poured on the sand from the mouth and lateral hole of a handled *túmrí* (pumpkin), the operator stirring the sand with his left hand while he sits alongside the cradle, which is raised a foot or two from the ground.

The sand having been washed through, the gravel left on the screen is tossed off, but the screen itself is left on, so as to soften and equalize the fall of the water from the pumpkin passing through it on to the sand, which the left hand keeps stirring about, and raking backwards toward the upper end of the cradle. After all the lightest of the sand has thus been washed out, small quantities of the remainder are placed on a round, slightly hollowed plate of *toon (pharú)* which is dexterously twirled and made to oscillate on the fingers of the left hand, while the washing is very gently continued. When as little as possible, and that consisting mostly of dark particles apparently of hornblende,—except gold, is left, mercury is rubbed with it by hand, to take up the gold, and the mercury is afterwards dissipated from the amalgam by heat. This finishes the process, which agrees almost entirely with that followed on the Biás, as described by Col. Abbott (J. A. S. March, 1847), the chief difference being, the trough used by the Boksas is considerably smaller.

The mercury is supplied to the Boksas at two annas a *mansuri paisa* weight by the same *baniyas* who purchase the gold from them, sometimes giving them advances on the possible future production, at sixteen rupees a tola. Several of the tribe, who could have had no possible collusion, stated that a gang of three or four people will average two annas worth of gold a day, and one man, of fair intelligence, said that into his village of under one hundred people, old and young, from one to two hundred rupees a year might come from gold-washing.

The gold is here invariably in minute particles, and the Boksas cannot conceive of the metal as ever being found in large pieces or imbedded in solid rocks; and a theory I have heard of the manner of its production has the quality of being as simple as are the people who credit it. Thus, it is said that the *sál* leaves which are burned by the forest-fires, act on any iron or copper which the soil or sand contains, so as to turn it into gold!

The agricultural operations and implements of the Boksas are the same as elsewhere in the N. W. Provinces. The chief crops of the hot weather *(kharif)* are rice, of several varieties, and *mandei (Mandua, Eleusine coracana)*, and of the cold weather *(rabi)* wheat with some *barley*, but besides these, most of the cereals grown in the open plain are also cultivated to some extent. Maize *(makki)* is but rarely grown, as it is said to be very subject to be eaten by wild animals (elephants, pigs and jackals!) So great is the damage to the crops by these, that the inhabitants of one village said, that since most of their guns were taken away, they had been obliged to give up cultivating a number of their outlying fields in consequence of not being able to protect the crops.

The pulses are very seldom cultivated, as the leaves are stated to be peculiarly liable to the attacks of *gindar*, a kind of worm which injures the plants so much as to prevent their maturing their fruit. For this reason, almost all the pulse used is bought from the bunyas. Another insect, *sundi* a sort of weevil, commits great damages among their stored grain, especially, they say, during the blowing of the *purwa* (east wind).

Nor are the pumpkin tribe cultivated, the reason given for this being that they do not ripen their fruit. This, if really true, is a very curious circumstance, the Forest tract being so moist that one would have supposed this class of plants would grow well.

A good deal of *sarson (Brassica campestris*, mustard) and lahi *(B. eruca*, rocket) are grown, chiefly for their oil, that of the former being used as food, that of the latter for burning. The young plant of the *lahi* is also consumed as greens,—as in France and other parts of Continental Europe,—and this is the only green vegetable they raise, such a thing as a garden being unknown among them.

Their agriculture is probably very slovenly, if one may judge from the large piles of manure near some of the villages, which they will not take the trouble to remove to, and spread upon, their fields. A still stronger evidence of laziness in this respect is, that they do not, so far as could be learned, raise a single stalk of tobacco, (which all use), although large quantities are grown in each village every year by *Sanis*. The latter are men of the plains and almost all of them reside in the forest for a few months only of each year, specially

for the tobacco-crop. A very few of them remain all the year in the forest (I met with one), and take two crops off the ground. The *Sanis'* houses are almost invariably in a little cluster apart from the Boksa village. I could not clearly discover what terms as regards land-rent are made with the Boksas. The facilities for getting excellent manure render tobacco a very luxuriant and lucrative crop, but men of the plains say, its quality is not so good as that grown outside the forest. The Boksas give as the reason why *they* do not grow tobacco, that it is unlawful for them to break off the top of the plant (as is done to prevent its running to stalk and flower); but this appears absurd enough, and the cause assigned for their allowing the *Sanis* to cultivate their village-land on any terms, viz. that the Boksas *have too few men*, seems to me almost equally so. It is to be found that laziness is the chief cause of both circumstances.

I can only give details, as to the area of land cultivated in proportion to the number of inhabitants, in regard to one village, and that the most comfortable-looking of all those visited. It contained less than one hundred inhabitants of all ages, and the extent of land under cultivation, for one or other or both crops, was about fifty acres. The Government land-rent paid by the Boksas appears to be in general exceedingly light.

After what has been said of the agriculture of the Boksas, it will be apparent that their food is of the simplest. It consist of bread made of the flour of wheat, barley, or some of the millets, or of rice with a small proportion of *dal*, and more rarely some *lahi* or wild herbs cooked as greens with a little oil. They also, as above indicated, consume a large amount of the flesh of wild animals compared with the ordinary inhabitant of the plains. And, were they always able to procure such food as the above, they would be, to say the least, no worse off than millions of the inhabitants of India. But, besides that the disarming process has affected their supply of meat, it will be at once evident, that if the proportion of land to population throughout is similar to that in the village instanced above, even were it cultivated in the highest perfection, sufficient food could not be grown for the inhabitants. We accordingly find that, even in ordinary years, most of the Boksas live for months on a wild yam, called *githi*, which, fortunately for them, is found in abundance in

these forests. The plant of which this is the root is the *Dioscorea bulbifera*, L. (*D. versicolor* Wall; *Helmia*, Kunth) which is common in the Sub-Siwalik belt as well as in the Himalaya to some distance inward. It is of the same genus as the West Indian yam, and as the *ratálu* which is cultivated for its tubers in most parts of India. The tubers of various other wild Dioscoreas are eaten in different parts of this country, and Buchanan Hamilton mentions one, with a similar native name *gength*, as being largely consumed by the savage *Bhars (Tharoos?)* of the Goruckpore jungles. The plant is a graceful climber having large handsome, heart-shaped leaves, and with little bulbs (whence the specific name) in the axils of the leaf stalks. The Boksas say the plant is always produced from these bulbs rather than from seed, and as the tubers examined had exactly the same kind of markings on them as the former, this is probably for the most part the case. The tubers themselves are found at varying distances, from a few inches to several feet, under the surface of the ground. The plant is luxuriant from the commencement of the rains in June, till about March, after which, as the stem dies away, there is no clue by which to find the tubers, so that, for at least three months of the year, they are seldom if at all dug. The Boksas declare that the *githi* will not keep for more than a few days, after which it dries up or gets rotten, but, from various circumstances, it seems not unlikely that this was merely given as an excuse for their having none stored up.

These tubers weigh from an ounce to (it is stated) five or six pounds, averaging perhaps a pound. For cooking, they are peeled and cut into *phanks* (slices), which are put into an earthen vessel with water and ashes, the latter being added in order to remove the excessive bitterness of the raw tuber. They are then cooked over a slow fire for from six to ten hours, generally in the night-time, and are afterwards washed before being eaten. An adult, it is said, will get through from two or four pounds at a sitting, using as a relish flesh *(kahya)* or pulse.

The Boksas themselves assert that they always prefer the cereals as food when they can get them, and that it is only necessity which drives them to eat the *githi*. They say the latter merely acts as *pet-boja* and has no strength *(kuwat)* in it, and in the more prosperous villages it is never consumed except in time of famine. In some of

the worst villages, again, they affirmed that during the two years of the late famine they had no vegetable food whatever, except the *gíthi*. Still, with the usual tendency of mankind to make the best of a bad bargain in such a case, they attribute various virtues to this kind of food. Thus, they state that it does not cause thirst or flatulence, and that their freedom from spleen is attributable partly to eating it. Their estimate of it, as tending but little to strengthen the body, is much nearer the truth, as like the other yams, it is mostly composed of starchy non-nitrogenous matter, and long-continued subsistence on any such diet will tend to debility of body. This must be kept in mind when we come to consider the general questions as to the health of these people.

The Boksas are fond of tobacco, which, when they have no hookah by them, they smoke in a twisted-up leaf *(patwíri)*; and they took kindly to Cavendish, which, however, they found very strong after the light unfermented tobacco they use.

All the men except those who follow Nának, indulge in spirit drinking. Some of them denied that their women drink, or said that they never do so until past the child-bearing age; and one man indignantly asked "What need have they for spirits, since they do not have to go out into the jungle, or sit for a whole night up in a *tánd* (= *machán*) among the musquitoes, crying, *hoo-hoo* (to frighten wild animals from the crops?)" But it seems certain that many of the women also drink. Boys begin to consume spirits at the age of ten or eleven, and the adults confess that they all drink whenever they can get liquor. Yet, it would appear, they very seldom carry it to intoxication or so far as to unfit them for work, but are generally contented with two or three glasses. The liquor, here as elsewhere in the district, is manufactured from *shíra*, and as it is sold at one anna and two annas a seer, this does not imply a very large consumption of alcohol. In one village, the *abkár* informed me that his customers comprized about fifty adult males, and his sales per month were equal to 80 seers of two anna spirits, which indicates a not very considerable average consumption of the liquor such as it is.

The best of their *purohits* often lectures them on their drinking habits, declaring that when they get a few annas they invariably run off to the *bhatti* to invest them, but he confessed with some sadness

that his admonitions do no good, while the Boksas standing round half-laughing denied the charge of drinking more than is good for them. They affirm that the spirits help, with *githi* and flesh to save them from spleen and *badi*.

I now come to what is practically perhaps the most interesting question connected with the Boksas, viz., their general state of health and the diseases to which they are liable. And, in palliation of the meagreness of what I have been able to discover under this head, it must be remembered that, among savages like these, each little fact must be expiscated separately, and the information derived from one man checked by repeated cross-questioning of him and others.

It may be premised that inoculation is quite unknown among them, and all denied that they use any medicinal substance whatever. As one man put it "What medicine do we know except *Bhagwán kí nám?*"

The only diseases unconnected with malaria regarding which particular inquiries were made, were urinary calculus, leprosy, cholera and small-pox. Cases of the two first have occurred among the Boksas, but the aggregate number of the tribe is so small, that no generalization of value could be made as to the rareness or frequency of these diseases among them, as compared with the inhabitants of the district generally.

Only one epidemic of cholera was mentioned to me. This occurred in 1862, and carried off nineteen people out of one middle-sized village. One sporadic case appeared in another village apparently about the same time.

The people were able to furnish some particulars of epidemic small-pox in five different villages, four of them apparently in the same year. The details indicate very varying intensity, as in two of the epidemics, although a good many children had the disease, no deaths occurred, while in each of the other three, ten to twenty, mostly young persons, died.

Ordinary intermittent fever is not unknown amongst the Boksas, but it is by no means common, and a number of those examined had had no attack for many years. Deaths occasionally occur from a form of fever which seems from their description to be a typhus with bilious complication, and which proves fatal in five or six days, if at all.

In a proverbially malarious district like that inhabited by these people, one might have been prepared to find the "Spleen-test," of some importance, and I was somewhat surprised to discover that in not one of the numerous adults examined, was the spleen notably enlarged. Indeed most of them had never heard of such a thing as *pilai*, while those who had, generally attributed their freedom from it to—as usual the *githi* and alcohol they consume. The percentage of enlarged spleens among the inhabitants of a district, as a test of the intensity of malaria in it, was first proposed by Dr. Dempster, when on the "Canal Committee" in 1847, and, since that time, it has been held as a dogma by probably the bulk of the profession in India, that a large number of "ague cakes" shew increased malarious activity in a district, while a blank return as to enlarged spleens would indicate absence or weakness of the miasm. Indeed, a report is on record, by a member of our service, who, when acting on a committee appointed to select a sanatarium, having in the course of a few minutes examined some of the residents of the village, and found few or no enlarged spleens, immediately pronounced the site "free from fever influences." But the almost total absence of spleen affection among this tribe, who inhabit from year to year, and all the year long, a tract where all the elements generally considered necessary, for the development of malaria are in full perfection for several months each season, and where it is but too certain that the miasm itself exists in the greatest activity at that time,—would induce us to believe, that there is still some datum to be discovered ere the "spleen-test" theory can be formalized.

Nor are we by any means at the bottom of the question of acclimatization so-called, in regard to a case apparently so simple as that of the Boksa living in comparative health throughout the year, in a tract twenty-four hours of many parts of which, at certain seasons, would be deadly to the newcomer. The Boksas' comparative immunity from malarious fevers has frequently been attributed especially to two causes; 1st, their not going out of doors after sunset in the fever-season, and 2nd, their houses being raised on poles at that time. Unfortunately, among our Boksas, neither of these habits has any existence,—houses on poles are unknown, and although in the rains, the Boksas naturally are not inclined to go out after dark

if it is avoidable, yet they make no special difference on account of the risk of fever. Thus those whose turn it is to go out and spend a night up in the *tánd*, in order to drive away wild beasts from the crops, do so in the rains as at other times. Nor are the Boksas the only people who may become "acclimatized." I met at least one *Sáni* who had spent two complete years in a Boksa clearing and had no fever. Again, some others do not so easily undergo the "acclimatizing" process. I inspected one *gote* of herdsmen from near Almora, of whom a certain number had that season (as in other years) remained down to tend their herds throughout the rains, a very large proportion of them had had fever severely and at least one had very bad spleen. Very many of these *gotiyas* suffer severely in the forests during the unhealthy season.

If we cannot as yet explain fully the cause of this difference, I may at least state in what respects the habitations of the Boksas and of the *gotiyas* ordinarily differ from each other, more especially as the differences observed tend to confirm the truth of modern views as to sanitary improvements. The Boksa villages are generally situated at some distance from forest and jungle, in or near the centre of the wide open space comprising their fields; they consist of one very wide, roomy, clean street, unencumbered by out-houses, &c., the floors of the houses are raised a foot or more above the surface of the ground, and are kept beautifully clean; the cattle are almost never lodged under the same roof with the human residents, except when there is great fear of tigers, and then they are in a separate chamber divided off by a well-lipped wattle and dab partition; nor is their dung allowed to accumulate close to, far less in the house.

In almost all these respects, a *gote* shews a very marked difference from a Boksa village. The former consists of immense quadrangular sheds, which are not necessarily or often pitched in an open space, but, as more frequently happens, are surrounded close up to their doors by forest and brushwood. In these sheds the herdsmen and their herds live in common, the former occupying the inner, the latter the outer end of a shed. The floors of these are not raised above the level of the ground outside, and the dung of the animals is not, so far as I could learn, removed for many weeks or months at a time, or at most only to just outside the doors, so that the whole place is one vast

dunghill and affords by no means a pleasant promenade even in the cold weather. With our modern views as to the effect that filth and close, foul air have on health, we need hardly wonder that the *Gotiya* is more subject to sickness than the Boksa, or that the latter attributes the greater liability of his neighbour to fever to the state of uncleanliness in which he lives.

In the course of my inquiries among the Boksas, it became evident that there is a very strong scorbutic tendency amongst them, of which the state of the gums affords a fair indication. In this pre-eminently statistical age, it would have been more satisfactory had I been able to give a good many figures bearing upon this point, but my attention became directed to it so late that I can speak positively as to the state of the gums in ten men only. These were taken promiscuously, and the gums of *nine* were more or less livid, spongy and hæmorrhagic, the one exception, with sound gums, being a robust young lad. In order to have some ground for comparison, the gums of several scores of prisoners in the Bijnour jail were subsequently examined on admission and at the time of discharge, and, with the exception of 2 (or 3) old thin-blooded men, and one lad who had been subject to considerable privation ere admission, the gums of all were healthy. These were sound even in the case of several who had been for some months on the *havalát* diet, which consists of only 16 oz., of flour with 4 oz., of pulse or 10 oz. of fresh vegetables.

The hæmorrhagic tendency of the Boksas appears to be shewn also by the great frequency and fatality of dysenteric affections among them. Of seven deaths, the causes of which were at various times, and without special design, detailed to me, five were from simple dysentery or diarrhœa, and two from dysenteric complications of fever and small-pox (respectively).

It may be a question whether the malaria, though it does not cause fever among the Boksas to anything like the extent which might be expected, has not something to do with the lowering of the system indicated by these purpuric or scorbutic symptoms, but I do not think we have any cause for it beyond the wretched food on which many of these people live. It has been seen, that the area of land tilled in a village is generally much less than would provide a sufficient quantity of cereals for the inhabitants under any system of culti-

vation however energetic, and that consequently, except in one or two favoured villages in good seasons, the mass of these people mostly subsist for a great part of the year on the wild yam, which does not contain all the elements for properly replenishing the blood,—that their supply of pulse which might supplement this want is not large, and that they grow almost no vegetables. Doubtless the flesh they eat, when it can be got, tends to lessen the detrimental consequences of their monotonous and miserable diet, but with the Disarming Act even partially enforced, they do not get the full benefit of that palliative. They are, at the best, but spare small men, and become prematurely old and feeble. Men of forty I have noted as "thin, grey, and breathless," and they themselves attribute their ailments to scanty food.

It would appear that the state of system induced among the Boksas, by the circumstances of their diet, is similar to that arising among some classes of the Irish from continued subsistence upon the potato alone, as detailed in a paper read to the Dublin Royal Society by a medical member in the course of last year. It is also analogous to that condition which is noted by Dr. Mouat as leading to the fearful mortality among the Sontals, and members of other wild tribes in the jails of Bengal, and which has also at times been observed among prisoners in Great Britain, in consequence of ill-advised changes in the dietary. Within the last few months, the existence of a similar state of constitution caused by poor diet has been suggested, by an experienced medical officer, as predisposing to the fatality of epidemic fever among the prisoners in the Punjab jails. This state of system, as existing among the Boksas, is perhaps more nearly allied to scurvy than to any other disorder, and although they or other people, in a condition of freedom, in whom it exists, probably seldom die *immediately* from it, yet it renders them infinitely more liable to succumb to attacks of epidemic or other disorders.

It is likely that the debility so evident in the adults likewise exists in the children of this tribe. Besides the numbers of young persons alluded to above, as carried off by epidemics; of 14 instances in which the age at which death occurred was incidentally mentioned, eight occurred before puberty, only six afterwards; and in almost all the families whose circumstances happened to be detailed, the minority

only were then alive, and in only one of these, had so many as three persons reached manhood.

The statements given above, however, though significant enough as indications, may not be very definite or on a sufficiently large scale to convince; the following facts do not labour under the latter defect. Seven Boksa villagas have become extinct, and no new Boksa settlements have been formed within our limits, in the memory of living men, and as the Boksa does not emigrate from the forest, the question arises "What has become of their former inhabitants?" There is *no* trace of any of them having migrated to the villages of the eastern Boksas beyond the Ramgunga, and only a very few from the western-most extinct village Lullutpore, appear to have crossed the Ganges into the Doon Boksa settlements, so that naturally one might expect the existing villages to have increased. But the fact is that of seven of the villages, where special inquiries were made as to increase or decrease of the population of late years, the largest of all (Bugnulli) had slightly increased, two others had remained stationary, while the remaining four had decreased from 50 to 90 per cent., and either figure will leave a margin, even for the irrepressible inexactness of the oriental.

While trying not to exaggerate the importance of these facts and indications, I cannot resist the impression that these western Boksas, the far outliers, as I presume, of one of the aboriginal races, are surely and not slowly, dying out. Several causes seem to contribute to this process. First among these may be put the unhealthy climate of the forest-tract, although it is impossible to say how, or to what extent, it acts in impairing the health of the race, or to separate its effects from those of the other agents in operation. Second, and most palpable, is the miserable diet on which most of the tribe habitually subsist; and third, the effect of epidemics is most fatal among a people whose blood is impoverished, and their strength impaired by the preceding causes. It has been seen that epidemics of small-pox, in particular, are frequent, and often fatal among the younger Boksas, and, had I remained longer in the district, I meant to have taken steps for sending vaccinators amongst them, so that the severity of this scourge might be lessened in its future visitations. It is possible, however, that ere this time the Boksas have come within the range of the general vaccine operations for Rohilkhund.

It might be supposed that Boksas are frequently killed by tigers and other wild animals, but I only heard of one man who had perished thus, having been killed by an elephant. I was subsequently informed, on doubtful authority, of three of them having been killed by one tiger, in 1863. In all likelihood, the frequency of wild beasts near their villages at certain seasons, renders these people peculiarly wary. At the same time they have the reputation of being very daring with tigers. I met one man who had been seized and mangled by a tiger a good many years before. The brute having been driven off by the other Boksas, who had no fire-arms, was shot by the wounded man as soon as he let him go, although he was laid up with his wounds for many weeks afterwards.

In bringing to a close these obervations on the western Boksas, attention may be directed to three special points which have come out more or less strongly in the course of them.

The first of these is a fact, which may possibly be of some practical moment, viz., the certainty that, among the inhabitants of a strikingly malarious tract, the proportion of enlarged spleens is not necessarily great, as the prevailing opinion would have us to believe.

The second point is also of some importance, not only as bearing on the inquiry, as to how, and to what extent the Boksas resist the influence of the funereal tract in which they live, but as related to the great sanitary questions which are agitated in the present day: it relates also to the nature of some of the circumstances in the sites and construction &c., of the Boksa villages, which apparently have some effect in warding off the deleterious effects of the climate, during and after the rains.

The third point is a mere hypothesis, and consists in the suggestion that so far from the Boksas being Rajputs, who migrated hither many generations since from Rajputana, as the traditions of the eastern Boksas say, they are probably either the relics of one of those waves of aborigines which the advancing tide of Aryan immigration drove from the Gangetic plain into the wilder recesses of the country, or, as is more likely, they constitute one of the extreme branchlets of that stem of the Turanian tree, which, rooted beyond the Kuenlun, has, at various times, sent its boughs far and wide towards the south. The materials available to me, under this head, are so scanty that the case

has necessarily been left "not proven." Some other enquirer may be able to throw fresh light on this subject.

But, even should these observations answer no very definite practical purpose, still, if my belief that the western Boksas are gradually vanishing be correct, it may be of some interest to have on record their peculiarities while they are still numerous and united enough to deserve and repay attention, and I shall not consider my labour lost, if, in the opinion of those whose views are worth having on such a subject, this end has here been at all adequately fulfilled.

Religion, Mythology, and Astronomy among the Karens.—By the Reverend* F. Mason, *D. D., Missionary to the Karen people.*

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Religion.

The Karens pray more, and make more offerings than the Burmese; but their only object in these observances is to obtain benefits in the present existence, principally health and prolonged life, so they cannot be regarded as religious; while the Burmese make them to procure benefits in a future state, and are therefore a religious people, though by no means so moral as the Karens.

The Karens believe in the existence of one eternal God, the Creator of heaven and earth, and have traditions of God, and the creation that must have been derived from the Old Testament Scripture. The following affords a specimen:—

"Anciently, God commanded, but Satan appeared bringing destruction.

Formerly, God commanded, but Satan appeared deceiving unto death.

The woman E-u and the man Tha-nai pleased not the eye of the dragon,

The persons of E-u and Tha-nai pleased not the mind of the dragon,

* The following pages have been prepared in reply to "Queries respecting the human race addressed to travellers, by a Committee of the British Association for the advancement of science."

The dragon looked on them,—the dragon beguiled the woman and Tha-nai.

How is this said to have happened?

The great dragon succeeded in deceiving—deceiving unto death.

How do they say it was done?

A yellow fruit took the great dragon, and gave to the children of God;

A white fruit took the great dragon, and gave to the daughter and son of God.

They transgressed the commands of God, and God turned his face from them.

They transgressed the commands of God, and God turned away from them.

They kept not all the words of God—were deceived, deceived unto sickness;

They kept not all the law of God—were deceived, deceived unto death."

Other traditions may be found in the appendix to a little book published by the London Religious Tract Society called "The Karen Apostle."

The names *Tha-nai*, and *E-u* in the above verses are sufficiently near the Biblical names of Adam and Eve to show a common origin; while they are so diverse from any mode of rendering those names adopted by either Roman Catholic or Protestant Missionaries as to prove they have not been derived from modern names.

The scriptural traditions have been found principally among the Sgaus, and as we leave the Sgau tribes, we meet with others that seem to me to have had a Hindu origin. Such are some of the traditions among the Red Karens. They say: "Anciently God created the heavens and the earth, and he formed two persons. One was called 'the female Tha-lu,' and the other 'the male Tha-lu.' God placed these two persons to superintend the whole world. And God created trees, and animals of every kind, and he wrote their names in a golden book, and gave it to the two persons whom he created, and according to the names found in the book, they called every thing. God created all things by his word and his power. He created every thing with a body, with seed, and with fruit." Thus far the tradition preserves a Biblical character, but they go on to say: "God did not

create all things at once. When God created the earth at first it was not as large as a cotton spindle. There was not as much in it as there is in a butterfly. And God commanded that the male Tha-lu should rule over the sky, and the female Tha-lu should rule over the earth, and all the animals on it. And that which made the earth increase was the earth-worm, and that which made it firm was iron, and that which sewed the earth together was silk. And before the iron and the silk had united the ground, the whole earth was covered with water. God was not pleased with the look of it, and he separated it by pressing the earth together with iron and silk, when the water flowed out and became rivers and seas, and the dry land appeared with its mountains and hills. And the three things that helped the earth, were the earth-worm, iron and silk. There was a spider in the sky, and he was able to pass to and fro between heaven and earth.

"The first mountain that was created was Lwie-nya; and the first rivers formed were La-ko-meu,

Lie-la-sho, and

Mai-e.

"And the river Lie-la-sho had its sources among the mountains of Rako-sho.

"And God created a precious stone, and it became a great tree, and the first tree was Than-du, and the first grass was the *Chrysopogon acicularis*. And the first bird he formed was the Night-jar, and the first fish was Tai-pai-men-bu, and the first snake was Die-lo-to.

"God created two suns, one was the husband and the other the wife, and they were shut within a palace with stone gates, and gave no light. God therefore gave the Pangolin to eat a hole through the gates which it did, and broke out all its teeth, and then the suns came forth, but the heat was so great that neither man nor beast could endure it. Therefore man entreated God to destroy one of them. And God told man to make a bow, and to shoot an arrow into the face of one of the suns. So the man went up into the valley of mount Ra-ko-sho, and shot an arrow into the face of one of the suns, and it ceased to give light and became the moon, which God appointed to rule over the night."

Another version of these myths is given as follows: "The Red Karens say: Where, or how God came into existence, they know not;

but they know that there is a God who has power over all things; and that this God existed before the creation of the heavens and the earth. He was like the air, and lived in the sky, like the wind; and like the wind he went about everywhere. This he did through his inherent power.

"And God prepared himself to create the inhabitants of heaven, and the inhabitants of earth; but before he created heaven and earth, he created two persons. The one a male, called the 'male Tha-lu,' and the other a female, called 'the female Tha-lu.' The signification of Tha-lu is to float about like the wind. They do not fall to the ground like a man from a tree top, but remain in the air.

"God put into the hands of these two persons the work of superintending the heavens and the earth. He appointed 'the male Tha-lu' to take care of heaven, and 'the female Tha-lu' to take care of the earth. Then when these people saw any deficiency, they asked God for what they required, and he gave them seeds and the elements of things, in order that they might make the earth complete.

"Some say that he who created all things under the direction of God, was Ie-a-pai; but the greater part say they were created by 'the male Tha-lu,' and 'the female Tha-lu,' and that the person who shot the sun's wife in the face was called Thye-kha. These four persons are regarded by the Red Karens as working for God continually. They also speak of another super-human personage that they call Pai-ie-pai-bya."

All the Karen tribes have traditions of God having once dwelt among them, but as having forsaken them. The tradition is varied. Sometimes he is represented as dying and rising to life again; and sometimes simply as departing. We have in verse the following:

"Ywah, about to return, commanded, commanded;
Ywah, about to depart, commanded, commanded;
He commanded the sun to come and weep for him,
He commanded the moon to come and weep for him,
He commanded birds to come and weep for him,
He commanded squirrels to come and weep for him.
Worldly people set themselves up;
Worldly people came not."

A Sgau story says: "Anciently God dwelt with the Karens, and they said to him: 'Thou art very old.' He replied: 'I will kill

myself by a leap;' and he called all his children to come and receive his dying commands. They came, and after each had been charged, he leaped into the sea. The Karens ran away into the jungles, but the white foreigners could not run, and they said to the Karens: 'Elder brother, I will go to where father commanded me.' The Karen replied: 'I will not go.' But the white foreigner went to his home, and leaping into the sea, brought up the body of his father. His father said to him, 'I am not dead;' and he gave orders to his children to come and receive his commands again, as he was about to go away. But the Karens had run away afar off, so he said to the white foreigners: 'Do not stay here.' And he washed them over with sandal wood, and said: 'If you stay here, the Karens will persecute you.' So they followed their father, and he gave them another country.

"The Red Karens say that anciently, after the transgression, God called all the different races of men together to learn to read, and all went, and every one studied zealously except the Karen, who did not study in earnest like the White Foreigner, the Chinese, and the Burmese. He went to and fro, and played, and did not understand books like the others. After a while, God dismissed the people and all returned home, but the Karen was not skilled in books, like the other nations. Still God had given him a book, but when he would study it at home, his wife scolded him, and drove him off to work. He therefore forgot what he had learned, and did not take care of his book.

"One day, while he was absent, his book fell into the fire, and was burned, and being unable to write, the Karens have had no books from that time to the present. However, they observed the variegated marks left by the letters of their books in the ashes where it was burned, and they made diligent efforts to embroider those forms on their dresses. Hence it is that the Karens are able to embroider different forms on their dresses. Had they not looked, and imitated the letters of the book that was burned, the Karens would not be skilled in any thing."

The above is from a Bghai assistant that spent two years among the Red Karens.

Ta-ywa.

The Sgau and Pwo name of God is Ywa, but the Bghais use a prefix and say Ta-ywa. To this name Ta-ywa, they attach long fabulous legends of which the following is one; and appears to be of Hindu origin.

The Elders relate concerning Ta-ywa and say: There was a woman who was pregnant, and when it was hot, she went and spread a garment out to dry in the sun, but so soon as it was spread out, it ceased to be hot, and clouds came up. Then she cursed the sun, and asked: "At first thou madest it hot, but now thou hast made it cloudy: Why is it so? The sun cursed her back in return, and said: "I wish thou mayst be pregnant three years, and when the child is born, may it be no larger than a jujube!"

After this, the woman remained pregnant three years, and at the end of that time, she was delivered of a son not larger than a jujube. The child eat, at first, as much rice at a meal, as can be put in the cover of a rice chutty; and after a little while, he eat a wash-bason full, and could wrestle with an ordinary man. After another short period, he eat as much rice as would cover a small table, and could wrestle with a strong man.

He asked his mother why he was so small, and she repeated the circumstances as related above. Then he said: "I will go and compel the sun to make me grow larger." Every morning and every evening, he worked hard to make himself a bow; and when he had finished it, he went up to the sky, to the place of drawing water of the sun and moon, and there he met the children of the sun and moon coming to draw water.

He bent his bow, and placed his arrow on the string, which was an Areca Nut tree as long as the height of a small mountain. Then he said to the children of the sun and moon, "Go tell your father to come here, and make me larger."

The children of the sun and moon were afraid, and said to their parents: "This man is very bold, and he said to us: 'Tell your father to come here and make me larger.' And he was about to shoot us with his bow."

The sun said: "If that be the case, let a cock go down and pick him to death." Ta-ywa drew his bow, laid on his gigantic Areca

tree arrow, and took aim at the cock, saying: "Tell your master to come down and make me great." The cock flew away screaming with fright, and told his master that Ta-ywa was very fierce.

In like manner, the sun sent a hog, and the hog was afraid. He sent a horse, and the horse was afraid. He sent an elephant, and the elephant was afraid. Every thing was afraid of him.

Then the sun said: "If it be thus, then make the waters rise, and he will be drowned." So he made the waters rise, but Ta-ywa made a boat, and remained quietly in it. When the waters fell, the sun said to his children: "Now that fellow is dead, go draw water." So they went to draw water.

Ta-ywa said to them again as before: "Go tell your father to make me great." The children were afraid, and returning to their parents said: "That fellow is not dead."

Then the sun said: "If it be so, we must make it burning hot." So he made it so hot that no one could endure it; but Ta-ywa created a banyan tree, and dwelt under its shadow.

After the heat had passed away, the sun said to his children: "Now that fellow is dead, go draw water." They were met again as before, and sent back with the former message; and they went and told their parents that they did not dare to go again to draw water. On hearing this, the sun made a bamboo tube, and went to Ta-ywa, who said to him; "Make me great." The sun took the bamboo tube, inserted it in him and blew him up larger, and larger, and asked: "Large enough?" Ta-ywa replied: "Not yet large enough." He blew again, asked the same question, and received the same reply two or three times, till Ta-ywa was satisfied, but when he rose up, his head hit against the heavens. The sun then flattened it down with his hand till it was low enough, and then departed.

When Ta-ywa returned home, the people said: "He is very great." And they envied him, and determined to kill him by stratagem. So they said to him: "Thy mother has no stones, on which to place her rice pot on the fire, let us go and bring her some stones." Then they went, and sought out the largest stone they could find, and all the village went to work to dig it up, and in order that it might roll over him and kill him; they said: "Go watch below, and carry it." So he went below on the side of the hill where they were digging, and

waited in the road to intercept it. When the stone came rolling down, he ran and took it up, and carrying it to the house said: "Where shall I put it?" They replied, "The house will break down." So he put it on the ground.

Then they devised again to kill him, and said: "Thy mother has got fever, and there is no large wood to make a great fire for her, go and bring some." So they sought out a large wood-oil tree, and went and cut it down, and told him he must receive it on his shoulder. He therefore caught it when it fell on his shoulder, and carrying it to the house asked: "Shall I put it in the house?" The people replied: "The house will break down." So he threw it on the ground.

Then the people said: "Ah, the rock rolling on this man did not kill him; the wood-oil tree falling on him did not kill him; but were a tiger to seize him, perhaps he might die." They therefore said: "Thy mother's fever continues, though we have offered fowls and hogs to the spirits, but were we to offer a tiger, she would recover." So the people made him go seek a tiger, in the hope that a tiger would seize him. He, however, had no fear, but went in search of a tiger's track; and after finding a very old one, he followed it up till he found the tiger, which he seized and carried alive to the house, when the people said: "We are very much afraid. Go turn it loose." So he took it back, and let it go free.

While his concubine was seeking vermin in his head, she was moved with compassion for him, and the tears dropped on his thigh. He said: "My faithful girl, what is it? It does not rain. Why is it that water drops on my thigh?" His concubine replied: "Ah, my dear boy, people are envious of thee and laying snares to kill thee." "Indeed!" he answered, "Is it really so? If people do not love me, then I will go away."

Every morning and evening, he worked on a bugle to give it a pleasant sound. When he had finished it, it blew out of itself, "Father and mother do not love me. Brethren two go abroad."

He said: "That is pleasant," and he prepared food for his journey. A hog of five spans round the body, five bundles of salt, five rolls of fish, and five baskets of rice. With this he started, and blew his horn as before, till he met with "Long-legs" planting, who had a silk-cotton tree stuck in his hair, whose shadow covered seven coun-

tries. While he made holes for the rice, his thirty concubines chopped in the seed. He said: "Ah, the hardest thing is planting. Who is this that comes blowing a bugle? Let us wrestle."

Ta-ywa said: "Ah, thy father and mother loved thee, so you can work and prosper; but my parents did not love me. They said I had grown exceedingly great, so I came away."

Though Long-legs planted rice with thirty concubines to sow the seed for him, he said: "Ah, it was so with me. Because my legs were long, they did not love me." He therefore prepared a hog of five hand-breadths, five baskets of rice, five bundles of salt, and five rolls of fish; and when his thirty concubines came weeping after them, he spit on them, and they turned to stone. Then the two went on their way.

Thus they travelled together, and the same scenes were enacted when they met in turn with Long-arms, Three-toothed, Broad-ears and Hollow-breast.

Having become six in company, they travelled together till they came to a fork in the Sitang river, made by an island; and there, they exhausted the water. Long-legs laid his legs across for a dam, Long-arms stuck his arms down perpendicularly for posts, and Broad-ears put his ear down on the interstices. Three-toothed bit up the fish, and Hollow-breast received them into his bosom.

When they came to divide the fish, Long-legs wished for all he could hold on his legs; Long-arms for all he could hold in his arms, Three-toothed for what he could take up with his teeth; Broad-ears for what he could hold on his ear; and they asked Hollow-breast: "How much do you want?" He replied: "I want all I can hold in my breast." His associates answered: "All the fish put together will not fill thy bosom. Why do you want so much?" And they quarrelled.

Then Ta-ywa, Long-legs, and Long-arms went in one direction; while Three-toothed, Broad-ears, and Hollow-breast went in another.

Ta-ywa and his associates met with Shie-oo, and they said: "We will cook rice." They went and asked Shie-oo to give them some fire, but he said: "I will not give to you. You must wrestle. If you throw me, I will carry the earth, but if you fall, you must bear up the earth."

This Shie-oo had a spur, like a cock, and when Ta-ywa wrestled with him, Long-legs came behind, and tripped up Shie-oo, but his spur entered the leg of Long-legs, and the blood flowed out like a river. When Shie-oo fell, Ta-ywa trod him down into the earth till he was immersed in it; and Long-arms thrust him down as far as his arms would reach; and then Long-legs trod him down as far as his legs would go; and he went down below the earth, and has to carry the earth to the present time. When the earth quakes, people say: "Shie-oo is raising himself."

Ta-ywa and his associates pursued their journey, and met with an empty house. After they had sat down, and drank water from a spout that brought down water from the brook above, they went up into the house, where they found a guitar. After Ta-ywa had tuned it, he played and sung:

"The house is pleasant, is fair;
The owner is where? Is where?"

The place where he sat was on the head of a very beautiful girl, who was hidden in the crevice of the floor, and she pinched him. He thought an insect had bitten him, and taking a cleaver he opened out the crevice of the bamboo floor, when he came on the head of the girl.

She said to them: "Ah, my dear boys, how is it that you are here? The great eagle has eaten my father and mother, my friends, and my brothers. My parents had compassion on me and hid me. How have you appeared? The great eagle will come and devour you."

They replied to her: "My dear girl, do not be afraid. Go beat out paddy and cook rice for us. So she went and beat out paddy, and cooked rice, and eat with them.

They asked the girl: "At what time does the great eagle come?" She answered: "When the sun passes the meridian, when it is half way down, and at sun-set." Then they said: "put up a split bamboo roof to the house, of seven layers; and below them a layer of iron." This was done, and then they made a tin bow, and an iron bow. The tin bow, they called the silver bow; and the iron bow, they called the old bamboo bow. Then they called out to the eagle singing:

"Every thing has the Eagle devoured,
Father, mother, and a wide land.
Has eaten father and mother,
But me in compassion they hid."

"Aha," the eagle exclaimed, "we said all were dead, and now we have found another quite unexpectedly." The oldest eagle came, and the sky became full of clouds. It became dark, it thundered, and the sun set. The eagle perched on the branch of a large wood-oil tree, but the branch broke, and it then flew up to the top of the tree and perched there, where it broke off a branch and picked its teeth with it, when the arm and leg bones of men fell out between its teeth.

Then it laughed, and said: "Aha! I said: can there be any thing more left? and here is the veriest trifle. Shall I dirty my teeth with it?"

Ta-ywa said: "Grandfather, you can devour me as a matter of course, but we try a bamboo, we try a tree. Let us try each other once."

The great eagle replied: "Why should we try? Be quiet, you cannot do any thing." Ta-ywa answered: "Nevertheless, things are tried; let us try."

The great eagle said: "Well then, how do you wish to try me?" He replied: "If you can strike through my roof then eat me; but if you cannot, you shall not eat me.

Then the eagle pulled a feather out of his wing, and with it struck through the seven layers of bamboo, but it did not go through the iron.

Ta-ywa immediately took the tin bow, and said to the eagle: "Where is thy heart?" He pointed to a spot on his side. Then Ta-ywa shot at the spot, but the arrow did not enter; so the eagle said: "Ah, you cannot overcome. Wait, let me eat you."

Ta-ywa said: "Grandfather, thou wilt eat me of course, but let me try a shot with this old bamboo bow." The eagle answered: "Eh, with the bow of glittering white if thou couldst not pierce me, how wilt thou pierce me with the rusty old bamboo one?"

Ta-ywa said: "I will try a shot. Where is thy heart?" He replied: "My heart is at this variegated spot." Then Ta-ywa shot, and the eagle fell dead.

When he had killed one bird, he repaired the roof and made it stronger than it was at first. Then he called and sung again, and a second eagle came, with which a similar course was pursued, and it was killed like the first, and so again with the third and last.

Then Ta-ywa ripped open the eagles, and took out the bones he found in them. The bones of men he placed in one pile, the bones of women in another, and the bones of the girl's father and mother in a third. Elephant bones, he placed by themselves; horses' bones, he placed by themselves; oxen's bones, he placed by themselves; buffaloes' bones, he placed by themselves; hogs' bones, he placed by themselves; dogs' bones, he placed by themselves; fowls' bones he placed by themselves. All kinds of animals, he placed their bones in separate piles.

This done, Ta-ywa made a strap, such as is used in holding a Karen basket borne on the back, on the head, and with it he struck the fowls' bones, when the fowls rose to life, and flew crowing away. In like manner, he struck the bones of each animal, and the animals came to life again. Last of all, he struck the bones of man, and the men came to life again. Then Ta-ywa said: "What has happened to you?" And they replied: "We have been asleep."

Ta-ywa planted two herbaceous plants, and left Long-legs in charge of the place, saying, If the plants wither, follow on quickly after me, and then departed.

He passed on and came to another empty house, where the hall was full of spiritous liquor. Here the same scenes were enacted as before, excepting that the girl was found in a spirit jar, and the destroyers were tigers. Before leaving, he planted the herbaceous plants, as before, and left Long-arms in charge.

Again he continued his travels, and met with another house without inhabitant, but he found rice spread out on the verandah to dry, and a number of pots of spiritous liquor. He sought a bamboo tube with which to suck it up, and having found one, he notched it at the bottom and drank. Here he found a handsome girl as before, and learned that three large Pythons had produced the desolation.

He dug a gallery under ground with seven bends, and put her at the end. Then he made two swords, and killed two of the serpents as before; but when he struck the third, the blade of the sword flew out of the handle, and Ta-ywa ran into the handle which the snake swallowed.

Immediately, the plants left behind withered, and Long-legs, and Long-arms followed on to the assistance of Ta-ywa. Long-legs went

kicking down the trees and bamboos as he went along, and the way being too narrow for Long-arms, he smashed down the trees and bamboos with the swing of his arms; but when they arrived, the Python had gone away.

Then they called it seven times, and the seventh time it came again. After the usual discussion, the two attack it, slashing at its head and tail, and finally killed it. When it was slain, they ripped it open, and found Ta-ywa in it dead. He was restored to life as others had been before; and then he separated from his friends and returned home.

He returned to his grandmother and younger brother, and told the latter to cook rice, while he went himself to the forks of the river, where he and his companions had at first dammed up the stream. When he returned, his brother was boiling fish, and the tail of one moved up and down by the bubbling of the boiling water as if alive. He said to his brother: "Why, it is alive! I went to look at the fish traps at the forks of the river, and have come back; and why art thou cooking a live fish?" Then he took his bow, and shot his brother dead.

He afterwards thought to himself: I ought not to have shot my brother. Then he set fire to a tuft of reed and ran round the edge of the horizon three times, and when he got back, the tuft had not done burning. He said: "I am very quick. I ought not to have killed my brother," and he repented.

After this, he was not happy, and he said: "I will kill myself." He made a bow, cocked the string, and laid on an arrow, and went to sleep beneath the arrow as he had set it, aimed at his head. A dove flying by, hit the cock, and the bow went off. He caught the arrow flying with his hand; and this was repeated ten times; but at last he forgot himself, and the arrow hit him.

For three years and three months, he grew very feeble, and at the end of this period, he called the monkey-tiger; and he sent him to call the Karens; and he called the Tupaia, and he sent him to call the Burmans. He loved the Karens more than the Burmans, therefore he gave the monkey-tiger a crayfish for food, that he might arrive quickly, because a crayfish is cooked in a short time, and he gave him a flint that he might get fire readily.

He had not much love for the Burmans, and that they might be slow in coming, he gave the Tupaia two bits of bamboo to rub together to obtain fire, and a bit of skin to eat, for it was difficult to cook, and the bamboos difficult to take fire.

When they departed, the monkey-tiger went up round all the crooks of the gigantic bean creeper, and slept one night by the way. When he cooked his crayfish, he said: "Why, it is blood red!" And it was long before he arrived.

But the Tupaia went rapidly. He was very hungry, so he roasted his skin a little, and eat it; and reached his destination in a short time. Hence the Burmans reached Ta-ywa first before he expired. They asked of him, and obtained horses, and elephants, and oxen, and buffaloes, and their dog asked for ears of paddy as large as the end of his bushy tail, and three crops a year.

The Karens did not arrive till after Ta-ywa was dead, and burned to ashes. His mats, and fanning baskets and carrying baskets were burned up and just their form and variegated patterns left in the ashes, which the Karens looked upon, and imitated.

Not satisfied, they followed on after the elephants, and tried to get on to their necks, but could not. Then he commenced driving bamboo steps into their legs, as when ascending trees; but this made them run away. Failing with the elephants, they tried to drag along the buffaloes with ropes tied to their legs, but could not make them go; and they tried the oxen with no better success; but the hog they succeeded in dragging along; so the Karens have hogs to this day.

The latter part of this story is versified, as follows:—

Go poison fish at Po, at Yau,
Go to angle at Po, at Yau.
Great frogs die, thou stayest to cook them,
Great fish die, thou stayest to cook them:
Thou remainest to cook them with thy brother,
To prepare them, thou remainest with thy brother.
Thou doest whatever cometh into thy mind.
Thou cockest the bow, layest on a red arrow,
Thou shootest dead thy younger brother:
Then thou repentest, sorrowfully.
Thou lightest the reed blossom, and boundest away
Three times thou runnest round the horizon,

Three times thou scamperest round the horizon.
Thou returnest, and the rice is not hot,
Thou returnest, and the fish is not hot.
Thou doest whatever cometh into thy mind:
Thou cockest the bow, layest on a red arrow.
One arrow flies, thou arrestest it in its flight,
Two arrows fly, thou arrestest them in their flight:
Thou forgettest that the arrow is flying,
The arrow hits thy heart.
Three years, three months, thou failest.
Thou sendest the Tupaia to Bamo
Thou sendest the monkey-tiger into the country:
But the monkey-tiger went slowly;
When the crayfish was cooked, he said: Why, it is red!
The Tupaia went trotting along:
He reached Ta-ywa before he died.
Received extraordinary power to variegate cloth,
To weave beautiful as the Python's skin,
And have rice crops three times a year;
Became great and returned to Bamo,
But back went the poor to the hill of Kukoo.

Idolatry.

Though the Karens can tolerate all sorts of absurd legends about God, yet they cannot endure idolatry. They seem to have no more sympathy with it than Christian nations. One of the commands of the elders says: "O children and grandchildren! do not worship idols or priests. If you worship them, you obtain no advantage thereby, while you increase your sins exceedingly."

They regard the Buddhistic religion of their neighbours with considerable contempt. One of the couplets that they sing, referring to the sleepy looks of the images says:

"Gaudama is drowsy,
He cannot save us."

Far off on the mountains, I have often noticed one and another of the wild Karens wrapped up in a flashy yellow and tinselled robe, which he had abstracted from some pagoda; an act that the Burmese regard as the greatest sacrilege.

Some of the Karen stories seem to have been composed to turn the worship of pagodas into ridicule; as in the following where the worshippers are represented as taking the language of a rat for that of their god.

"There was a lazy dirty Karen young man called Sanken, and he one day caught a white rat and was about to kill and eat it; but the rat spoke up, and said: 'Do not kill me. I will get you a wife from among the king's daughters.' So he let the rat go, and it ran into a hole in the royal pagoda.

"When the king came and prayed to the pagoda, he said: 'May my power and glory increase. May my subjects become more numerous.' Then the white rat in the pagoda replied: 'If you will make Sanken your son-in-law, your power and glory will increase. Your subjects will become more numerous, your people will multiply.' The king supposed it was the image in the niche of the pagoda that spoke to him, and was astonished. He returned to the palace and told the Queen what had happened, but she would not believe it; so they both went to the pagoda, and the king prayed as before, and received the same answer in the hearing of the Queen who was then convinced; and they gave the lazy dirty Karen, one of their daughters in marriage."

Notes and Queries.

Zoology.

Reliable information has at last been supplied by Dr. Jerdon regarding the workers of one of the Indian species of Dorylus, an Hymenopterous genus, which, as F. Smith observes in his British Museum Catalogue, 'at present (1859) consists of males only.' The following extract from the Proceedings of the Entomological Society at their May meeting will perhaps induce others to carry on Dr. Jerdon's observations should opportunity offer.

Mr. F. Smith read the following letter from Mr. T. C. Jerdon :—

"*Lahore, March 16th*, 1865."

"I have at last got hold again, after a long absence, of the specimens of workers of Dorylus, and they are, as you suggested, evidently, I think, Typhloponc. It is, however, strange to say, quite a Termes in its *habits*, working under ground *entirely*, and never coming outside except when the males are coming forth winged, when they accompany them in swarms to the holes by which they make their exit. I first observed the workers at Mhow, in Central India, where they had undermined a house so completely that the foundation had to be dug up, and I there saw the winged males (*Dorylus*) issuing out of the same holes as the workers. I afterwards saw them twice again; the last time in a green-house of the Botanical Garden at Saharunpore, N. W. Provinces. They were issuing every morning and evening in great numbers from a hole in the flooring (lime), and several winged individuals were with them, and these entered houses at night: this was in February. I have met with Dorylus in every station where I have been, and it is certainly curious that the workers are so little known, as they must have been observed occasionally by hundreds of Europeans. I have a lot in spirits and enclose you three or four in this letter, enough, I dare say, to show if it is the same species mentioned in your 'Catalogue,' T. Curtisii, or not. Dr. Jameson laughed me to scorn when I talked of digging up the flooring of his pet greenhouse, but if I ever get an opportunity of another nest in a get-at-able situation I will try and get at the mystery of the female. Surely, however, some of the winged individuals must be females; if not, then

the only other conclusion is that the female always remains apterous, and is impregnated in the nest; or, if winged, that she is kept a forcible prisoner till her wings drop off. I would have written long ago, but was separated from the bottle containing the workers."

Mr. F. Smith thought there was now little doubt that Typhlopone was the worker of Dorylus, as had been suggested years ago by Shuckard. The female, however, was still unknown.

Prof. Westwood enquired whether Mr. Smith was acquainted with the insect which Gerstücker represented to be the female of Dorylus; it was very different from Typhlopone. Mr. Smith replied that he had never seen the large female in question, but he believed its connexion with Dorylus to be purely conjectural.

The following discussion took place at the same meeting in regard to the flashing of fire-flies. Observation, we apprehend, will establish the irregularity of these flashings, as testified to by Mr. Bates and Mr. Saunders:—

The Rev. H. Clark read from 'The Reader' of the 1st of April, 1865, the following extract from a review of Cameron's recent work on 'Our Possessions in Malayan India:'—

"The following account of that very common tropical phenomenon, the light of the fire-flies, is altogether new to us, and not quite intelligible.—Does the author mean that the little insects actually keep time with each other so accurately, that thousands of them scattered over a shrub or tree all put out their lights at the same instant, and rekindle them with equal punctuality? If so, here is a new insect-wonder, before which the economy of bees and ants will sink into insignificance:—'The bushes literally swarm with fire-flies, which flash out their intermittent light almost contemporaneously; the effect being that for an instant the exact outline of all the bushes stands prominently forward, as if lit up with electric sparks, and next moment all is jetty dark—darker from the momentary illumination that preceded. These flashes succeed one another every three or four seconds for about ten minutes, when an interval of similar duration takes place, as if to allow the insects to regain their electric or phosphoric vigour.' We commend this as a subject of investigation for those naturalists who are so fortunate as to live among fire-flies."

Mr. Clark added that, though he was utterly unable to give any explanation of the phenomenon, he could so far corroborate Mr. Cameron as to say that he had himself observed this simultaneous flashing; he had a vivid recollection of a particular glen in the Organ Mountains, where he had on several occasions noticed the contemporaneous exhibition and extinction of their light by numerous individuals, as if they were acting in concert.

Mr. McLachlan suggested that this might be caused by currents of wind, which, by inducing a number of the insects simultaneously to change the direction of their flight, might occasion a momentary concealment of their light.

Mr. Bates had never in his experience received the impression of any simultaneous flashing; on the contrary, he thought there was the greatest possible irregularity in giving and extinguishing the light, and that no concert or connexion existed between different individuals; he regarded the contemporaneous flashing as an illusion, produced probably by the swarms of the insects flying amongst foliage, and being continually, but only momentarily, hidden behind the leaves. Mr. Bates further remarked that the light-emitting insects were Lampyridæ, not Elaterida (Pyrophori), which rarely flew by night; the Lampyridæ had a weak vacillating flight, the number of species was very large, and he had himself found eighty or ninety species; several species would flit about together, and in the squares of Parà he had captured three distinct species; it would be curious if there were any concert or action in unison between individuals of different species.

Mr. Clark remarked that the lights of the Lampyridæ and Elateridæ were perfectly distinguishable; it was the former which gave the intermittent flashing light.

Mr. W. W. Saunders had frequently observed the fire-flies in Bengal, at Pondicherry and at Madras; they usually flew at a height of ten to fifteen or twenty feet, amongst the foliage; he had never noticed any flashing or regularity of intermission, and thought that each individual was perfectly irregular, and independent in the exhibition or extinction of its light.

M. Sallé (who was present as a visitor) had never observed any flashing or regular intermittency, or simultaneous emission or extinction of the light.

Prof. Westwood was unable to recall any analogous phenomenon; the simultaneity of the flight of *Empis* over standing water seemed to be the nearest in point.

The following is from our late Curator.

The Inuus assamensis.

In the Notes and Queries published in the last page of the Society's Journal for 1864, Capt. T. Hutton remarks that in my Catalogue of the species of mammalia in the Society's museum, I "make *Inuus assamensis* of Maclelland and *Inuus pelops* of Hodgson to be one and the same;" also, that I "never saw a specimen of *Pithex (Inuus) pelops* of Hodgson."

Referring to my Catalogue, I find that I placed *Pithex pelops*, Hodgson, as a synonyme of *I. assamensis* on the authority of the late Dr. Horsfield. *Vide* his Catalogue of the species of mammalia in the old India-house museum, now at Fyfe House.

Capt. Hutton may remember that he brought two living individuals of what he considered to be *I. pelops* to Calcutta, many years ago, from Mussoorie, which I saw repeatedly in his presence, though not to much advantage in the small cage in which they were confined. When his family proceeded to England, those monkeys were shipped; but what afterwards became of them, I am unaware.

Did Capt. Hutton ever see a specimen of *I. assamensis*, that he is enabled to pronounce so confidently on its specifical distinctness from *I. pelops?*

Not long ago, I examined the original specimen of *I. assamensis* procured by McClelland, which still remains unique; and I could not perceive that it differs in any respect from the common *I. rhesus*, excepting that the hind part of the body is not, as usual, strongly tinged with bright ferruginous or tawny, being uniformly coloured with the rest; and my present impression (liable to correction) is, that it is merely an individual variety of colour of the common animal of Lower Bengal.

Indian Rats and Mice.

With reference to my paper on these animals (J. A. S. XXXII, 327 *et seq.*), I hoped to have been able to reduce the number of nominal species considerably, on examination of the specimens in the British museum and the India museum; but the less known of them

are generally illustrated by such exceedingly bad and imperfect skins, that little can be satisfactorily made out from them.

The *Mus Hardwickii*, Gray, (noticed in p. 330,) rests on a single specimen in the British museum. It is certainly distinct from *Nesokia indica*, having a much shorter tail, measuring (vertebræ) but $2\frac{1}{4}$ inch; the fur dense, shortish, and of uniform length.

M. (?) *hydrophilus*, Hodgson, (p. 331,) has very soft fur, much finer than that of *N. indica*.

Nesokia Griffithii, Horsfield, (p. 332,) is founded on a young specimen of *N. indica*.

Mus setifer, Horsfield, (p. 334,) is founded on a bad and imperfect specimen of *M. bandicota*, (p. 333); but *M. setifer* apud Cantor, from Pinang, is very different, being identical with my *M. andamanensis* (p. 340.) The small specimen from Malacca in the Society's museum, doubtfully referred to *M. setifer* (in p. 355), is probably the young of *M. andamanensis*.

M. brunneus, Hodgson, (p. 335,) as illustrated by a good specimen in the India museum, is identical with *M. nemoralis*, nobis, (p. 340,) and Mr. Hodgson's name holds precedence; the species being nearly akin to *M. alexandrinus*.

M plurimammis, Hodgson, (p. 336,) in India museum, is a well marked species.

"*M. decumanoides*, Tem. (nec Hodgson,)" apud Horsfield, (p. 338,) is the common *M. rufescens*, (p. 340); and the *M. asiaticus*, Gray, (p. 341,) appears to me to be no other.

M. caudatior, Hodgson, and *M. cinnamomeus*, nobis, (p. 341,) are, I think, identical; but the Nipalese specimens are much less brightly coloured than those from Burma.

M. peguensis, nobis (p. 345.) I found a specimen of this strongly marked species, unnamed, from the Philippines, in the Derby museum of Liverpool.

M. bactrianus, *gerbillinus*, and *Thcobaldi*, (p. 347,) are identical, as I suggested; and I have seen what appears to be the very same mouse from Syria and N. Africa. The specimen of *M. bactrianus*, originally described by me, is now in the British museum.

M. Darjeelingensis, Horsfield, (p. 348,) comes exceedingly close to *M. strophiatus*, H. (p. 349); and *M. terricolor*, nobis, to *M. minutoides* of S. Africa.

M. rama, Cantor; Syn. *M. musculus* apud Cantor, from Pinang. Akin to *M. musculus*, but more deeply coloured; the tail (vertebræ) $2\frac{3}{4}$ inch, with about 24 distinguishable vertebræ. A miniature of *M. concolor*, (. 344).

This is a small further contribution towards the elucidation of the difficult group of Indian *muridæ;* and little or no progress can be made in the investigation of the series until much better specimens are available for examination.

E. Blyth.

Mineralogy.

Syepoorite. In all works on Mineralogy, a simple sulphide of Cobalt, Co. S, is said to occur in Rajpootana and to be used by Indian jewellers for giving a red colour to gold. In a recent paper in the Journal by Col. J. C. Brooke, mention is made of a cobalt ore, a sulphuret, occurring with Copper ore at Khetree. Is this Syepoorite? There is not a specimen in any of the principal museums of Europe, or at least there was not a few years since, and should a careful analysis confirm the chemical composition assigned to the mineral, it is very desirable that specimens should be distributed.

W. T. Blanford.

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Religion, Mythology, and Astronomy among the Karens.—*By Rev.* F. MASON, *D. D.*

[Continued from page 188, Part II. No. 3.]

MYTHOLOGY.

FUTURE STATE.

Karen ideas of a future state are confused, indefinite, and contradictory. They seem to be a melee of different systems. That which appears to me indigenous Karen, corresponds to the notions of the American Indians. It represents the future world as a counterpart of this, located under the earth, where the inhabitants are employed precisely as they are here. When the sun sets on earth, it rises in the Karen Hades; and when it sets in Hades, it rises on this world. The following story is adduced by the Karens as proof of the accuracy of this cosmology.

"The elders say: There was a man who had a wife that he loved, and she loved him in return. His wife died, which distressed him beyond measure, and he said. 'If there be any one that will raise her up to life again, I will give him whatever he may ask.'

"A prophet or necromancer was found, who raised his wife from the grave, and restored her alive to her home in the night. She pursued her usual daily avocations throughout the night, but as soon as daylight appeared she died again, and remained dead all day, but revived at eve and went to work as people usually do in the morning. This course she pursued constantly. Hence it is manifest, that people in the next world work just as they do in this."

To these ideas are appended others that appear to have been originally derived from the Hindus. They say that Hades has a king, or judge, who stands at the door to admit or reject those who apply for admission into his kingdom. He decides the future of each. Those who have performed meritorious works are sent to the regions of happiness above; but those that have done wickedness, such as "striking father or mother," are delivered over to the king of hell who is in waiting, and who casts them down into hell; while those who have neither performed deeds of merit, nor are guilty of great crimes, are allotted a place in Hades. The Sgaus call this personage *Yu*, or *Tha-mie-Yu* and the Bghais *Tha-ma*. Both are probably derived from the Hindu *Ya-ma;* and his office and duties are as old as the earliest records we have of the Egyptian religion.

The Spirit World.

To a Karen, the world is more thickly peopled with spirits, than it is with men, and the occasions on which his faith requires him to make sacrifices and offerings to these unseen beings are interminable.

Every human being has his guardian spirit walking by his side, or wandering away in search of dreamy adventures; and if too long absent, he must be called back with offerings.

Then the spirits of the departed dead crowd around him, whom he has to appease by varied and unceasing offerings, to preserve his life and health.

Again there are all the conspicuous objects of the material world —the lofty mountain, the wide river; the shady tree and the inaccessible pricipice, every one of which, by the awe they inspire, demands reverence and respect from human beings, and punishes each breach of etiquette with sickness or death. These too must be propitiated.

Thus, though the Karens have no cumbrous written ritual of services and ceremonies, like the Mahommedans, the Brahmins and the Buddhists; they have yet an oral liturgy of observances, as burdensome as the services of the ancient Egyptians or the Mosaic ritual.

Guardian Spirits.

The word in Karen that designates the heart is also used for the mind and soul. The seat of all moral qualities is in the heart, and death is designated as the departure of the heart from the body.

Some German critics say, that "Psyche, in Homer, signifies only the breath and the life; never, as in the language of later times, the spirit or soul. Yet it goes to Hades and continues to live there." There is something like Psyche, as thus defined, in Karen Psychology; yet in many points more like the genius of the Latins; but differing as it does from both, it will be better in this paper to designate it by its native name; and explain it by its attributes. The Pwas call it Là, the Bghais Lai, the Sgaus Ka-là, and the Red Karens Yo.

This Là existed before man was born, comes into the world with him, remains with him until death, lives after death, and for aught that appears to the contrary, is immortal. Yet no moral qualites are predicated of it. It is neither good nor bad, but is merely that which gives life to mortality.

The Làs of a part of the dead remain on earth and become mischievous spirits; others go to Hades, where they are employed as on earth; others go to hell, where they suffer punishment; while others go to the Deva heavens, where they enjoy happiness.

Although in this state, the Là and the man himself, the Ego, are said to be distinct; yet in nearly all the representations of the future state, the man seems to be absorbed in the Là; and inconsistent as it is with previous representations, it then appears equivalent to the soul.

Sometimes it is spoken of as the man, before being united with the body. Thus a Bghai writes:

"The elders say: 'The God of the whole human race resides at the foot of the sun, at the foot of the moon; and people who are born are sent by God, and people who die are called back by God.'

"Men at the beginning are in the presence of God, and he sends them forth; but before sending them, he tries their courage. He takes a sword and lays it across an abyss as a bridge, with the edge uppermost, and orders them to walk over it. Those who dare to walk across it, are bold; and God sends them into the world men. Those who, after being urged two or three times, dare not go, God sends into the world women.

"When God sends them forth, he gives commands in relation to the times and the seasons of their return. It is related that a prophet, or necromancer, looking into the world of spirits, on one occasion saw seven men and two women coming into the world, and he heard them talking with each other. The first man said, 'God has ordered me to

go and return.' The second said: 'God has ordered me to return, after I am able to draw water.' The third said: 'God has ordered me to return, after I am able to weed.' The fourth said: 'God has ordered me to return, after I am able to make it easy for my father and mother.' The fifth said: "God has commanded me to return, after I am able to go to the Burman and Shan country.' The sixth said: 'God has commanded me to return, after I am able to cultivate paddy for my father and mother.' The seventh said: 'God has commanded me to return, after I have married.'

"The prophet said that after this he saw them all born on earth, all boys, and he noted that they all died one after another, as he heard them say in his vision.

"Of the two women, he said one carried two Kyee-zees, and the other a basket on her back, and a spinning wheel and distaff in her hand. The first one he heard say: 'God has commanded me to stay with my Kyee-zees, till I am white-headed.' The other one said: 'God has commanded me to spin thread and prepare cotton, till I am white-headed.' The prophet said he saw both born in this world females; and the one came in possession of two Kyee-zees, and the other spun thread and carded cotton, in accordance with his vision."

According to a Sgau authority, the Là promises God, before it comes into the world, that it will die by one or other of seven things it says: "I will die in the mouth of a tiger. If I do not die in the mouth of a tiger, I will die of some kind of sickness. I I do not die of disease, I will die by drowning. If I am not drowned, I will die by the hand of man. If I am not killed by man, I will die by a fall. If I am not killed by a fall, I will die by a blow. If I am not struck dead, I will die of old age."

The Là sometimes appears after death, and cannot then be distinguished from the person himself. One story says:

"After a certain woman's husband had gone to the city, she died. On his return home, he met her Là in the road, and taking it for his wife in the body, he said: 'Where art thou going?' She replied: 'I am going to see my father and mother.' He was not at all aware that it was her Là, and she said to him, 'Thou hast a long way to go, let us spend the night together here:' He consented, and to obtain food for their supper, she went and asked it of her children, but they did not see her.

" Though they did not see her, they still had some indications of her presence. While her daughter was beating out paddy, all the paddy suddenly leaped out of the mortar, and a fowl suddenly dropped down dead.

" The man and his wife eat and drank together, and in the morning separated, to pursue their several journeys.

" When the husband got back to his house, he found his wife dead, and his children and neighbours preparing for the funeral. Then the truth rushed on his mind, and he said : ' Children, I met your mother last evening in the road, and we spent the night together. She was going on a visit, but alas it was her Là. Had I but known it, I would have called her back."

Although the body and the Là are represented as matter and spirit, yet in the following story, materiality seems to be possessed by the Là.

" A certain woman sickened and died, while her husband was absent on a journey. While he was returning home, he met her Là on the way and asked : Where art thou going ? She replied : ' I am going to visit my parents.' He then slapped her on the face with his hand, and she came to herself again and returned with her husband home.

" When they arrived at their house, they found the people mourning over her body ; but she immediately entered the body, and it came to life again as before."

The Là may be separated from the person to which it belongs during life. In sleep it wanders away to the ends of the earth, and our dreams are what the Là sees and experiences in his perambulations. When absent in our waking hours, we become weak, fearful, sick, and if absence be protracted, death ensues. Hence it is a matter of the deepest interest with a Karen to keep his Là with him ; and he is ever and anon making offerings of food to it, beating a bamboo to gain its attention, calling it back, and tying his wrist with a bit of thread, which is supposed to have the power to retain it.

The forms differ in different tribes, though the thing is substantially the same. A Bghai writes :

" Should a person be often sick ; if he cannot walk without being weary, or work without feeling exhausted ; if he has no appetite for his food ; if he pines away, and has a sallow countenance ; it is said that his Là has left him."

Then his friends take a fowl and a garment of the invalid's, and they spread a mat down at the top of the steps. The garment they place at the top of the steps, and taking a stick with which they stir the boiling rice, they strike the steps, saying :

" Mr. A. B., thy Là has left thee, thy Là has gone away. It is going to and fro ; going to the Shans, going to the Burmese ; and hence thou art afraid. Thy Là has gone away, and thou art startled, thou art not strong, thou art not vigorous, thou art depressed, thou art heartless, thou hast a sallow countenance, thou hast a cough, thou hast difficulty in breathing, thou art weak, thou art weary, thy head is bald.

' Now Là, I call thee, beat for thee. Here is the great hen-bird, here the great male fowl. Come, *come*, come. Come and dwell in thy dry place, in thy pleasant location, in thy house, as water tight as the bottle gourd, to thy divan, to thy bedstead. Come and eat the flesh of the female bird, the flesh of the male fowl.'

After the fowl is cooked, the fowl and rice are set out, and the sick man is made to take hold of the fowl's head, when his wrist is tied with a thread, and then the above prayer is repeated. The string is then cut off, the end unravelled, and the cotton pulled from it and scattered on the head of the sick man, with the following blessing :

' Mayest thou live till thy head is white, and thy teeth broken, like this string !'

At the Sgau funerals, the presence of the Là is said to be manifested thus. One end of a slender erect bamboo is attached to the bone of the deceased that has been taken from the funeral pyre. A small thread with alternate tufts of cotton and bits of charcoal, with a metal ring, or bangle, at the extremity is tied to the other end, which makes the bamboo bend down in a curve; and under the bangle, nearly touching it, is a brass bason containing a boiled egg.

The closing ceremony of the bone feast, is calling the Là of the deceased, which is supposed to be hovering around till the funeral rites are completed ; when, should it respond to the call, it is bidden to depart in peace to Hades.

When the apparatus has been put in order, the relatives of the dead approach in succession and strike the edge of the brass cup with a bit of bamboo ; and when the one that was most beloved touches the cup,

the Là responds by twisting and stretching the string till it breaks, and falls into the cup; or at least shakes and rings against it.

A hundred witnesses could be produced, who have seen it done. Indeed the thread is of such slender material that a very little legerdemain would be required to break it under the weight of the bangle, and the bamboo is so slender, that still less would be necessary to make it spring up and down, and hit against the sides of the cup. But I have watched the whole ceremony, kept the crowd away from the machinery, and there was no more answer to the calls, than there was to the cries of the priests of Baal before Elijah.

Prophets, or Necromancers, are said to have the power of going into the invisible world, and bringing back the Là, when it has wandered away; but the Elders warn their children against unrighteous prophets, who for the sake of gain, when they cannot find the Là of the sick person, will bring the Là of some other person in its place; by which the disease is aggravated.

Thus it would appear that a person may have another one's Là.

The Là is sometimes supposed to take the form or to inhabit insects. Thus when insects are flying around a light at night, the wish is often expressed that the Làs of beasts and demons may be burnt to death, while the Làs of human beings may avoid the fire and escape. Here when an insect flies into the fire, it is said to be the Là of a beast, but when it hovers around and flies away, it is regarded as the Là of a human being.

According to the representations of some, but the idea does not prevail extensively, each person has seven Làs that are constantly devising his death; which is only prevented by a guardian spirit that sits on his head. When that spirit jumps down, the man is lost, for then one or other of the Làs rushes on him and kills him. These Làs seem to be the personifications of evils, natural or moral.

They are madness, epilepsy, lechery, wrath, the exhibition of dreams, the bearer of diseases and languor. "If our mad Là comes, we become insane; if our epileptic Là comes, we are seized with epilepsy; if our lecherous Là comes, we become lost to shame; if our wrathful Là comes, we are filled with anger, malice, and commit murder; if the shower of dreams comes, we are overwhelmed with dreams; if the bearer of sickness comes, we are prostrated by disease; and if languor comes, we feel unable to do anything.

The Là is not confined to human beings; as has been previously intimated, every living thing has its Là. When sitting by the fire at night, and an insect flies into it and is burnt to death, a Karen will say: "There the Là of some animal has leaped into the fire and burnt itself to death. We shall have meat curry to-morrow. The snares and traps have caught something."

Plants too have their Làs; and when the paddy appears sickly, it is said that its Là has been devoured or led away, and it is called back in the following form:

"Là of large grained paddy, full grained paddy, come! If at the forks of the Salween and Sitang, come! If in the west, come! If in the east, come! If in the mouth of the bird, come! If in the mouth of the squirrel, come! If in the mouth of the monkey, come! If in the mouth of the hog, come! If in the mouth of the rat, come! If in the mouth of the elephant, come! If in the mouth of the dove, come! If in the mouth of the sparrow, come! If in the mouth of the porcupine, come! If at the sources of the streams, come! If at the mouths of the streams, come! If in Siam, come! If at Ava, come! If at the corner of the kingdom, at the corner of the land, come! Come, *come*, come, and dwell in the barn, come and reside in the granary."

Even inanimate things that can be put to useful objects, such as instruments, are supposed to have their Làs. So if a man drops his axe while up a tree, he looks below and calls out: "Là of the axe, come, come."

Looking then at Là in all its usages, it seems to be the personification of the life, or efficiency of a person, or thing.

Departed Spirits.

The spirits of the dead resolve themselves into two great classes. Those who are not permitted to go to Hades, corresponding very nearly to the European notions of ghosts; and the spirits of the ancestors of the Karens, who, on going to Hades, were awarded, on account of their good deeds, a place in the heavenly world, where they exercise a kind watch-care over their descendants on earth. The offerings and prayers made to these beings seem to correspond to the Chinese worship of ancestors.

Ghosts.

The unburied dead.

The Greeks and Romans believed that those who were deprived of funeral rites, wandered about, and were not allowed to enter Hades; so it is no marvel to find this now to be the popular faith in Europe; but it is not a little remarkable to find precisely the same rites prevalent among the Karens.

The Làs of those who have been deprived of funeral rites, the Karens suppose, wander about on earth, and occasionally show themselves to men as ghosts.

The following story illustrates the character of these ghosts:—

"It is related that a man was travelling and lost his way. When night overtook him, he made a fire at the foot of a large tree, and then ascending it, he built himself a little booth among its branches in which to spend the night. Before he got to sleep, he heard the ghosts calling to each other, and, thinking they were the voices of men, he replied to them.

"So soon as the ghosts heard him, one came upon him, and wrestled with him, and was repeatedly on the point of throwing him down, but he had a comb in his hair which in the struggle fell down into the fire below, and the stick-lac in the comb burnt with a very strong smell. This smell made the ghost cough and sneeze, cough and sneeze, till he could endure it no longer, when it ran away, and left him. Had it not been for the smell of the stick-lac, the man would have lost his life, and by this incident we know that ghosts are afraid of the smell of stick-lac."

The sight of a ghost may be obtained by the possession of a skull, or part of one.

"Formerly," say the Karens, "there was a Burman killed by lightning, and a Burman picked up a bit of his skull, and bringing it home put it in the ashes in the fireplace. In the night it became a man, came out of the ashes, and walked about the house, making a noise like the treading of a man, and the wife and children of the man were greatly afraid. In the morning it entered the ashes again, and became a bit of skull bone as before."

Some persons, we are told, breed ghosts. "If a person goes and takes the skull of a corpse, it becomes a ghost, and the possessor can

use the ghost to kill any one with whom he is angry. In the day time, it is a skull, or a bit of a one; but in the night, it is a man. None raise ghosts but wicked men and murderers."

Spirits of those who died by violence.

Another class of ghosts, with a distinctive name, are those who have died violent deaths; "who have been shot, died by the sword, died by falls or drowning; have been killed by elephants or devoured by tigers." The Las of these people do not go to Hades, but remain on earth preying on the Las of men. Hence they are propitiated with offerings, to induce them to free the Las they may have seized. To the previous class of ghosts no offerings are made.

Nearly related to the preceding are the ghosts of wicked men who have been unjust rulers, or who have suffered death at the hands of justice for their crimes. They are regarded as taking the forms of birds and beasts; and when persons dream of elephants, horses, dogs, vultures, Burmans, or Burmese priests, they are said to see these ghosts. Unaccountable sounds and sights in the jungles are also attributed to them.

Varied offerings are made to these last classes of ghosts, of which the following is a specimen :—

After food has been set out for an oblation, the sick is sprinkled with powdered charcoal, and the following prayer is made :—

"Here is property, receive the property, Talaing ghost, Burman ghost, horse ghost, elephant ghost, wild dog ghost, felis ghost, wood-pecker ghost, you call *re re, ro ro* at the foot of the paddy mortar, by the pile of chaff, at the brook, at the place of drawing water. This person going to the bank, going to draw water, going to the new field, going to the old field, you have speared him, you have shot him, you have struck him, you have beat him, you have switched him, you have whipped him, you have beset him. Pluck out the head of your arrow, pluck out the blade of your spear, pot up the wound, heal the gash. Let him be cool as water; let him sleep and be comfortable."

Ghosts' Dog.

The wood-pecker is said to be the ghosts' dog, and employed to hunt up game for them.

"It is related that formerly two men travelling were overtaken by night in a mountain gorge, where they built up a little booth in which to sleep. After dark, the wood-pecker screamed, and the men heard the ghosts saying to each other: 'The dog barks.'

"Thinking it was other men speaking, the travellers hallooed in reply, when the ghosts said: 'The monkeys are leaping, let us shoot,' and immediately the snap of a bow was heard. Instantly one of the men was seized with a severe fit of shivering; and he went home in the morning and died."

Hence the wood-pecker is a bird of omen, and when a Karen hears it scream, he cries out: "Wood-pecker, shun me afar off. Shun my house, shun my road, shun my way, shun my field, shun my garden, shun the roof of my house, shun my place, shun my stream, shun my brook, shun the place where I draw water. Shun me, keep afar off, go thine own way, thine own road."

Spirits of Ancestors.

The Karens suppose that their parents who have performed meritorious acts go to a place of happiness above, which seems to correspond to the Deva heavens of the Buddhists. The existence of God the original Creator of all things is quite ignored, and he appears to have no place in it. It has its rulers and its subjects; and one of the names applied to them is the Burmese designation of Indra, the king of the Deva heavens.

These beings are supposed to preside over births and marriages, and to exercise a general watch care over their children on earth; and the Karens make offerings to them, as their deified ancestors.

There are different classes of worshippers or sects, as they may be denominated, who make different kinds of offerings. One set of worshippers offers only rice and vegetables; another offers fowls, another hogs, and another oxen or buffaloes. Those who sacrifice animals, sometimes offer all three as different rites, but those who offer rice and vegetables never offer sacrifices.

These different rites are hereditary in different families of the same or of different tribes. Those whose ancestors offered bloodless offerings, offer bloodless offerings; and those whose progenitors sacrificed animals, sacrifice animals.

In the Tenasserim provinces, none are found who sacrifice oxen or buffaloes. At Toungoo, I have not met with those that offer only rice and vegetables; and among the Red Karens, the Bghai rite in which a hog alone is sacrificed is unknown.

There is much confusion in the minds of the Karens in relation to the character of the beings addressed, and contradictory statements are made by different tribes, and by different individuals of the same tribe, and much diversity prevails in the forms and prayers.

The following is a Sgau prayer, when offering a fowl:—

"Mothers and fathers, The-klu, I will offer you a great cock with a spur fit to stick a rice mortar upon. Take away sickness, take away disease, take away laziness, take away inefficiency, take away sleepiness, take away drowsiness, take away inability to obtain, take away inability to make a living, take away unsuccessfulness, take away want of success, take away debasedness, take away wretchedness, take away the whole."

The Bghai forms, given below, are used when the sacrifice is a hog, but the Bghais do not seem to have any definite ideas of the Beings to whom the offerings are made; much less so than the Sgaus. They require that the officiating priest shall be a woman, the oldest of the family. The husband has nothing to do in the matter; the woman and her relatives are the only parties concerned. If the husband is rich, he has to look to his own relatives to make the necessary offerings for him, in which he joins. A Bghai writes:

"The first thing is to brew or distil spirits for three days. Then a little table is made with four bamboo posts. Leaves of a plant of the ginger tribe are next rolled up in a sugar loaf form, and three joints of bamboos are cut off even. Spirits are then poured into these three bamboos, and the conical rolls of leaves with bamboo bottles of drink are all set upright on the table. Then a living hog is put on a fanning basket.

"The head of the offering, or priest, is a woman, and she takes one of the conically rolled leaves, and, turning to the table, she prays to Yau, as if he were present there. She prays thus:

"O, Yau-peu, thou dost now devour the whole family. We feed hee with old spirits, and a great hog. Heal us, watch over us, defend us. When we fall, raise us up; when we slip down, set us up

again. Make us strong, make us vigorous; all of us. When we fall on the wood, hew it through; when we fall into the coffin, split it open, [*i. e.* raise us up from the point of death]. Establish us, make us immoveable. Let not plots, let not devices against us succeed. Let us have large crops, let us have good paddy. Let us have little grass, let us have few weeds. Let our labour be light, let us eat whatever we want. Let us succeed in our works; let us eat with little work. Let the effects of our labours increase, let our produce swell up, like rice in boiling. Let us ascend to the tops of the mountains, let us descend to the depths of the valleys. Let us spear hogs, let us seize captives. Let us purchase kyec-zecs, let us dig out the pangolin, [*i. e.* let us accomplish difficult things]. In the water, let us be great rocks; on land, let us be large wood-oil trees. Let not the tiger seize us, let not the tiger kill us. When the tiger would leap on us, may he growl; when man would seize us, may he cough. When tigers would leap on us, may they wait for each other; when men would seize us, may they feel abashed. Let us devour a stream to its source, let us eat a creek to its mouth, [*i. e.* get possession of the whole valley]. Let us eat up the rock to atoms, let us eat the sand to dust, [*i. e.* overcome every difficulty]."

The priestess next lays her left hand on the neck of the hog, and with her right, she grasps the hand of the oldest person in the company, and shaking it slowly up and down, she repeats the above prayer. In this way, she goes round the whole company from the oldest to the youngest, repeating the prayer with each.

The hog is killed next, but it is not killed with a knife or spear; but a sharpened bamboo is forced into it on the right side, under the fore leg. When the bristles have been singed off, a part of the flesh is cooked with rice flour in a chatty, and a part in joints of bamboo; but the head is hung up whole on the posts of the table.

When the rice and meat is spread out, the priestess shakes hands again with each one, and prays as before. She then tastes the food, and after her the others taste it in succession, from the oldest to the youngest.

This done, they rise up, and the priestess tastes the spirits; and, as before, all the rest follow her example according to seniority. After this they all return to the food again.

At evening, the stomach of the hog is roasted, and all taste of it, in the manner described above.

Next morning at dawn, they take the posts of the table, and throwing them away endwise, as they would throw a javelin, into the earth without the village, they say: "Now it is done, it is finished. Go thy way, return to thy place."

After it is light, they cook the head of the hog, and eat it with any meat that may be left. On that day the people do not go away from the house.

Witches and Wizards.

Next in order to the spirits of the departed dead, in Karen mythology are their witches and wizards; but witches, among the Karens, are not persons who have made a compact with Satan, as European believers in witchcraft suppose, but persons possessed with a demon which they call *Nà*, and the Red Karens *Ne*. The name does not correspond to the Burmese *Nat*, as some have thought, which denotes an entirely different being, but is equivalent to the Burmese *Sung*.

According to one myth, the Nà is an animal that God commanded man to eat at the beginning, with other animals, but neglecting to do so, it became invisible and now eats him.

According to another legend, it is a human stomach; those possessed of Nàs having stomachs, while others are destitute of that organ. One story represents a woman, who had incontinently married a man possessed of a Nà, as saying: "I saw his stomach under his finger nail, but thought it was an insect."

One man, with a Nà, was observed when asleep to be without a head, and to eat and breathe from the top of his neck. These are headless demons in the Hindoo mythology.

A person possessed of a Nà is said to devour people, but it is the Là, or vital principle that it devours, not the body. When it eats the eyes of another, the eyes remain, but they are blind; the matter is left, but the life has gone.

Sometimes the stomach is represented as going about devouring men, but more often the act is attributed to the person. One possessed by a Nà sees men as beasts, and their eyes as fruit.

In one story, a young man had married a woman with a Nà, and

soon after marriage, she was seized with an intense longing for glittering fruit." He brought her all the fruits he could find, but none were of the right kind; and she sent him off to her mother, who lived in another village to ask her for some. Her mother said she knew what her daughter wanted, and told her son-in-law to go and visit the neighbours till she procured some for her. The old woman then went to pounding rice in a mortar before the house, when the children, who were playing around, came up, peered down into the mortar and said: "Grandmother, what are you pounding here?" and as each one looked down into the mortar, an eye dropped in, and the children were suddenly struck blind. After she had thus obtained a sufficient quantity, she gathered them up, put them into a hollow bamboo, and sent them to her daughter by her son-in-law, with the charge that he should not unstopper it and look in by the way. He did, however, when half way home, pull out the cork and look in, when he saw the eyes rolling about, and some of them jumped out, of the bamboo; and the eyes of the children that escaped were restored to sight again. Those that remained he carried to his wife, who devoured them with great relish.

Human beings often appear to a person possessed of a Nà as rats, and are devoured as such. In one story a man is represented as going to the field, followed by his child, and on reaching the foot of a large tree, the power of the Nà came upon him and he devoured his little boy, thinking him to be a rat. He then returned to his house, and brought back with him his other child, which he devoured in the same place that he had eaten up its brother. He next went and brought the mother to the scene of his former barbarities, but left her there a little while to look for a club to kill her. In the interval, a lizard in the tree that had witnessed the death of the children, told her what had occurred, and drew her up the tree out of her husband's reach. When he returned, and could not get at his wife, he was so enraged that he began to devour his own flesh, and eat up his arms and legs close to the body.

A person possessed of a Nà has the power to take the form of another. In one story, an old man asks his nephew in the morning, why he came and shampooed him so severely during the night. The nephew declared he had not been near him, and gave his uncle a sword

to smite the visitor if he came again. The next night, the supposed nephew was at the old man's bedside again, and his uncle looked at him from head to foot, and he seemed to be his nephew so accurately in every part, that he could not use the sword against him. In the morning the nephew called, and asked if he had cut down his visitor. "No," he replied, "he was from one end to the other so exactly like thee, that I did not dare to strike him." The young man sharpened up his sword and made his uncle promise to cut down the man when he came again without hesitation. This he did, and struck off his head at a single blow, when he immediately disappeared. Next morning it was reported that a man had died in the village during the night, and when the nephew went to look at the body, behold it was headless; "so he then knew that a Nà had attempted to devour his uncle."

The interchange of persons is sometimes represented as a change of skins. It is related that—

"Anciently there was a woman possessed of a Nà whose name was Po-kla, and she was as black as a crow. She would exchange skins with other people; and when she met with a woman with a white skin, she would put on the white skin and clothe its owner with her own black skin."

In one story she is said to be the black slave of a young man of property that went abroad and brought home a handsome white wife. Soon after his return, Po-kla succeeded in exchanging skins with her mistress, and took her place as her master's wife, without her master suspecting the change. The mistress was now beaten and cruelly used by her former slave.

At the time of early paddy, she was sent into the field to drive away the birds; when all the doves and little birds came around her daily. She charged the birds not to eat the paddy, and she had no occasion to run after them, for they remained with her in the booth all day long. She ordered the dove to go and bring her fragrant oil from her grandmother's house; but when the dove reached there, she broke her wings, and for a long time she was unable to return. So soon, however, as the wings healed, she picked up the bamboo joint, which contained the fragrant oil, unobserved, and flew away with it to her mistress. Her mistress anointed herself with the oil, and became herself again, and even more beautiful.

She then went and told her husband that she was his true wife and the other woman his slave, as he might know by looking at her tongue, which he would find to be black. It was found difficult, however, to obtain a sight of her tongue, for she was aware of the consequences. All attempts to make her laugh failed, but they struck her suddenly, when she screamed and exposed her tongue, which was seen a jet black. Her master then slew her with the sword.

Then he wished to live with his true wife again, but she said he had defiled himself by his connection with the black slave, and she would have nothing to do with him, till he had steeped himself in water seven days and seven nights. He agreed to do the prescribed penance; but after he had been in the water one day and one night, he was almost dead with cold, and could scarcely speak, so his wife had compassion on him, took him out of the water, warmed him by the fire, and lived with him happily ever afterwards.

The sensation in sleep, called "night mare," is produced, the Karens say, by a Nà being seated on the region of the stomach; an idea very analogous to that received anciently in Europe of its origin.

Such an evil influence is supposed to emanate from persons possessed of Nàs, that their praise is deemed injurious to the person or thing possessed. If one looks on a piece of grain and says: "This is a very fine field;" the grain withers, and becomes sickly. If he says to a parent: "You have nice children;" the children become sick and perhaps die.

Hence it is not always safe to praise the Karens or their possessions; for if any accident happens to them subsequently, there is great danger that the person who praised them will be reputed a Nà.

The belief in the existence of these Nàs is still very strong, and the persons who possess them are deemed worthy of death.

A few years ago, two young men appeared before a Karen Goung-khyruk in Mergui with a charge against a man of having a Nà. The magistrate's reply was of such a character, that they immediately went and killed the man in open day.

Lords.

In Karen mythology, every natural object has its lord or god in the signification of its possessor or presiding spirit. There is not only

a lord of the earth, but there is also a lord to every country and land and district.

Lord of the Earth.

The lord of the earth appears to be confounded with the king of Hades, and clearly comes from the Hindu pantheon, but probably through the Buddhists. The Sgaus furnish the following account of him :—

"The lord of the earth existed at the creation of the world, and the elders say, he rules over the whole world. If we go to a distant region, and swear or use foul language, he makes the tigers devour us, or the serpents bite us, or brings sickness upon us. Hence, if we go to another district, or into the jungle, we are afraid to speak unadvisedly, or to use bad language. We fear the lord of the earth will hate us. Therefore before we eat, we offer him a little of our food, and pray : 'Lord of the earth, eat first and preserve us, O lord!'

"If we transgress in our language, while in a distant land, the lord of the earth will kill us before dark ; but if we are in our own country, and are guilty of swearing or using indecent words, we make him an offering and pray : 'We are dark ignorant people. Whatever transgressions we may have been guilty of in our words by swearing or obscenity, do not, O lord, set against us. We will make offerings to thee annually, every year. If we do not die, your lordship shall eat of our food continually and of our children's food, generation on generation.'"

The spirits which are denied admittance into Hades and are condemned to become evil spirits on earth, are regarded as the servants of the god of the earth, and employed to execute his orders.

Among the Sgaus in the south, an annual festival, usually in January, is observed, for making offerings to this god and his followers.

The Bghais observe a similar custom, but it is varied a little. Once in three years is the usual period for its performance ; but in calamitous times once in two years, while a succession of good crops and general prosperity will delay it to four or five years. The Bghai festival is held, when the paddy is well up, about the month of July.

As the rite has been described to me, the first thing done is to take a hog to a central position in the village lands, and placing it

under a Eugenia tree, there erect a booth. The Eugenia is chosen because regarded as a more holy tree than any other. The booth is for the "four heads of the sacrifice," or priests, and elders to occupy.

When the booth is built, every man cuts three bamboos, one long one to represent a post in his barn, and two short ones which he ties to the long one, to represent the height to which he wishes his crop of paddy to reach when it is gathered into his barn. Then he makes in miniature, a paddy bin, a long pen, a hen coop, a trap, and a snare.

When these preparatory measures have been taken, one of the heads of the sacrifice calls the people together, and all the men assemble about the booth. The most wealthy elders sit together with "the heads of the sacrifice" in the booth, but the young people and the poor stay without. No women are allowed to be present.

The ceremonies are introduced by "the head of the sacrifice" taking a small branch of the Eugenia tree in his hand, when all present imitate him and take a leafy sprig of the tree. The leader lifts his clasped hands to heaven with the sprig between them, and prays; when all follow his example, each asking in his prayers for whatever he most desires.

After the prayers, the head of the sacrifice rises up, and taking a spear, spears the hog to death. So soon as the blood begins to flow, all the people jump up, and each one seizes his bamboo which had been set against the tree, and calls out with a loud voice: "May my barn be filled with paddy as high as my bamboo!" Some cry out, "I have caught many rats in my trap;" and others: "I have snared many wild fowls in my snare." Some dance with shields that they have prepared for the purpose, and others beat drums, and blow pipes.

They next take the hog to the village, and every man, young and old who is able, kills a fowl; and after they have cooked the hog and fowls, and prepared the food and drink properly, they carry the whole to the booth. There they place the food on a raised platform prepared for the purpose, and taking again sprigs of the Eugenia tree between their clasped hands, they all pray, saying:

"Lord of the seven heavens and seven earths, lord of the water, lord of the land, Thie-kho-mu-kha, all of you, eat our property, eat our pork, eat our fowls, make our paddy good, our rice good, make

our daughters handsome, our sons skilful; give us food, give us drink, give us to become governors, give us to become elders; enable us to buy kyee-zees, to spear with fatal effect; make our names famous, heard above and below; make us joyous and happy with our wives and children."

After praying, they rise up and dance again. When the dancing is done, they set the food in order in the booth, to remain there all night, as not a bit of it is to be eaten before the next day, and then return to their houses, dancing all the way home. The remainder of the day is spent in their houses, drinking, dancing, and beating kyee-zees and gongs.

The next morning they all repair again to the foot of the Eugenia tree, when the heads of the sacrifice and the elders commence eating the food and drinking the spirits that have been prepared and placed in the booth. All are allowed to partake that choose, but the food is considered holy, and none but the holy, clean, and upright persons are considered as proper persons to partake of it. The question of fitness is left, however, for every one to decide for himself. If a man feels persuaded in his own mind that he is guilty of no transgression, but is upright and holy, he goes forward and partakes of the food; but if his conscience reproves him for some wrong deed or word, he joins the throng outside the booth and occupies the time with others in dancing. Nor is unfitness to partake of this holy food confined to immoral acts. There are certain ceremonial uncleannesses which are regarded as unfitting a man to partake. For instance, if a man's wife is pregnant, he is deemed unclean, and unfitted to eat of this holy food.

After the feast is finished, the company returns to the village, dancing all the way as before; and on arriving at the houses, one or two of "the heads of the sacrifice," go to the brook and draw two bamboos of water for every family in the village. After the water has been drawn, "the heads of the sacrifice" call all the members of each family to the hall or verandah; men, women, and children, and then he sprinkles or throws the water from one bamboo upon them. Those who get wet are said to be free from evil, because the water is "holy water." One bamboo full remains in the house till next morning, when the owners go to the fields, and sprinkle it on their growing

paddy; and they say, because it is "holy water," the paddy being wet by it will be good and abundant.

In all these ceremonies women are carefully excluded, except in participating of the "holy water."

The four elders that are called "the heads of the sacrifice" or priests, have special names or titles given them to distinguish their office.

The first is called Deu-sai, *i. e.* Lord of the village.
„ second „ „ Pghai-sen, „ The Messenger.
„ third „ „ Ywa-san, „ Keeper of the village.
„ fourth „ „ Sa-kai, „ Signification uncertain.

These offices are strictly hereditary. The fathers of the present occupants held them, and their places, when they die, will be held by their sons.

When the priests officiate, they have embroidered tunics given them by the people. Sometimes they are embroidered with silk, and often with red silk, and are made longer than ordinary garments. The people give them also ear knobs and beads, and think that it is very meritorious to do so.

Some villages offer a cow or bullock instead of a hog, and one of the Mopaha villages near Toungoo were always in the habit of seeking a black bullock for sacrifice. Their desire was for one perfectly black, without a single white or red hair on it; and for such an animal they would give almost any price.

Goddess of the Harvest.

Another distinguished character is an old woman called grandmother Bie-yau, who presides over the paddy. She seems, from the account given of her first appearance, to have been originally a serpent, and is now a widow.

"It is said, that in former times, a certain person cultivated paddy, and grandmother Bie-yau with her husband took the form of two pythons and wound themselves around his pile of paddy, when the paddy increased enormously. The owner of the paddy ignorantly killed the male snake and the female ran away, but she cursed him saying: 'We came in compassion and helped thee with so much paddy, and thou hast killed us! May thy three barns of paddy last only three months!' His paddy was done in three months, and the

owner had to borrow money to buy more, that he might live; and he finally became a slave."

Offerings are made to her in a little house built in the paddy field for her residence, in which two strings are put for her to bind the Là of any person that may enter the field. The following prayer accompanies the offerings:—

"Grandmother, thou guardest my field, thou watchest over my plantation. Look out for men entering; look sharp for people coming in. If they come, bind them with this string, tie them with this rope, do not let them go. If they will pay fines of money, do not let them go; if they will pay fines of silver, do not let them go; but if they will pay fines in piles of paddy, barns of paddy, dismiss them. Eat, grandmother, guard my field, watch over my plantation. Pour down thy children's rice and paddy, grandmother, or thy children's fields will come to nought, sweep it off with thy hand, bring it down continually."

At the threshing out of the paddy another form of prayer is used as below.

"Shake thyself, grandmother, shake thyself. Let the paddy ascend till it equals a hill, equals a mountain; ascend as high as Mount Than-thie, as high as Mount Pshan-ghau; ascend and become a conspicuous object, ascend and become a distinguished object; ascend and look at the sun; ascend and look at the moon; ascend and look at the heavens, ascend and look below the earth. Let my paddy pile, grandmother, be as large as a mountain. Shake thyself, grandmother, shake thyself."

Goddess of Fortune.

There is a divine female who dwells on the summit of Than-thie, the highest mountain known in Burmah, who spends all her time in blessing and cursing. The elders said: "If she curses the leaves that they may fall, they fall; if she blesses the young leaves, they sprout. If she curses the trees to die, they die; if she blesses them to live, they live. Every thing, the elders say, takes place according to her imprecations."

When the long-armed apes are heard screaming at night, it is said they scream on account of having heard the imprecations of the goddess Tà-là, the name given to this lady. The apes on Than-thie, at the

south-east corner of Toungoo, hear her words and cry, and the language is taken up by all the other apes within hearing, and is thus passed on from one to another throughout the whole land.

Thunder and Lightning.

The thunderbolt is regarded as a living being. It has been seen and described by the elders as tearing up trees in the form of a hog, and about the same size, but with bat-like wings. When it utters its voice, it thunders, and when it flaps its wings, fire is produced, and it lightens.

When it lightens in the evening near the horizon, and no sound is heard, it is said that the young thunderbolts are flapping their wings, but they are not old enough to make a noise so as to be heard far.

Rainbow.

The Rainbow is deemed to be a spirit or demon, but the people are not united in regard to its true character. Some say it is a woman who died in pregnancy; others, that it is a demon which devours the spirits of human beings, and then they appear to die by accidental or violent deaths; and other theories are propounded.

"The Rainbow can devour men," says one. "When it devours a person, he dies a sudden or violent death. All persons that die badly, by falls, by drowning, or by wild beasts, die because the Rainbow has devoured their ka-la, or spirit. On devouring persons it becomes thirsty, and comes down to drink, when it is seen in the sky drinking water.

"Therefore when people see the Rainbow, they say: 'The Rainbow has come to drink water. Look out, some one or another will die violently by an evil death." If children are playing, their parents will say to them: 'The Rainbow has come down to drink. Play no more, lest some accident should happen to you.' And after the Rainbow has been seen, if any fatal accident happens to any one, it is said the Rainbow has devoured him.

Naiads.

The waters are inhabited by beings whose proper form is that of dragons, but that occasionally appear as men, and who take wives of

the children of men. Unlike the Naiads of classic antiquity, they never take the forms of females, but always appear as men.

One girl, who had been deceived and had taken an inhabitant of the water for her husband, was told that she might ascertain his true character by watching him privately when he bathed. She did so, and saw him in the water change to a monster dragon, with a crest as large as seven wide mats. He threw up the waters to the heavens, which descended in heavy rain.

A water spirit called *Mau-lau-kwie* figures largely in the Karen myths. A girl is represented as having formed an acquaintance with this personage, and as holding clandestine meetings with him, when she went down to the stream to draw water. Standing on the bank she sung :

" Mau-lau-kwie, come, let us bathe together.
Mau-lau-kwie, come, let us wash our faces together.
Mau-lau-kwie, come with beads and rings ;
Come, come, as thou art wont."

" Mau-lau-kwie came, and they washed their faces together, and combed their heads together."

This occurred frequently, and the girl's parents wondered at her long absence, when she went to draw water ; so they sent the younger children to see, and they came back with the report that their sister had a meeting with Mau-lau-kwie. Her father then sent her off to help her grandmother, and in the interval he went down to the water and called Mau-lau-kwie, as his daughter had done. He came at the call, when his father-in-law cut off his head with a sword, and split open his head with an axe.

When the girl returned from her grandmother's, she went down to the banks of the stream, and called her lover as usual ; but instead of Mau-lau-kwie, there came a long procession of tadpoles, crabs, crayfish, shrimps, prawn, fish and crocodiles. She asked : " What does all this mean ? Where are you going ?

" A crocodile replied ; ' Mistress, we are going to weep at the funeral of Mau-lau-kwie,

His father-in-law cut off his head,
Split open his skull ;
Mau-lau-kwie is dead, is dead."

" She answered : ' I will go with you.'

"The crocodile said: 'Thou canst not go;' but she replied: 'I *will* go.'

"The crocodile then said: 'If thou wilt go with me, prepare seven cakes of bread, seven chatties of steamed rice, seven hams, and seven white cloths.' She made the requisite preparations, and started off with the crocodile. The crocodile said to her: 'When I wriggle my body about, throw down a cake, a chatty of steamed rice, and a ham.' She went along, and fed the crocodile as he directed; and they reached the body of Mau-lau-kwie, where she wept and sung:

'There is no one to build the house,
There is no one to build the dwelling;
The flying squirrel's wings are split unequal.
Would that I had died with my husband.'

At this juncture Mau-lau-kwie rose to life again; and, on uttering a word, the tortoise said *Yà-lau;* when Mau-lau-kwie, exhausted, fell down, and hit against the breast of the tortoise.

Again they wept for Mau-lau-kwie, and when his wife sung, again he rose to life, and spoke a word; but the flying squirrel said Yà-lau, and Mau-lau-kwie fell against the flying squirrel, and tore his wings unevenly. Again they wept, and again his wife sung, and Mau-lau-kwie rose to life again; and now to die no more.

After Mau-lau-kwie's wife had born a child, the family went to visit her parents; and one day she went out to visit the neighbours, and left the child in charge of its grandmother; saying to her: "Mother, if the babe awakes, do not bathe it in the brass bason."

After the mother had gone out, the child awoke, and its grandmother put it into the brass bason to bathe it, when it turned into a little yellow-tailed carp. The old woman broiled it, and when her daughter returned, told her what had happened, and what she had done. The mother took the fish, went down to the stream, and threw it into the water. Her sister followed to weep with her for the loss of the child, but the mother ran down the bank on the crooks of the gigantic bean creeper, and she did not dare to follow, but stood weeping at the top of the steep bank. Her father came and asked her, what she was crying for; and on hearing, he cut off the vine in anger; and it fell down into his son-in-law's great hall and filled it up.

His daughter called out: "Father, thou hast given me up now. Thou hast cut off the gigantic creeper, and I can no more visit thee." Her father heard these words, and he also heard his grandchild.

"I visited grandmother, I visited grandmother; grandmother gave me an egg to eat: I visited grandfather, visited grandfather; grandfather gave me a fowl to eat."

He heard the voice of his daughter and the voice of his grandchild, and he dived down into the water time after time all day, but found nothing, and returned home at eve sorrowing.

Dryads and Oreades.

The elders relate that Mount Kie-ku, in the Bghai country, and the peepul Tha-ka-u beyond the seas engaged in war.

It arose on this wise. The peepul had a daughter whose name was Bu-ban, and the mountain had a son whose name was Phai-thau-o; and the two were married. After the marriage, she came and lived with her husband's family.

She was possessed of miraculous powers, and did not pound paddy. She would take a single kernel of rice, and split it in two, and then throw one half into the rice bin when it was filled with rice immediately, and the other half she threw into the rice chatty which became filled with rice in the same manner.

Her neighbours were envious, and mount Bai-tha-lu seized her, and gave her to mount Po-phau; and mount Po-phau gave her to mount De-pha-ho; and mount De-pha-ho put her in the stocks, which still remain. There she sat, and wept, and blew her nose; and the marks of her finger nails, where she wiped her hand on the rocks, are yet visible.

The peepul, Tha-ka-u, became very angry with mount Kie-ku on account of treatment his daughter had received, and made war with him.

The peepul being in the sea, made the crocodiles his soldiers, and mount Kie-ku's soldiers were thunderbolts. When they fought, the peepul made the waters rise, and soften the earth, and the crocodiles thrust their tails into the ground, so that the sides of the mountains slipped down. At each land slide, they would say: "There dies an officer."

When mount Kic-ku attacked, he made it so hot that the sea was dried up, and the crocodiles could not live in it; and he threw his thunderbolts at the peepul, and when a branch was struck off, they said: "There dies an officer."

The peepul came and fought the mountain several days, but getting the worst of it, he said: "I will retreat." In his retreat Phai-thau-o, his daughter's husband, intercepted his path, and hid himself in a gorge by the way, watching for his father-in-law to come along. He had a sword, and a gold comb that shone like the sun, and to keep himself from being seen, he put his comb under his foot and trod on it. There he stood in the interstice of two rocks, and when one of the peepul's officers came along, he smote him with his sword and killed him; and so on, one after another, till he had nearly killed off the whole. There was only one left. He said to himself: "They are all ended, and took up his comb, and put it in his hair again, which made him visible.

The remaining officer said, as he came along: "A great many people have gone before, and yet the sound of horse or elephant is not heard;" and starting on, he saw Phai-thau-o, whom he cut down and killed with his sword.

Until this day, people say the matter is not finished. They have a saying: "Mau-khe's contention is not settled: Mau's contention is not settled."

Brownies.

Now and then, we find a good natured spirit appearing in Karen stories that comes for some one's benefit. Here is a specimen:

"The elders say that there was once a poor orphan boy, that owned nothing but a dog with seven tails. On one occasion, he noticed his dog go and bark on a hillock in the field near his house; but when he went there, he found nothing, so he came away. Still the dog remained barking, and he went again and dug into the hillock, when he found a cavity with an egg in it. He took the egg, intending to eat it, put it in a basket, and went to work in his field. During his absence, the spirit in the egg cooked the poor youth's rice and curry for him; and when he came home, he found his meal ready prepared for him, but he was afraid to eat it, and he went to the neighbours to inquire if they could explain the matter. They

replied to him roughly: 'Thon art an orphan, thy house is nasty and dirty, who dost thou think would go up into it?' He returned to his house, and being very hungry, he said to himself: 'If I die, I die, I will eat.' So he ate, and nothing happened to him.

"The same thing occurred next day. His food was cooked and ready for him on returning from his labour. The following day, he determined to watch; so after going away, he returned cautiously, and he saw a young woman come out of the basket. She went to the brook and brought water, and then cooked the rice. He showed himself to her, and she no more took the form of an egg, but became his wife. She said to him: 'My name is Miss Egg, but never speak my name. If thou dost, I shall disappear, and thou wilt see me no more.'

"People frequently asked him for his wife's name, but he never told, till they induced him to drink arrack to intoxication. Then he revealed her name. When he came to himself his wife was gone, and he wept bitterly.

"His dog said to him: 'Master, don't cry.' We will go to where Mistress is.' He answered: 'If we go, shall we find her?' The dog said: 'Follow me.' So away they went together, till they reached the banks of the Salwen, when the dog said: 'I will swim across. Take fast hold of my tail, and on reaching the other side, do not say: 'Good.' If thou dost, my tail will drop off.' He failed, however, to do as he was commanded, and on getting on shore he exclaimed: 'Good!' when one of the dog's tails dropped off.

"They kept on their way, till they reached another large river, where the same scene was enacted; and so on, till they had crossed seven large rivers and all the dog's seven tails had dropped off. On losing the last, the dog said to his master: 'I shall die, and there are many cross-roads on the way. If master goes on, let him take my body with him. On reaching the first crossings, cut off my head, and try on which road the blood drops. Follow the road on which my blood drops; and on coming to a multitude of houses, try the foot of the steps of each house till my blood drops down on one. The house in which my Mistress lives, is the one on which my blood drops upon the steps.' The dog ceased speaking, and immediately expired. This time the man followed his dog's directions, and found his wife."

Feticism.

The Karens, in some of their observances, come very near to the worship of "stocks and stones." Many keep stones in their houses that they suppose possess miraculous powers, and which seem to represent the household gods of the ancients.

A Bghai writes:

"The elders say: Some stones are possessed of superhuman powers, and if we possess them, we shall succeed in our undertakings, and obtain a sufficiency of food. If we possess but a little, that little will not be expended by using, but will always be enough to supply our wants.

"Some stones are called paddy stones, because those who possess them, obtain good crops of paddy. Some stones are said to make us invulnerable; so that when javelins are thrown at us, spears thrust against us, or blows aimed at us with swords, we shall not be hit; or if hit, they will not enter our flesh.

"These stones crave blood. If we do not give them blood to eat, they will sometimes eat us. So people kill hogs and fowls, and then pour the blood into a vessel, and put the stones into the blood.

"If the stones are thrown away, after a considerable time, they will be sometimes found to have come back again to their old accustomed places.

"In a village of thirty families, perhaps ten will have these stones; but in some villages nearly every family will have them. They are sometimes bought and sold, and those that are reputed good ones, will sell at from thirty to fifty rupees. Some that have been in a family a long time, the owners dare not sell. If a stone is sold at less than its real value, or is stolen, it will return to its former owner.

"We have heard that the inhabitants of the village of Deu-mu-kha had a number of stones, the principal one of which they called Lwai. No one dared to touch or even look on these stones, excepting the officiating priests in the sacrifices to the lord of the earth. They had charge of the stones, and were called their lords or masters; and when a black bullock was sacrificed to the lord of the earth, a fowl was sacrificed to these stones in the same place.

"It is said that the Burmese on one occasion made an attack on

this village and carried away all their stones; but afterwards all the stones came back to their old places.

"When the teacher arrived, they carried away all their stones into the jungle, and built a chapel, and said; 'If the stones come back, we will not worship God, but if they do not come back, as formerly, we will worship God.' The stones have never returned, so the people worship God to this day. The inhabitants of that village stand in great fear of stones, more than ordinary.

"We have also heard that the Pakus have stones, like a man's fist, and when they have any hatred against any one, they will strike the impressions of his foot on the ground with one of these stones, and the man dies."

I have seen many of their stones, but there is nothing remarkable in them, and they possess nothing in common. They are most usually bits of rock crystal, or jasper, or some variety of chalcedony, but never of any value, or in any way curious. Occasionally they are mere lumps of stratified rock, remarkable for nothing but the numerous thin lines of strata displayed on their edges.

The possession of one of these miraculous stones had much to do in dividing the Red Karens into two tribes, eastern and western, as they are now found. The story has been related to me thus; "There was a Sgau called Shapau, who possessed an exceedingly good stone. He set himself up as a kind of political teacher, and travelled about from village to village among the Sgaus and Pakus. They said to him, 'We cannot receive thee. If we receive thee, should the king at Ava hear of it, the Burmans will kill us all.'

"As he could not succeed among his own countrymen, he took his wife and wife's sister, and went away to the Red Karens. They received him and built him a house, and it was not long before he began to work miracles with his stone. The stone was remarkable, it is said, for having the power to change its colour. It could change from black to yellow or white at pleasure. The result was that all the Red Karens believed in him. They believed in him so fully that they were discussing the question of making him king.

"At this juncture, a son of the king of Ava rebelled against his father, but his father overcame him and he fled to Toungoo. He did not dare to remain long there, however, for fear of his father, so he

went into the Red Karen country, where he met with Shapau, and married his wife's sister. In the end, the Burman succeeded in establishing himself in the eastern part of Karenee, killed his brother-in-law Shapau, stole his stone, and became king or chief of all the eastern part of the Red Karen country, where his descendants rule to this day."

Magic.

Karens believe in the magical properties of things, as illustrated in the following story:—

The Magic Ring.

"The Elders say, there was an orphan child brought up by his grandmother, who was so lazy that he would not open the skins of the wild plantains when he wanted to eat them, but made his grandmother do it for him. He would do nothing but play, so he got the name of Mr. Laziness.

"His grandmother, finding a trading boat going down the river, persuaded the boatmen to take him along. When on board, he would not do anything. If the boatmen gave him food, he ate; if they gave him none, he fasted. They found him good for nothing but to watch their boat when they left it; and for this they gave him an occasional two annas or a quarter of a rupee.

"One morning, when all the men had gone up into the town, and he was left alone in the boat, he heard that one of the citizens was about to kill a cat, and he asked permission to buy it, and it was sold to him.

"Again, about noon, he heard that another one was going to kill a rat, that had done some mischief, and he bought off that also for three pice.

"Towards evening, several of the citizens came along with a crocodile, that they had just taken, and were about to kill, for having devoured several men. This, with a dog, he bought for a quarter of a rupee. He put the crocodile into the boat, when it spoke and said to him: 'Master, thou hast had mercy on me and bought me, and I shall not die. The reason I devour men is, that there is a gold ring in my head. The ring is under the flesh in my head, and whatsoever I desire, I obtain. Chisel it out, take it for thyself, and let me go into the water.' So he took a chisel belonging to one of the boatmen,

cut the gold ring out of the crocodile's head, and let it go free in the water.

"He put the gold ring on his finger, and when he desired silver, silver came into his box; and when he desired gold, gold came into his box. The boatmen came back to the boat at night, but knew nothing of what had happened; and he returned with them to his home.

"He told his grandmother to go to the king of the country, and ask his daughter in marriage for him. She said: 'Dost thou want to be killed by the king's sword?'—and refused to go. He replied: 'If thou dost not go, let thy arm come out of the back,' and immediately her arm come out of her back. Being unable to withstand her grandson, she finally went to the king, and asked his daughter for him.

"The king said: 'Let thy grandson build a bridge of silver, and a bridge of gold from the foot of the steps of your house, to the foot of the steps of my palace, and then he shall have my daughter in marriage; but if he does not, then you shall die.' The old woman returned weeping, but when she told the king's terms, he bid her cheer up, for he could easily comply with them.

"During the night, he desired a silver bridge and a golden bridge to stretch itself between his house and the palace, and it was done. So in the morning the king led his daughter over the golden bridge, and gave her in marriage to Mr. Laziness.

"There was a Brahmin at court, who came to the princess, and said: 'Thy husband wears a gold ring, and he will not allow thee to put it on thy finger.' She replied: 'If I ask him, he will.' So she asked her husband to allow her to wear the gold ring, and he at once granted her request.

"When the Brahmin saw the ring on her finger, he asked to see it; and she handed it to him. Immediately he put it on his finger, and exclaimed: 'Fly away, fly away palace;' and the king's palace flew away to the other side of the ocean with the Brahmin and the princess in it.

"The king said to his servants: 'Because I received Mr. Laziness, I have lost my palace, go put him in prison, and to-morrow go and kill him.' The king's servants went and put him in prison.

"He was accompanied to the jail by his dog, his cat, and his rat; and he ordered them to go and fetch his gold ring from the Brahmin that night, and to be sure to be back before morning. Away they went at once. The dog swam across the sea, and the cat and rat rode on his back.

"When they arrived at the Brahmin's, they found him asleep under wire musquito curtains. The cat told the rat to gnaw a hole through the curtain, which it did large enough for the cat to get in. They both went in, and the cat said: 'Rat, smell about, and tell me where my master's ring is.' The rat replied: 'I smell the ring in his mouth.' The cat then said: 'I will bite him in the throat, and if he vomits up the ring seize it quickly.' The rat replied: 'Perhaps our master will think we killed the Brahmin, and then he will kill us. To make him throw the ring out of his mouth, I will put my tail up his nostril and tickle him till he sneezes, and then he will throw the ring out of his mouth; and then you must snatch it up immediately.'

"The plan succeeded. They obtained the ring and both ran out of the house to the dog, that was waiting for them outside. He asked, if they had gotten the ring; and on being told they had, he said: 'Give it to me, you cannot carry it safely.' So they gave it to him, and he put it in his mouth.

"The whole three returned then across the sea, as they came; but when half way back, the dog saw a pack of otters in the water and he barked at them, when the ring was thrown out of his mouth into the sea, where it was swallowed by a fish.

"The cat said: 'This is hard. The ring is lost, and our master will be killed in the morning.' The rat said: 'The otters were the cause of this misfortune. Dog, go bite them on the rocks.' The dog leaped on the rocks, and bit an old otter, saying: 'It is on your account that we have lost the gold ring into the sea, and our master will be killed in the morning.' The otter replied: 'Do not kill me, I will get the fish for you.' So he plunged into the water, brought up the fish that had swallowed the ring; and the cat ripped it up and took the ring out of its belly. They then continued their journey, and arrived with the ring without further accident, which they delivered to their master; who then delivered himself from prison, and brought

back the palace with the Brahmin in it. He slew the Brahmin with all his relatives, and exterminated the whole race."

Giants.

Men-eating giants are among the supernatural beings with which a Karen has to contend; and their exploits are heard as often in Karen nursery tales, as they formerly were in Europe. Here is a specimen:

"The elders say that a little girl went down to the brook to draw water in the usual Karen bucket, made of a joint of a large bamboo. When she laid it on the surface of the stream to fill with water, it escaped from her hands, and floated away. She ran after it down the bank, till she reached a dam, which proved to be the dam of a giant. Soon after her arrival, the giant came down to fish, and was about to devour her; but she told her artless tale, and the giant spared her, and took her up to his house. Here they were met by the giantess who congratulated her husband on having picked up so nice a morsel for their dinner. However, the old giant protected the child, and she became their adopted daughter.

"On one occasion, when the old people went out, as they said, to search for greens, they left the little girl in the house, and charged her not to look into two baskets that were in one corner of the room. Her curiosity being excited, no sooner was she left alone, than she peeped into the baskets. One was found filled with gold and silver, and the other with nothing but dead men's skulls.

"Ever after making this discovery, she importuned the giants to allow her to return home; and they finally consented, but the old giantess required before her departure to look over her head once and pick out the vermin; an act of courtesy often performed by Karens for their friends. On looking into her hair, the little girl was astonished to find it filled with green snakes and centipedes. She called for an axe, and chipped away in the head of the old giantess till she could endure it no longer, and then permission was given the little girl to depart.

"Before going, the giants told her she might take one of the baskets with her; whichever one she chose. She said; As you are getting into years, and cannot well weave baskets, I will take the old

one. This she knew contained the gold and silver; and she was permitted to take it.

"When about to start, the giantess said: 'When thou reachest black water, comb thy hair and wipe thy teeth. When thou reachest red water, wipe thy lips; but when thou comest to white water bathe thyself.' She observed the directions given her, and reached home in safety, where the fame of her gold and silver brought together all her friends and relatives; to each of whom she gave a bowl full.

"Among those who received a bowl full of silver and gold, was one dissatisfied young man, who coveted more; so he determined to try his future with the giant, and endeavour to obtain a whole basket full for himself. He succeeded in being adopted into the family, in being allowed to return, and in having the offer of a basket to take with him. He had not looked into the baskets, but like his predecessor he chose the old one. The same charge was given him in regard to crossing the streams, but he paid no attention to his instructions, but dashed across them and got home as quick as possible. On reaching his house, he opened the basket, when to his horror and disappointment, he found the basket full of dead men's skulls. Little time, however, was given him to brood over his misfortunes, for the giant followed rapidly after him, and devoured him on the spot."

Omens.

The Karens, like other nations in their ignorance, believe in omens; and desist from a journey or an undertaking, when they occur. Like the Romans, a snake crossing the path, or a woodpecker tapping, stops a man by the way; as does the falling of a branch of a tree, or the bleating of the barking deer. Sickness is supposed to be the consequence of non-observance, and a sacrifice is offered for an atonement.

Among the Bghais an elder is called, and all the family assembled together: male and female, young and old. The elder then leads a dog round the assembled family three times, praying as he goes: "When we work, or labour; when we go, or return; at the bleat of the barking deer, at the voice of the otter, at the crash of a falling tree, at the sight of a snake, at the sight of a scorpion, at the sight of a large serpent, at the sight of a python, we ought to pause, or

we become sick, we suffer and die. Now we offer thee food to eat, a great dog. Heal this man, let disease leave him."

The dog is then killed, and the elder sits down facing the whole family, with a green bamboo raised two or three feet, and stretched horizontally between them, over which he throws the dead dog, taking it by the legs; and the family catches it and throws it back at him. This ceremony is repeated three times, and then the dog is cooked and eaten.

Soothsaying.

Subjected, as a Karen is, to the multifarious dangers proceeding from the wrath of unseen spirits; he tries, when he has come under the ban of one, and is prostrated by sickness thereby, to ascertain which, it is, that he may propitiate it by suitable offerings.

To make the discovery, he resorts to prophets or necromancers, persons that have eyes to see into the unseen world, and to fowl's bones. Omens too fall within the same category, as giving indications of the future.

Necromancers.

There are persons among the Karens who profess to have eyes to see unseen spirits, to tell what they are doing, and even to go to Hades and converse with the spirits of the dead there. When a person is sick, these people, for a fee, will tell what spirit has produced the sickness, and the necessary offering to conciliate it. They will sometimes go to Hades and bring back the Là that has gone thither, and resuscitate the dead body. This is proven by the following story:—

"The elders relate that there was a woman who had two daughters; and her husband died and left her a widow.

"After their father's death, their mother treated them very cruelly, beating them continually, so that both died and left her alone. Then she grieved, and wept unceasingly, and refused to be comforted. In her distress, she went to a necromancer, and induced him to visit her children in Hades. He found the Là of the youngest, and said to her: 'Thy mother on earth weeps for thee exceedingly. Go comfort her.' The younger then sang to her elder sister.

'Return sister, mother requests,
She weeps for us in deep distress.'

"The elder sister responded:

'Return not to her, sister dear,
'Twas mother beat and sent us here.'

"The elder sister positively refused to return to the earth, but the Là of the younger one came back with the necromancer, and on her arrival at home, the body came to life again."

Fowl's Bones.

In the beginning, say the elders, God gave to the Chinese a book of paper, to the Burmese a book of palm leaf, and to the Karens a book of skin. The Chinese and the Burmese studied their books, and taught them to their children; but the Karens were indolent, did not value their book and laid it on the end of their house, where it was thrown down on the ground, and a hog came and tore it up. After the hog had gone, a fowl came and picked up all the fragments.

It soon became apparent even to the Karens that the Chinese and Burmese greatly excelled them in knowledge through their acquaintance with books; and they then regretted the loss of their own book.

They concluded, however, that the fowl which had eaten up the book must possess all the knowledge that the book contained. They resolved therefore to consult its thigh bones, and note the marks and indentations made by the tendons on them as letters, and pray to it to reveal its knowledge.

There is no superstition so commonly practised among the Karens as this. No measure of importance is undertaken, till a favourable response has been obtained from the fowl's bones.

The thigh bones of a chicken are taken out, and after prayer, and making a condition that the bones may exactly correspond, or they may differ in some particular; that the indentations for the tendons, may be alike or unlike, that the bones may be even or uneven; the two bones are held up abreast of each other, between the thumb and finger and carefully examined. It requires a practised eye to read the result accurately, and there are many nice distinctions, known only to the elders, who do not always agree in their readings.

From my house in Karenee, I looked down into the court-yard of the Saubwa, where he was in consultation with some of his chiefs over the chicken bones. They were passed round from hand to hand, each

giving his opinion, and the conclusion reached was, as I afterwards learned, that the omens were favourable for a contemplated attack on a village in eastern Karenee. The fowl, however, deceived them that time; for some half a dozen wounded men of the village were brought in next day, and no plunder.

The Bghais seem to regard the fowl as the bird of Indra, the king of the Deva heavens. Once a year, in February or March, every Bghai family holds a festival, in which every person's wrist is tied with a thread, and prayers are addressed both to the fowl offered, and to Thie-keu, Mo-khie, or Indra. The rite is called: "The good to do;" but of its origin and object, the natives can give no account beyond what is found in the forms themselves. An intelligent Bghai assistant furnishes the following statement:

"When the time approaches, the people prepare beforehand ardent spirits, and buy hogs and fowls, and get every thing ready. When the time actually comes, the villagers perform the ceremony, two or three or four families a day, till it has gone through the whole village.

"The first thing done is to bring up two jars of arrack, and secure them by tying them to a bamboo, and the next is to bring up a hog and fowls. Then an eating dish is washed and filled with water, and set by the side of the jars with spirits.

"An elder is now called on, any one skilled in interpreting fowl's bones, and a fowl is put into his hands. He cuts off the bill of the fowl, dips its head and feet in the water, and then drops the blood from the bleeding head on the forehead of the oldest man of the family that is performing the ceremony.

"The master of ceremonies then addresses the elder, and says: 'The hand-tier devours thee. Thou hast the jaundice, thou art shrivelled up, thou art not strong, thou art weakly. Now we give food and drink to the hand-tier. Mayest thou be strong, mayest thou be vigorous. Mayest thou be established as the rock, indestructible as the hearth stones. Mayest thou have long life, mayest thou have a protracted existence.'"

After besmearing the elder's forehead with the fowl's blood, the master of ceremonies pinches a few feathers and a little down from the fowl's neck, and sticks them on the blood, where they adhere, perhaps for the whole day.

He next addresses the fowl, and says: "Arouse, arouse, Thie-keu's fowl, Mo-khie's fowl, we give thee food, we afford thee sustenance. Thou drinkest in a knowledge of the future, thou eatest superhuman power. In the morning, thou seest the hawk, in the evening thou seest man. The seven heavens, thou ascendest to the top; the seven earths, thou descendest to the bottom. Thou arrivest at Khu-the; thou goest unto Tha-ma [*i. e.* Yu-ma, the judge of the dead]. Thou goest through the crevices of rocks, thou goest through the crevices of precipices. At the opening and shutting of the western gates of rock, thou goest in between; thou goest below the earth where the sun travels. I employ thee, I exhort thee. I make thee a messenger, I make thee an angel. Good, thou revealest; evil, thou revealest. Arouse thee fowl, arouse; reveal what is in thee. Now I exhort thee, I entreat thee, if this man is to live to an old age, if his head is not to be bent down, if he is not to come down crash, like a falling tree, let the right hand bone come uneven, let the bones be short and long. Thou art skilled in the words of the elders, thou knowest the language of old men. The good, thou fully knowest; with the evil thou art perfectly acquainted. Fowl, I exhort thee, I entreat thee; reveal whatever is in thee. And now, if this man's head is to bend down, if he is to come down crash, like a falling tree, if he is to be unable to rest himself from incessant trouble; if unable to overcome obstacles which shall meet him on every hand; if unable to rise up or lie down, if his life is not to be prolonged, if he cannot live, then, fowl, come up unpropitious, come up with the tendon short on the right side, come wrong end foremost. If he be able to obtain sufficient to support life, if he be not overcome by feuds, fowl, come up even. Thie-keu's fowl, Mo-khie's fowl, I pull out thy feathers, I pull at thy skin, I dip thy head, I dip thy feet. Arouse fowl, reveal what is in thee."

Every one in succession is then besmeared on his forehead with the blood of a separate fowl; and then every one marks his own fowl by tying a string to it that he may recognise it after being cooked. Some tie a string on the neck, others on the leg, others on the wing, and others elsewhere. They next scorch off the feathers, and boil them.

The hog is taken if the gall bladder be deemed a good one, otherwise it is rejected. When the rice and meat is cooked, they bring the rice,

and the pork, and the fowls, and the threads, and the bamboo tubes to suck up the drink and the spirits; and all are placed together.

The master of ceremonies then goes and puts two bamboo tubes into the left hand of one, and the gall bladder of the hog and the head of the fowl into his right hand; and then the elder of the family takes the thread and ties his wrist. Each one in succession takes the articles in his or her hands mentioned above, and the elder ties every one's wrist, at the same time praying with each: "Mo-khe, the hand-tier, the good-to-do, we offer thee food and drink, spirits well prepared, a great hog. Defend us; when we go to and fro, look after us. If we fall, raise us up. When we go or return, when we walk on a branch or a beam, when the branches or creepers break down, when we go among the Burmese or other tribes, when we climb trees or descend into the waters, when we go up into the house, or return to the paddy field, may no accident befal us! Stretch forth thy hand, and help us; put forth thy foot and assist us. Go before us, follow behind us. Deliver us from demons, deliver us from ghosts."

After this the person whose wrist is tied, changes the things in his hands from right to left and left to right. Then each one tastes the spirits; after which each one tastes the fowl; and when this is done, an elder is called upon to pray, who prays thus:

"Mo-khe of mountain Kie-ku, Mo-khe of the seven heavens, Mo-khe of the seven earths, assemble together, even the blind, the deaf and the lame; and eat and drink the valuables."

A libation of spirits is then poured out; and after this the drama closes with spirits being served out for all to drink.

ASTRONOMY.

Cosmology.

"There are seven heavens and seven earths." This expression occurs frequently in Karen stories, but the people have no definite ideas on the subject. The sun is supposed to go round the earth. In the west are two massive strata of rocks which are continually opening and shutting. Between these strata the sun descends at sunset, but how the upper stratum is supported, no one can describe.

In the western ocean is an immense volcanic mountain, which is continually fighting with the water. They have a story which must be of common origin with Sinbad the Sailor.

The Elders say there are fish in the sea as large as mountains, with trees and bamboos growing on them as on land. Voyagers have to be careful where they land to cook. They carry axes, and cut into the ground to try it. If juice springs up where it is cut, they know that they are on a fish; but if the ground seems dry, they are on land, and go to cooking.

It is related that a man landing on an island, went to cooking without trying his ground, and it proved to be a fish which sunk with him into the sea, and then swallowed him. When the man was in the fish's belly, he said to the fish: "When males acquire large game, they shout, and cry out in exultation, but you are silent. Are you not a male? On hearing this, the fish opened his mouth to scream, when the man leaped out and escaped."

The Elders say that when people kill one of these fish, it is impossible for them to eat it all up, and they burn its fat. With its bones they can make beams and rafters for houses.

Constellations.

The Karens have names for a few of the most prominent constellations. The great Bear they call an elephant, and so do the Burmese and Hindus. The pole star is a mouse crawling into the elephant's trunk.

The southern cross they call Mai-la-ka, a name whose derivation is not obvious, but they regard it as some kind of animal; for they say that Mai-la-ka and the elephant once dwelt together in the middle of the heavens, but they quarrelled and fought. Mai-la-ka seized the elephant by his tail, and the elephant took Mai-la-ka by his thigh, and in the struggle which ensued the two were thrown to the opposite extremities of the heavens, where they remain to this day.

The Pleiades is called "the great house," and is regarded as a family of persons, consisting originally of seven persons, but one has been lost, and there are only six now. Two men, one of their myths states, married here two sisters. The names of the men were Lan-to, and To-phau; and of the women Thă-bgheu-mu, and Tha-bgheu-bghai.

While the men were out fishing, "the wife bearer," or Orion, came and carried them off on his shoulder. The women cried out to their husbands:

"Lau-to, oh, Lau-to dear,
Snatch up thy bow and spear.
To-phau, oh, To-phau come,
We're carried away from home."

After calling a long time, their husbands heard their cries, and returned home, when they discovered that their wives had been carried away. They seized their bows and spears and followed on after "the wife bearer." When they came within a spear's throw of him, Lau-to poised his spear or javelin to throw it at "the wife bearer;" but his younger brother came behind Lau-to unobserved, and struck the handle of the javelin, so that it flew against his father-in-law's house, and knocked a part of it down. To encourage their wives, the men sung:

"Tha-bgheu-mu, suffering dear,
Tha-bgheu-bghai, have no fear.
The bow's bent, the string tight,
Arrows ready, you in sight."

Then they followed on silently, and "the wife bearer" thinking he was not pursued, stopped and set down his burden to rest; but while he was gone down into the water to bathe, the husbands arrived and carried their wives back home, and repaired their father-in-law's house.

Though the resemblance is remote, yet this story must have had a common origin with the Greek myth of Orion and the daughters of Oenopion.

Some of the Karen constellations, to judge from their names, are of Karen origin. One is called the "Burmese yoke," from the resemblance the stars are supposed to bear to the yoke a Burman carries on his shoulder.

Some names are local and vary in different places. For instance, the Karens in the south call the Milky way the "Paddy Bin;" while the Bghais denominate it the "Bazar street," because the streets in the bazar are usually an undistinguishable mass of people.

Comets.

Comets are sometimes called "Tailed-Stars," sometimes "Fire-Stars," and sometimes "Smoke-Stars." In common with all other unenlightened nations, the Karens regard their appearance as indicating approaching war, famine, pestilence, or other public calamities.

Planets.

The Karens do not seem to recognize any planet, excepting Venus. They know the evening and morning star to be one and the same, and by some process not clearly understood, she is sometimes before, and sometimes after the sun. When a morning star, she is called the "Star receiving the morning;" and when an evening star, the "Star receiving the evening."

Shooting Stars.

Shooting Stars are said to be "Youth Stars," going to visit the "Maiden Stars." When a Karen girl sees one she exclaims, "May my hair grow as long as the path thou fliest!"

Meteors.

Meteors, the Karens say, are the animals that produce gold and silver, and when seen in the heavens descending to the earth, are supposed to be returning home. When a report is heard, as the Karens say there often is, it is the roar the animal makes on entering the earth. Wherever they fall, gold or silver is certainly to be found in the neighbourhood.

Division of the Year.

The Karens divide the year into twelve lunar months, and, like occidental nations, they begin it with January, and end it with December. This is contrary to the usage of all the nations that surround them; the Burmese, the Talaings, and the Shans commencing the year in March. "The civil year," says the Journal of the Asiatic Society of Bengal, "commences differently in different parts of Thibet, varying from December to February. At Asadakh, it begins in December. The months have several names expressive of the seasons, &c., but they are usually denominated numerically; first, second, &c." The Karens would seem then to have derived their calendar from Thibet, for while they make now the year to begin in January, yet

the months corresponding to June and July are designated numerically "the seventh," and "the eighth" months, which must have originated from a system that made December the first month; as our September and October must have been named, when the year was made to commence in March.

The names of many of the months show that they were given when the Karens had the same habits that they have now. Thus January is "the searching month," from the habit of going about in search of a suitable locality to clear a field. And February is "the hewing month," because in this month the trees are cut down. Other names show that the seasons were the same when and where the names were given as they are now. Thus April is "the seed month," because in this month the seed is sown; and August is "the month of gladness," because the corn is then in the ear; like the month of Abib among the Hebrews; but that corresponded to April, indicating a different climate from the Karen. May is "the Crinum" or holy month, because the Crinums, popularly called lilies, are then in flower; while December is denominated "the month of the shades," because in this month the Karens make their annual offerings to the shades of the dead.

The Red Karen names are usually coincident, but a few of the months have different names. July is not with them "the eighth month," though June is the seventh; and August is not "the month of gladness," but is named from a feast that is made this month, and which is peculiar to themselves.

A correspondent writes: "In the month of Ai-du, the Red Karens kill hogs, and fowls, and oxen all at once, and make a feast in which the whole village eat and drink together. They beat drums, and fire off muskets, and have sham fights, firing at each other with nothing but powder in their guns. Accidents often happen, and houses are frequently set on fire. The feast is kept up for three days, and during their feasting the people send food and drink to their friends and relatives in other villages. The origin of the feast is not known."

A Catalogue of domestic Karen words, with English, Sgau, Bghai, &c. Synonymes.

English.	*Sgau.*	*Bghai.*	*Red Karen.*	*Pwo.*	*Taru.*	*Mopgha.*	*Kay or Gaikho.*	*Toungthu.*	*Remarks*
Air	Kalie	Kalie	Kay-lya	Lie		La-lie	Ren-yu	Ta-lie	Siam. *Lon.* Burm. *Lay.*
„ Coup.	Thaughau	Way-thra		Lang		Lay		La	Tal. *La.* Koreng. *Tinghun.*
Ant	Teu	Teu	Teu	Htung		Hten	Hteu	Htung	
Arrow	Pla	Play	Pra	Phla		Pla	Pla	Pla	Koome. *Pala.* Shan *Pen.*
Bird	Hto	Htu-ba	Htu	Hto	Hto	Tcu	Htu	Awa	Limbu. *Bu.*
„ Coup.	Lie	Le	La	Lie		Lie			*Lie* signifies a squirrel.
Blood	Thwie	Thwie	Thwie	Thwie		Sweit	Htwie	Thwie	Burm. *Thwe.* Tibet *Thak.*
Boat	Khlie	Khlie	Thau-khlie	Khlie		Hlick	Reu	Phre	Burm. Hlay.
„ Coup.	Hto	Ka-pay	Ta-pay	Htaung		Wa			This couplet signifies a *raft.*
Bone	Ḳhie	Khwie	Kvwie	Khwie		Ḳhie	Hsweit	Hsot	Shan. *Sot.* Chin. *Kuh*, and *kweh.*
Buffalo	Pana	Pa-nay	Pa-nay	Pa na	Pa-na	La-na	Pa-na	Pa-na	
Cat	Tha-mie-yau	Mie-yau	Htoo, Htoo-ma-nya	Mein-yau		Mie-zau	May	Nyoo	Chin. *Miau.*
Cow	Klau and Po	Peu	Po, Pu	Klau		Peu	Phouk	Phou	Tibet. *Ba.* *Bos.*
Crow	Sauwakha	So-wa	Sau-ray	Kla		Sa-gwa	Sa-wa	Zanka	
Day	Nie	Nie	Ne	Nie		Ne	Neu	Ya	Burm. *Ne.*
Dog	Htwie	Htwie	Htwie	Htwie	Shwie	Htwie	Htwie	Htwie	Mru. *Ta-kwie.*

English.	*Sgau.*	*Bghai.*	*Red Karen.*	*Pwo.*	*Taru.*	*Mopgha.*	*Kay or Gaikho.*	*Toungthu.*	*Remarks.*
Ear	Na	Nay-koo	Kha-lay, Ne-kyeu-khalay	Na	Na	Na	Ne-ko	Na	Singho. *Na.*
,, Coup.	Nu	Nay-kau	Noung	Nu					
Earth	Hau-kho	La-kheu	Hay-khu	Ghang-kho	Hang-kho	Hau-feu	Hay-khu	Ham-tan	
Elephant	Ka-hsan	Ka-sha	Ta-sha	Ka-hsaung	Hsaung	La-hso	Htsang	Hsan	Shan. *Tsang.* Chin. *Siang.*
Eye	May	Meu-la-doo	May	Me	May	May	Mie	May	Chin. *Moh.* Shan. *Matta.*
Father	Pa	Pa, & Ta	Phay	Pha	Pa	Pa	Pha	Pha	
Fire	Me-oo	Me	Me	Me-ung	Mie	Me-ouk	Me	Me	Botia. *Me.*
Flower	Phau	Phau	Pho	Phang	Phang	Foo	Pho	Heu	Limb. *Phu.*
Foot	Khau	Kha	Kha	Khang	Hang	Khau	Ku-ku	Khan	Tibet. *Kang.*
Goat	May-tay-lay	Pay-ko-lay	Pay	Be		Pie-koo-lay	Phye	Bay	Shan. *Pa.*
Hair	Kho-thoo	Kheu-loo	Kho-lya	Kho-thoo	Khoo-lau	Feu-htook	Kho-louk	Ta-loo	
Hand	Su	Su	Su	Su	Sa	Sook	Sa	Su	Chin. *Syu.*
Head	Kho	Koo-kheu	Hoo-krau	Kho	Khoo	Feu	Ko-kwau	Ka-tu	Burm. *Khoung.* Shan. *Ho.*
Hog	Hto	Htau	Hta	Hto	Hteu	Hto	Htouk	Hto	Chin. Tchee.
Horn	Neu	Neu	Nau	Nong	Nung	Nau	Nu	Nung	
Horse	Ka-the	Thia	Ta-the	Ka-the	Tie	La-gho	Theik	Tha	Botia. *Ta.* Aka. *Ghura.*
House	Hie	He	Hie	Ghaing	Sum	Heik	The	Lam	Shan. *Hien.*
Iron	Hta	Hta-la	Hto-htay	Hta	Hta	Hta-la	Hta-la	Pathie	
Leaf	La	Lay	Lay	La	La	La	La	La	
Light	Ka-pau	Lie	Lie	Phang	Lie	Ta-la-po	Kha		Burm. *Len.* Shan. *Len.*

Man	Pgha-knyau	Pie-ya	Pray-ka-ya	Heu-phlong	Plu	Pei-do, Ze-zau	Pra-ka-yong	Lau	Burm. *Loo.*
„ Coup.	Pgha-tha-pleu	Pie-yeu		Heu-khong			Plau	Pa-kyoung	Shan. *Khoung.*
Monkey	Ta-u	Yeu	Yau	Hseu-oo		Ze	Yau		There is no generic.
	Ka-yu-pha	Yeu-ka-phay	Yau-ku	Ka-yeu-pha		Zeu-la-po			term for monkey
	Ta-thwa	Ka-nie	Ta-nie	Hieu-awa-me		La-nie	Myeu		
Moon	La	Lay	Lay	La	La	La	La	La	Shan. *Leu.*
Mother	Mo	Meu	Meu	Mo	Mo	Am	Mu, A-yeu	Meu	Shan. *Amya.*
Mountain	Ka-seu	Khau-mu	Sho	Kho-laung	Khaung	La-seu	Khwau	Koung	Chin. *Khou.*
„ Coup.	Ka-lo	Khau-lau	Lya	Htoung-lo		La-lau			Siam. *Kham-ta.*
Month	Hta-kho	La-mau	Kha-oo	No	Guwa-kho	Hta-feu	Kha	Proung	
Musquito	Pa-so	Pa-so	Phu-shie	Pa-so		La-seu	Ka-poo-ta-yo	Ta-khia	
Name	Mie	Mie	Mie	Meing	Myoung	Em, Meik Ta	Mie	Meing	Bhotia *Ming.*
„ Coup.	Tha	Thay	Thay	Tha					Chin. „
Night	Na	Nay	Nay	Na		Na	Na		
Evening	Ha	Hay	Hay	Gha	Ha	Ha	Ha	Ha	
Oil	Tho	Theu	Thoo, or Htya	Tho		Nay-teu	Beu	Na-mau	
Plantain	Tha-kwie	Ya	Die-kloo	Tha-kwie	Gna	La-kwie	Kwie	Gna	Shan. *Hwa.*
„ Wild	Ya	„		Ya		Za			Burm. Gna-pyau.
River	Lo, Klo	Lau	Klo	Lo		Loo	Lau		
Road	Klay	Klay-poo-tha	Klya	Pung-tha		Peu-ta	Klay	Klay-tan	
Salt (noun)	Ie-tha	Ie-thay	Ie-thay, or Te-thay	Htie-la		Deik-ta	Se-thay	Ta-tha	

English.	*Sgau.*	*Bghai.*	*Red Karen.*	*Pwo.*	*Taru.*	*Mopgha.*	*Kay or Gaikho.*	*Toungthu.*	*Remarks.*
„ (verb)	Hau	Hay	Hay	Ghang		Hau	Heing		
Skin	Phie	Phe	Phie	Phe		Pa-hie	Phie	Phro	Chin. *Pi.*
Sky	Moo-ka-po-lo	Mau-ka-pau-la	Mau-kla-me-lo	Moo-po-long		Mau-hyo-apho-pho	Sa-keu-tha		There is no single word for *sky* in Karen.
Snake	Ghu	Woo	Roo	Ghoo	Roo	Ghuk	Roo	Hru	
Star	Hsa	Shay	Shay	Sha	Hsa	Hsa	Hsa	Hsa	Chin. *Sing*
Stone	Leu	Leu	Lau	Long	Lung	Louk	Louk	Lung	Lepcha. *Long.* Limbu *Lung.*
Sun	Mu	Mu	Lă-moo	Mu	Myung	Meu	Myeu	Mu	
Tiger	Khe, or Bo-tha-o	Khe, or Tay-poo-lie	Khie	Khe		Ta-pa-leik	Khe	Ka	Burm. *Kya.*
Tooth	May	Theu-may	Kho-khe	May	Me	Swa-hteik	Tha-khe	Ta-gua	Burm. *Thwa.*
Tree	The	Theu	Thau	Theing	Teing	Te	Theu The		
Village	Thă-wau	Deu	Dan	Tă-wang		Deu	Hay-khu		
Water	Htie	Htie	Htye	Htie	Hseu	Hteik	Sheu	Htie	Chin. *Shui.*
„ Coup.	No	Kă-nau		Noung					Siam. *Nam.*
Yam	Nway	Nway	Kreu	Nway	Nwe	Nway	Nway	Nwa	

The following table exhibits the pronouns in all their forms, in the various dialects.

	Case Absolute. I, as to me.	*Nominative. I.*	*Objective. me.*	*Poss. Pron. my.*
Sgau	Yá, or yay	Ya, yeu seu	Yá or yáy	As nominative.
Pwo	Yeu, or yawe	Ya, or yeu	Yeu	,,
Bghai	Yay	Ya	Yay	,,
Mopgha	Zá	Za	Zá	Ei
Toungthu		Khwa		
Red Karen		Va		As nominative.
Kay or Gai-kho		Khye	Khye	
Taru		Ya		

	Thou, as to thee.	*Thou.*	*Thee.*	*Thy.*
Sgau	Ná, or nay	Na, or neu	Ná	As nominative.
Pwo	Neu, or nawe	Na, or neu	Neu	,,
Bghai	Nay	Na	Nay	,,
Mopgha	Ná	Na	Ná	,,
Toungthu	Ná	Na	Ná	
Red Karen		Na		,,
Kay, or Gai-kho		Na		,,
Taru		Na		

	As regards &c.	*He, she, it, they.*	*Him, her, it, them.*	*His, her, its, their.*
Sgau	Away	A, or way	Au	A.
Pwo	Awe	A, or we	Eu	A.
Bghai		Seu	Say	A, or Sa
Mopgha		O, or wo		
Toungthu		Wa		
Red Karen		A		,,
Kay, or Gai-kho		Hwon		,,
Taru		A		

	Case Absolute. We, as regards us.	*Nominative We.*	*Objective. Us.*	*Poss. Pron. Our.*
Sgau	Pa way	Pa, or peu	Pgha	As, Nomin.
Pwo	Pa we	Pa, or peu	Peu	,,
Bghai	Kay	Ka, or wa	Kay	,,
Mopgha	Kay	Ka	Wau	Oo, or Ei.
Toungthu		Ne		
Red Karen		Pay		As nominative.
Kay, or Gaikho		Pa, or ka		,,
Taru		Pa		

	You, as regards you.	*You.*	*You.*	*Your.*
Sgau	Thu way	Thu	Thu	As, Nomin.
Pwo	Nathie	Nathie	Nathie	,,
Bghai	Thie	Thie	Thie	,,
Mopgha	Nay	Nay	Nay	,,
Toungthu	Nathie	Nathie	Nathie	
Red Karen		Thie		,,
Kay, or Gaikho		Thu		,,
Taru				

English.	Sgaw.	Bghai.	Red Karen.	Red Karen, 2nd Form.	Pwo.	Taru.	Mopgha.	Kay, or Gaikho.	Toung-thu.	Remarks.	
One	Ta	Ta	Ta	Ta	La	Mau	La	Ta	Ta	Tal. *mu-a*	
Two	Khie	Kie	Ne	Tho	Nie	Neu	Sehheu	Neu	Nie	Shan. *htsoung*	
Three	Theu	Theu, or teu	Theu	Tha	Thung	Tu	Teu	Theu	Thung	Tibet. *sum*	
Four	Lwie	Lwie	Lwie	Ta-to	Lie	Lwie	Lwie	Lwie	Leet	Limbu. *lish*	
Five	Yay	Yay	Nya	Ha	Yay	Gnay	Zay	Gnei	Gnat	Bur. *gna*	Shan. *ha.*
Six	Khu	Theutho	Theutho	Ho	Khoo	Hso	Khu	Sho	Thu		,, *hok.*
Seven	Nwie	Theutho-ta	Theutho-ta	Se	Nwe	Nway	Um	Nway	Nwot	Limbu. *nush*	,, *tset.*
Eight	Kho	Lwietho	Lwietho	Ta-pya	Kho	Hsoo	Kho	Shau	That	Lepcha *kakeu*	,, *pet.*
Nine	Khwie	Lwietho-ta	Lwietho-ta	Kau	Khwie	Kwie	Khwie	Kway	Koot	Shan. *kowt, kau*	
Ten	Tahsie	Tashie	Tashe	Ta-kha	Lahsie	Hseu	Lashie	Ta-sheu	Tasie	Chin. *shi.* The first root is *one.*	
Eleven	Tahsieta	Tashieta	Tasheta	Ta-kha-ta	Lahsiela			Ta-sheu-ta	Tasieta		
Twenty	Khiehsie	Kieshie	Neshe	Gna-to	Niehsie		Schheu-shie	Neu-sheu	Niesie		
Hundred	Takaya	Takayay	Tayay	Ta-yay	Laya	Aya	Laza	Ta-ya	Talyea		
Thousand	Takahto	Takahtau	Tarie	Ta-rie	Lahtaung	Alie	Lahto	Ta-htau			
Twelve	Ta-hsie-kie	Ta-shie-khie	Ta-shi-nie	Ta-kha-nie	La-hoie-nie	Shie-sehheu		Sheu-neu			
Thirty	Theu-hsie	Theu-shie	Theu-shie	Tha-kha	Thung-hsie	Tu-shie		Theu-sheu			
Forty	Lwie-hsie	Lwie-shie	Lwie-shie	Thie-kha	Lie-hsie	Ouie-shie		Lwie-sheu			
Fifty	Yay-hsie	Yay-shie	Nya-shie	Ha-kha	Yay-hsie	Gnay-shie		Gnei-sheu			

English.	*Sgau.*	*Bghai.*	*Red Karen.*	*Pwo.*	*Taru.*	*Mopgha.*	*Kay or Gaikho.*	*Toungthu.*	*Remarks.*
Of	A	A	A	A		A	A		
From	Leu	Dau, Leu	Deu	Leu Day Ta		Leu	Dwa		
To	Hsoo	Seu	Seu	Shaing		Seu	Hsa, Dwa		
By	Leu, Dau	Lay	Rau	Leu Day		Leu	Deu		
With Without	Dau	Lay	Rau	Day		Leu	Dwa, Deu		No proper word in Karen. Expressed by an idiom.
In	Poo	Poo	Koo	Phung		Poo	Koo		
On	Phau-kho	Dau-kheu	Klau-khoo	Phang-kho		Dau-fō	Deu-kheu		
Now	Khay-kă-neie	Khau-neu-yeu	Kho-nya-ae	Bong-na-ing-yo		Khau-nay-ie	Kha-yo		
Then	Tu-nu-ta-blau	Ta-nu-ta-pla	Tyeu-nyeu-ta-pgheu Tyeu	Htaung-nau-la-blang		Htau-nu-la-plau Tu, Ftau	Tu-nu-ta-blay		
When	Tu	Teu	A-khay-byie-te	Htaung		A-kha-play-lay	Tu		
When?	A-kha-phay-day	A-khay-be-day		A-khay-htaung-lag			Deu-ma		
To-day	Ma-htta-tanie	Ma-shay ta-nyie	A-ae-ta-nyie	Mu-hta-ta-nie		Ma-la-nie-ie	Mu-htsata-neu		

To-morrow	Khay-ghau-ta-nie	Kau-moo-hau-ta-nie	Shie-pu-ro-ta-nyie	Kay-mu-ghau-ko	Ko-ma-gho	Hay-so-a-vo
Yesterday	Mā-ha-ta-nie	Moo-hay-ta-nie	Ma-shay-ta nyie	Mu-gha-la-nie	La ma-ha-nie	Ma-ha-ta-neu
Here	Phay-ie	Be-yeu, Dau-yeu	Byie-ae	Htaung-yo	Play-ie	Be-yo, Be-yeu Dwa-yeu E-yo
There	Pay-ne	Be-neu Dau-neu	Byie-nyeu	Htaung-nau	Play-nu	Deu-gna
Where?	Pay-lay	Dau-lay	Byie-te	Htaung-lay	Play-lay	Ba-ma, Deu-ma
Above	Phau-kho	Dau-kheu	Klau-khoo	Phang-kho	Dau-fō	Deu-kheu
Below	Phau-la	Kau-lay	Klau-lay	Phang-la	Fo-la	La
Between	Beu-hseu	Deu-seu	Sau-koo	Bong-hseung	Bau-hseu	Deu-htseu
Without	Leu-kho	Leu-khau-kheu	Klau	Leu-khaung	Leu-khau-fō	Deu khau
Within	Leu-ă-poo	Leu-ă-poo	Koo	Leu-a-phung	Leu-a-poo	Deu-koo
Far	Yie	Ye	Ye	Yaing	Yie	Yeu
Near	Boo	Bo	Phoo	Boo	Beu	Phu
Little	Hsie	Shie	Pa-bie-ta-ke	Pay	Shie	Shie
Much	A	Ay	Ay	A	Pge	A
How much	Hsie-à-lay	Pghe-lay	Bà-te	Hsie-à-lay	Pge-lei	Bghe-ma
Thus	Yau-ie, Die-ie	Ya-yeu	Pho-ae Pho-nyeu	Bay-yo Bo-yo	Zie-ie	Ka-yeu
How?	Yau-lay, Die-lay	Ya-lay	Pho-te	Bay-the-lay Bo-lay	Zie-le	Ka-ma

English.	*Sgau.*	*Bghai.*	*Red Karen.*	*Pwo.*	*Taru.*	*Mopgha.*	*Kay or Gaikho.*	*Toungthu.*	*Remarks.*
Why?	Bà-mă-nu-lay	Bay-ma-nau	Bay-tie-te	Bay-nau-lay		Ba-ma-nei	Ba-ta-ra		
Yes	Eu, Me-yeu	Eu, Me-ba	Eu, Ma-hau	Eung May-youk Mway-youk		Su Me-bo Me-no	Eu Mwe-ra		
No, not	Tă-me-bà, Me-ĕ	Nau, Tă-me-nau	To, Ma-to	May-e Mway-e		Me-ay	Seu-mwe-koo		
And, also	Dau	Lag	Vau	Day		Dyo	D va, Deu Lay		Burm. *Le.*
Or									There is no word for *or* in Karen. It is expressed by an idiom.
That	A-ne	A-neu	A-nyeu-ta-pray	A-nau		A-nu	Deu-gna		
Which?	Phay-lay-gha-lay	Dau-lay-ta-pghay-nau	Byie-te-ta-pray-te	La-gha-gha-lay		Htaing-lei la-gha-lei	Deu-ma-ta koo-koo		
Who?	Ma-tà-tă-gha-lay	Me-pgha-nauta-pghay-nau		Phau-la-gha-lay		Me-pa-lei-la-gha-lei	Me-pa-pra-ta-pra-pra		
Eat	Au	E	E	Ang		Au	Ay		
Drink	Au	Au	O	Au		Oo	Hwō,	Awa	
Sleep	Mie	Shau-mie	Mye	Mie	Mie	Meik	Mie	Ping	
Wake	Phu-the-nau	Phoo-thie-nay		Nang-a-tha		Phu-se-nau	Khyau-htaung	Ting	

Smoke	Au-mo	Au	O-mye	Au-mo		Oo-	Hwo-	Awa-	*Lit.* Drink a segar or pipe.
Laugh	Nie	Dje	Nyie	Nie	Gna	Ne	Nga	Nga	
Weep	Hau	Ha	Gneu	Ghang		Ho	Nga		Burm. Ngo.
Be silent	Bghau	Sau		Lang-mang		Sau	Nie-soo	Nging	Burm. *Ngyeing.*
Speak	Kă-to, Po	Apo, hie, yie,	He-bay	Khlaing	Tung-shwie	Po	Bā-swie		
Come	Hay	Le	Ray, Ha	Ghay		Hay	Le	Lon	Come and go in some of the dialects are distinguished only indirectly.
Go	Lay	Le	Syeu	Le	Lay	Le	Le	Lway	Sunawar. *Lau.*
Stand up	Hseu-hteu	Shauh-teu	Se-htau	Hseun-tung		Sheu-hteu	Thau-hteu	Ung-htung	
Sit down	Hse-nau	Sha-na	O-nya	Hse-naug		Hsau-nau	Ie-nang	Ung-lau	
Move	Thu	Theu	Thau	Thu		Thu	Thu		
Walk	Ha	Hay	Hya	Gha, Saing		Ha	Hsa	Lay	Burm. *Lay.*
Run	Sie	Sway	Kywa	Saing-ta-laing		Sie	Swa	Lau	Chin. Tsou.
Give	He	Ie	Dye	Pe	Pe	He	Pe	Pha	Shan. *Pau.* Burm. *Pay.* Sans. *da.*
Take	Hie-ne	Bie-ne	Phie-ne	Phoung-pie		Siez	Pie-ne	Khou	
Strike	Tau	Peu	Mu	Do	Van	Peu	Htei	Tway	Shan. *Pautihu.* Chin. *Ta.*
Kill	Ma-thie	May-thie	Me-thye	Ma-thie	Ma-thie	Ma-teik	Ma-thu	Ma-thie	Literally *make death.*
Bring	Hay-sau	La-sa	Sau-ray	Gray-hso		Le-so	Mu-yeu		Bring and take away are made from the same root.
Take away	Ke-sau	Ke-sa	Syu-ku	Htaing-hso		Le-so	Seu-yeu		

English.	*Sgau.*	*Bghai.*	*Red Karen.*	*Pwo.*	*Taru.*	*Mopgha.*	*Kay or Gaikho.*	*Toungthu.*	*Remarks.*
Lift up	Sau-htau	Sa-hta	Htyeu-htya	Hsa-htang		So-tau	Pau-htang	Hya	Literally, *carry-ascending.*
Hear	Na-hoo	Shau-nay	Ne-hyeu	Na-heung	Na-ko	Na-hoo	Ne-hu	Heun	
Understand	Na-peu	Nay-koo-nu	Nyeu-kha-lay-koo	Na-the		A-nam	Na-theing	Thena	
Tale	Sie-ba	Dau-bey	Dya-sho, Hie-bay	Lau-ba		Po-ba	Sie-ba	Thou-thau	
Good	Ghe	We	Rea	Ghe	Rie	Ghie	Rie		
Bad	Eu	Kie-kay	Hea-kay	Eung		Eu	Kie-ka	Kay	Greek. *Ka-kia.*
Cold	Gho	Wau	Ro	Ghaung		Ghau	Rau	Khwa	Shan. *Kat.*
Hot	Ko	Keu	Koo	Kho	Ko	Ko	Koo		
Raw	Thie-kă-say	Thie-theu	Thye-thyeu	Theing-hse		Wook	Tha-thung		Shan. *Leu.*
Ripe	Mae	Mei	Mye	Meing	Mie	Meik	Mie	Hma	Burm. *Hme.*
Sweet	Hseu	Shie	Shyu	Hseung		Seu	Hseu	Neu	
Sour	Hsie	She	Shye	Hsaing	Hseik	Shie	Sheu	Hsya	Shan. *Htsoi.*
Bitter	Kha	Khay	Khay	Kha	Kha	Kha	Kha		Burm. *Kha.* Shan. *Khou.*
Handsome.			To			La-la-pau	Phu-sa-na		
Ugly			To-to						Negative of handsome.
Straight	Lo	Na	Sau	Loung	Na	Lo	Seu	Sou	
Crooked	Ke	Ke	Ka	Kaing	Ka	Kay	Ke	Nga-keu	
Black	Thoo	Lay, Thie-ehe	Thyeu, Lau Thyie	Theung	Tyeung	Tu	Su	Phren	Shan. *Laing.*
White	Wa	Bo-tha	Boo	Wa	Phoo	Gwa	Bo	Bwa	
Red	Ghau	Lie	Lie	Wau	Lie	Wook	Hlie	Tanya	Shan. *Laing.*
Green	He	Thă-klo	Klo, Thyeu	Yay		Klo	Ka-louk		
Long	Htau	Hta	Htoo	Htau	Htau	Htoo	Htu	Hto	
Short	Phu	Pheu	Phu	Pie	Phu	Pheu	Phu	Pu	
Tall									Same as *Long.*

On the Pendulum operations about to be undertaken by the Great Trigonometrical Survey of India; with a sketch of the theory of their application to the determination of the earth's figure, and an account of some of the principal observations hitherto made.—By Capt. J. P. Basevi, *R. E., 1st Assistant, Great Trigonometrical Survey of India.*

[Received 29th July, 1865.]

Whilst Lieut.-Colonel Walker, R. E., the Superintendent of the Trigonometrical Survey, was in England last year, General Sabine, the President of the Royal Society, solicited his attention to the importance of making a series of Pendulum observations at the stations of the Great Indian arc, of a similar nature to those made by Captain Kater at the stations of the English arc, and by himself, Captain Henry Foster and others in various parts of both the Northern and Southern hemispheres. Pendulum observations were made on the French arc by Arago, Biot and Mathieu early in this century; it is also the intention of the Russian Government to have them made at the principal stations of the Russian arc: moreover there is hardly an instance of the measure of an arc which has not been accompanied by such observations.

General Sabine offered to assist by placing at the disposal of the India Board the pendulums, clocks, and apparatus which he had employed in his own operations; and he added that, should the India Board desire any opinion from the Royal Society on the subject, he would assemble a Committee for the purpose.

Colonel Walker drew up a scheme and estimate of the probable expense, and submitted it with General Sabine's letter for the approval of the Secretary of State for India, who, acting on General Sabine's suggestion, requested the Royal Society to report on the plan of operations proposed by Colonel Walker.

The President accordingly called for opinions from several distinguished Fellows, viz. Professors Challis, W. H. Miller, Stokes, H. J. S. Smith, Dr. Robinson, Sir G. Everest, and Sir John Herschel; all in their replies were agreed on the scientific value of the operations, and

all, with the exception of Sir George Everest,* approved of the proposed plan of carrying them out; several made very valuable suggestions.

The Secretary of State in Council consequently sanctioned the experiments, and on Colonel Walker's recommendation he directed Captain Basevi, R. E., who was then in England on furlough, to proceed to Kew to learn the use of the Pendulum and apparatus, with the view of his conducting the experiments in India.

Before detailing the proposed operations, a sketch of the theory, and of what has hitherto been done in the way of Pendulum experiments, may be interesting. The application of Pendulum experiments to determine the figure of the earth, is based upon a theorem demonstrated by Clairaut, which may be stated thus, that the sum of the ellipticity† of the earth, and the fraction expressing the ratio of the whole increase of gravity to the equatorial gravity is a constant quantity, and is equal to $\frac{5}{2}$ of the ratio of the centrifugal force to the force of gravity at the equator. Hence by ascertaining the difference between the polar and equatorial gravity, or, which is the same thing, the progressive increase in the force of gravity in going from the equator towards the pole, the ellipticity of the earth is at once determined.

It is proved in mechanics that the forces of gravity, at any two stations on the earth's surface, are proportional to the lengths of the seconds Pendulum at those stations, or to the squares of the number of vibrations made by the same pendulum in any given time, one solar day for instance. Here is at once an easy means of determining the variations in the force of gravity, and the solution of the problem of the earth's ellipticity is reduced to the measure of the length of the seconds pendulum at a number of points on the earth's surface, or, as has been most generally done, to the observation of the number of oscillations made by the same pendulum in a mean solar day.

This theory, however, supposes the pendulum to be a "simple pendulum" that is, to consist of a material point suspended by a string without weight, which is, of course a practical impossibility; but as

* Sir G. Everest proposed to employ only the Pendulum of an astronomical clock, but this method is objectionable, as the Pendulum cannot be said to be acted on solely by gravity.

† The ellipticity or compression, as it is sometimes called, is the fraction whose numerator is the difference between the polar and equatorial semi-diameters, and the denominator is the equatorial semi-diameter.

it is always possible to calculate the length of the simple pendulum which would vibrate in the same time as a given compound pendulum, the latter may be used for precisely the same purpose as the former.

Besides this, there are several other conditions supposed to hold good, which in practice are never attained, viz. the arc of vibration has been assumed to be indefinitely small, the length of the pendulum to be constant, *i. e.* unaffected by temperature, and the oscillations made in vacuo and at the level of the sea. Corrections have therefore to be computed and applied to the observations, for each of these assumptions.

The time of vibration* in a circular arc is expressed in terms of the length of the pendulum, the force of gravity, and a series of ascending powers of the arc of vibration. The arc is always small, but still not so small that the terms depending on it can be wholly neglected; the first term, however, of the series is all that is ever appreciable in practice. Again, the observations are generally continued for a considerable time, and the change in the arc of vibration has to be taken into account. It has been shewn mathematically, on a certain supposition regarding the resistance of the air, and found to be the case practically, that the arc decreases in a geometric ratio, whilst the times increase in an arithmetic ratio, and on this principle the correction† to the observed time of oscillation is computed.

Secondly, a correction must be applied for the temperature of the pendulum: a change of temperature will, of course, by altering the length of the pendulum, affect the time of its vibration. This cor-

* $$t = \pi \sqrt{\frac{l}{g}} \left\{ 1 + \left(\frac{1}{2}\right)^2 \operatorname{Sin}^2 \frac{\alpha}{2} + \left(\frac{1.3}{2.4}\right)^2 \left(\operatorname{Sin}^2 \frac{\alpha}{2}\right)^2 + \ldots \right.$$

$$\left. \ldots\ldots \left(\frac{1.3.5.\ldots(2n-1)}{2.4.6 \ldots 2n}\right)^2 \left(\operatorname{Sin}^2 \frac{\alpha}{2}\right)^n \right\}$$

in which t = time of one oscillation.
π = semi-circumference of a circle whose radius is unity.
l = length of the Pendulum.
g = force of gravity.
α = arc of semi-vibration.

† The formula for this correction is

$$n \frac{M}{32} \frac{\operatorname{Sin}(A+\alpha) \operatorname{Sin}(A-\alpha)}{\operatorname{Log} \operatorname{Sin} A - \operatorname{Log} \operatorname{Sin} \alpha}$$ in which

n = number of oscillations made in a day; M = logarithmic modulus = 0.4342945; A the *initial*, and α the final semi-arcs of vibration. Correction always additive.

rection* must be determined experimentally. Captain Kater immersed his pendulum in fluids of different temperatures, and measured with a micrometric arrangement the alterations in its length. Captain (now General) Sabine observed the change in the number of vibrations made by a pendulum in different temperatures. This is the most direct method of obtaining the correction undoubtedly, but everything depends on the perfect compensation of the clock pendulum with which it is compared.

Thirdly, the formula is only true for observations in a vacuum, and as observations have generally been made in air, or at all events only in a partial vacuum, the effect of the air has to be taken into account. This effect is to diminish the weight of the pendulum by the weight of the air displaced, or to diminish the apparent force of gravity in the same proportion. In the very large majority of observations, the correction has been computed on this consideration solely; but Bessel demonstrated in 1828† that this correction was insufficient, inasmuch as a portion of the surrounding air was set in motion by, and moved with, the pendulum so as to become part of the moving mass. The correction for this can only be determined practically, as by swinging the pendulum in "media" of different densities. It depends chiefly on the form of the pendulum. As this correction, "reduction to a vacuum" or "buoyancy correction" as it is

* According to Kater's method—if τ be the standard temperature which is generally taken as 62° Fahrenheit; t the observed temperature of the pendulum; f its factor of expansion for 1° Fahrenheit, then correction $= \frac{1}{2}\ n.\ f.\ (t-\tau)$ positive when $t > \tau$.

† This circumstance was most clearly pointed out by the Chevalier du Buat in 1786, who made a number of experiments with pendulums formed of different substances, but his researches, which created a great sensation at the time, appear to have been completely lost sight of, and to have been unknown even to Borda, who was conducting his experiments, little more than ten years after the publication of Du Buat's results.

The *true* correction for buoyancy Mr. Baily has shown to be (Phil. Trans. 1832)

$C + \frac{\beta}{1 + .0023\ (t-32°)}$ where β is the height of Barometer, and t the temperature during the interval of observation. C is a *constant* for the *same pendulum* and is determined from the formula

$$C = \frac{N''-N'}{\beta'-\beta''}\ [1° + .0023\ (t°-32°)]$$ in which N' is the number of vibrations in a mean solar day, β' and t' the barometer and thermometer readings, *in air*; and $N,''\ \beta,''\ t''$ the same quantities in a *highly rarified medium* $t' = \frac{1}{2}\ (t° + t'')$

called, depends also on the state of the atmosphere, it is necessary for its calculation, to record the readings of the barometer, when the observations are taken in air.

The last correction is for the height of the station of observation above the mean sea level. The force of gravity varying inversely as the square of the distance from the earth's centre, a pendulum swung at a certain elevation above the sea, will make fewer oscillations in a day than at the level of the sea, and a correction has to be added on this account. Dr. Young, however, demonstrated that the correction computed on this consideration alone, was too large, as it neglected the attraction of the elevated mass itself, and he showed how this might be approximately allowed for.*

The general principle followed in determining the length of the seconds pendulum, is to observe the number of vibrations made by a pendulum of known length, in a mean solar day; then the length of the seconds pendulum is found by multiplying the length of the given pendulum, by the square of the number of its vibrations in a day, and dividing by the square of the number of seconds in a day.

The number of vibrations is generally determined by the method of coincidences. The detached pendulum is placed in front of a good clock, and adjusted to such a length as to gain or lose, (the latter generally) two beats upon the clock in some convenient time, 5 to 10 minutes. Suppose the pendulums to be started together, then the longer one of the two will be left behind by the other, the distance between them continually increasing, until at length they will be at opposite extremities of their arcs of vibration at the same moment: the longer pendulum has now lost one oscillation on the shorter one, and both are apparently going at the same rate, but in opposite directions; after a short time they will begin to approach each other, the distance between them gradually diminishing, until they both appear to coincide. It is clear that between two consecutive coincidences the

* This correction is given by the formula $\left(\frac{n}{r}\right) h\ x$, where n denotes the number of oscillations in a mean solar day, r the radius of the earth at the given station, h the height of the station above the mean level of the sea: x is an unknown quantity determinable from theory; on the assumption that the mean density of the earth is 5.5 and that of the surface 2.5 Dr. Young (Phil. Transactions 1819) showed that the correction for a station on a tract *of table* land would be reduced by $\frac{1}{3}$rd or that the correction $= \frac{2}{3}\ n\ h$.

longer pendulum will have lost two oscillations on the shorter one. Hence all that is requisite in practice, is to observe as accurately as possible the intervals between the successive coincidences; the number of vibrations made by the clock pendulum is determined by observations of the sun or stars, and then the number made by the detached pendulum is computed by simple proportion.*

The first pendulum observations of which any account is preserved are those made by Picard at Paris and Uranienburg (Tycho Brahe's observatory) and those by Richer at Cayenne in 1672. These last observations are said to have attracted Newton's attention, as they proved the variation in the length of the seconds pendulum in different latitudes, and it is generally stated that Richer made the discovery by accident. But it appears from Picard's address to the French academy in 1671, that a variation had been already observed, and it is probable that Richer's mission was undertaken partly with a view to throw light on the subject. Picard stated that "from observations made at London, Paris and Bologna, it would seem as if the seconds pendulum required to be shortened in approaching the equator, but that on the other hand, he is not sufficiently convinced of the accuracy of those measurements, because, at the Hague, the length of the seconds pendulum was found to be quite the same as at Paris, notwithstanding the difference of latitude."†

Near the end of the 18th century, Borda made his celebrated experiments for determining the length of the seconds pendulum at Paris. His apparatus, which is named after him, consisted of a spherical ball of platinum attached by grease to a brass cap which had been truly ground, so as to fit it perfectly. The object of this attachment was to enable the observer to turn the ball round in the cap at pleasure, so as to destroy the effects of unequal density in different parts of it. A fine wire carrying the cap was fastened to the lower end of a small cylinder, passing through the knife edge, which carried on its upper end a small moveable weight, by adjusting which the knife edge and cylinder could be made to vibrate independently in the same

* If r = daily rate of the clock and I the mean interval of the coincidences, then the number of oscillations made by the pendulum in a day = n

$$n = \frac{I-2}{I}\ (86400 \pm r)$$

the lower sign is to be used when the clock is *losing*.

† Cosmos Vol. IV. page 25, Sabine's translation.

time as the pendulum, so that their effect might be neglected in computing the length of the simple pendulum. When in use, the knife edge rested upon a steel plate. The number of vibrations per diem was ascertained by means of a clock, but Borda made a great improvement on the old method of *counting* the coincidences. He fixed a straight edge vertically, so as to coincide with the pendulum wire at rest, when seen through a telescope placed opposite. A cross was made on the bob of the clock pendulum, and the observation consisted in noting the times when the wire and cross disappeared together behind the edge. After a series of coincidences had been observed, the length of the pendulum was measured by means of a horizontal steel plate, which was screwed up from below, so as just to touch the ball: then the pendulum was removed, and a bar, whose length had been carefully compared with a standard, inserted in its place. The bar had a ⊤ head, of which the lower surface rested on the upper steel plate, and a graduated rod, sliding on the bar, was adjusted to contact with the lower plate. The diameter of the platinum ball was then measured by means of the same slider, by placing it on the steel plate for the purpose; the brass cap and wire were then weighed. The apparatus was enclosed in a glass case, and the temperature was carefully recorded. All necessary corrections were applied, excepting the true one for buoyancy. The whole process, which required very great delicacy, had to be repeated, and the length of the corresponding simple pendulum computed after each series of observations. Borda'a pendulum was about 12 feet in length.

His method was followed by M. M. Arago, Biot, and Chaix, at Formentera, the southernmost station of the French arc, with this exception that they used a pendulum of only 3 feet in length. These observations were extended by Biot in 1817 to Leith, and Unst in the Shetlands, and in conjunction with M. Mathieu, he observed at Dunkirk, Paris, Clermont, Bordeaux, and Figeac. From these operations, Biot deduced an ellipticity of $\frac{1}{304}$.

In about 1809, Captain Warren made some observations at the Madras observatory with a pendulum formed of a leaden ball suspended by a fibre made from the plantain leaf. The vibrations were counted and an assistant noted the times, from an astronomical clock. In order to measure its length, he attached some glass plates to a wall, and set

off on them a scale, transferred from Colonel Lambton's scale ; the length was then measured by a pair of beam compasses. The length of the seconds pendulum was found to be 39.0263 inches of this scale *in air*.

In 1818, Captain Kater published his determination of the length of the seconds pendulum in London at Mr. Browne's house, Portland Place, taken for the purpose of fixing the standard of English measures. His method was founded on the dynamical theorem due to Huyghens, that the centre of oscillation, and axis of suspension, are reciprocal in the same body ; that is, if the body be suspended at its centre of oscillation, the former axis of suspension will pass through the new centre of oscillation, and the body will vibrate in the same time as before. The distance from the axis of suspension to the point called centre of oscillation, is equal to the length of the simple pendulum.

Captain Kater's pendulum consisted of a bar of plate brass 1.6 inches broad and $\frac{1}{8}$th of an inch thick : two knife edges of the hardest steel, attached to solid pieces of brass, were fixed to the bar at a distance of rather more than 39 inches from each other ; when the pendulum was in use, these knife edges rested on horizontal planes of agate. At one end of the bar, immediately below the knife edge, was a large flat brass bob firmly soldered to it ; and on the bar, between the knife edges, were two sliding weights. The plan of operations was to observe the number of vibrations per diem, made by the pendulum when suspended, first, by one knife edge, and then by the other ; and if these numbers were not identical, to make them so, by means of the sliding weights. The distance between the knife edges, that is, the length of the corresponding simple pendulum, was then measured by a micrometric arrangement. The method of observing the number of vibrations was as follows ; to each extremity of the pendulum, a light deal tail-piece, well blackened, was attached ; and on the bob of the clock pendulum a white paper disc, equal in diameter to the breadth of the tail-piece, was fastened ; the detached pendulum was now placed in front of the clock, and both pendulums being at rest, a telescope was alined, so that the blackened tail-piece exactly covered the paper disc. The telescope was also fitted with a diaphragm, consisting of two perpendicular checks, which could be adjusted so as to

become tangents to the disc. Now, if both pendulums be set in motion, the detached pendulum vibrating slower than the clock one, the tail-piece will be seen to pass across the diaphragm, followed by the white disc; at each succeeding vibration the disc follows closer and closer, first touching it, and at last becoming completely eclipsed by it. The exact time of this event, called a "disappearance," is noted; after a few more vibrations, the disc will reappear *preceding* the tail-piece; the time of this event, called the "reappearance," is also noted; and the mean of the disappearance and reappearance is taken as the true time of coincidence. It is immaterial in this method of observation, whether the detached pendulum vibrates faster or slower than the clock pendulum, but it is a *sine quâ non* that its arc of vibration be less. The result, introducing all corrections, except the true one for buoyancy, was 39.13929 inches, which is still the received length, although General Sabine, in 1831, showed, by swinging the pendulum in air and in vacuo, that the buoyancy correction was different, according as the heavy weight was above, or below, the plane of suspension.

Captain Kater, in the following year, 1818, made a series of experiments at the principal stations of the English Survey, from Shanklin in the Isle of Wight, to Unst in the Shetlands. He used in these observations a pendulum of a different pattern, known as "Kater's invariable pendulum." With it, it is not possible, nor was it intended, to determine the length of the seconds' pendulum, but it is essentially a differential instrument, and is used for measuring the differences in the number of vibrations at different stations. With these differences, if at any one station the length of the seconds' pendulum has been already determined, the corresponding lengths at the other stations can be ascertained. The invariable pendulum is of the same dimensions as the convertible one, but is without the second knife edge, and tail-piece, and the sliding weights. The mode of observation is exactly the same. Captain Kater deduced values of the ellipticity, from consecutive pairs of stations; he considered $\frac{1}{304}$ as a probable value (the same as M. Biot's); but he remarks on the difficulty of deriving a satisfactory determination, unless the extreme stations comprise an arc of sufficient extent to render the effects of irregular local attraction insensible.

In 1821-22, some very good observations were made by Mr. Goldinghom, at Madras, and afterwards at a small island called Pulo Gaunsah Lout, lying nearly on the equator in East Longitude 98° 50′. The pendulum used was an invariable one, and observations were first taken with it in London, by Captain Kater. From the observations at Madras and London, Mr. Goldingham deduced an ellipticity of $\frac{1}{297}$.

Captain Basil Hall, assisted by Captain (then Lieutenant) Henry Foster, made a series of experiments with an invariable pendulum in 1820-23, at Galapagos, San Blas (Mexico), Rio Janeiro, and London (Mr. Browne's house). Comparing the results at each of his own stations, with each of Captain Kater's, he deduced ellipticities of $\frac{1}{285}$, $\frac{1}{314}$, and $\frac{1}{302}$.

In 1822, Sir Thomas Brisbane took with him to Paramatta (near Sydney,) an invariable pendulum that had previously been swung in London, at Mr. Browne's house. He deduced ellipticities of $\frac{1}{296}$ and $\frac{1}{304}$, comparing his observations with those of Kater in London and at Unst.

In 1817, the French Government fitted out a scientific expedition under the command of Captain Freycinet, who was furnished with three invariable brass pendulums, one of which was similar to Captain Kater's pattern, and the other two had solid cylindrical rods instead of a flat bar. He had also a fourth pendulum, with a wooden rod formed of two plates of deal firmly clamped together. Instead of a clock he used an astronomical counter, ("compteur astronomique") whose beats could be adjusted to synchronism with those of the pendulum. The counter had a dial, which showed hours, minutes, and seconds, so that by comparing the time shown by this "compteur" with that of a chronometer, he obtained the number of vibrations made by the pendulum in a certain interval, generally an hour or 40 minutes. The pendulums were first swung at Paris, and afterwards at Rio Janeiro, Mauritius, Guam (one of the Ladrone Islands), Mowi (one of the Sandwich Isles), Cape of Good Hope, Port Jackson, Ravak (an island under the line, north of New Guinea), and Malouine or Falkland Isles. Rejecting the determinations at the Mauritius, Guam and Mowi, as they appeared affected to a remarkable degree by local influences, Captain Freycinet deduced an ellipticity of $\frac{1}{289}$ from all four pendulums.

On the return of Captain Freycinet, the French government sent out another expedition under Captain Duperrey. He was supplied with two of Captain Freycinet's brass pendulums, viz. one with a cylindrical rod, and the one on Kater's principal. He observed at six stations, viz. Ascension, Mauritius, Port Jackson, Falkland Isles, Toulon, and Paris. In deducing the ellipticity, he combined his results with those of Freycinet only, and obtained values varying from $\frac{1}{266}$ to $\frac{1}{290}$.

During Ross's voyage to Baffin's Bay in 1818, some observations were taken at Brassa, in the Shetlands, and at Hare Island, with a clock fitted with an invariable pendulum vibrating on a knife edge, which rested on hollow agate cylinders. Observations were repeated at these stations, and a further set taken at Melville Island, on Captain Parry's first voyage to the North Pole in 1819-20. Captain Sabine conducted both these experiments, using the same instruments.

In 1822, the English Government sent out an expedition under Captain, now General, Sabine, for the purpose of extending the enquiry commenced by Captain Kater; for both Kater and Biot had come to the conclusion, from a discussion of the experiments, that no decisive result of the earth's ellipticity could be obtained from them, on account of the smallness of the comprised arc, and the variations of local density. Captain Sabine visited thirteen stations between Bahia, S. Lat. 12° 59′ to Spitzbergen N. Lat. 79° 50′. He had with him three pendulums of Kater's invariable pattern, which were all swung at each station. Besides these he had the two clocks and attached pendulums which he had already used on his arctic voyages. His method of observation was similar to Captain Kater's; all the pendulums were swung in London at Mr. Browne's house, both before and after the expedition.

The ellipticity deduced from the experiments at Captain Sabine's stations was $\frac{1}{288\cdot4}$, from the same combined with Kater's $\frac{1}{289\cdot5}$, and combined again with Biot's $\frac{1}{288\cdot6}$, and from a general combination of all of these, $\frac{1}{289\cdot1}$. The observations of the *detached* pendulums only were used in these determinations; for though the clock pendulums gave closely coinciding values of ellipticity, still being acted on by other forces than gravity, their results are less reliable, and are only valuable in so far as they afford an independent corroboration of the other results.

Captain Sabine was not at first aware of the strict expression for the reduction to a vacuum, but after the publication of Bessel's observations in 1828, he had an apparatus specially constructed, and ascertained the proper correction practically, by swinging his pendulums in air, and in vacuo.

The error from this cause, however, proved to be trifling, owing to his observations being strictly differential, so that only the differences between the corrections by the old and new formulæ entered.

The most widely differing buoyancy corrections at any of his or Captain Kater's stations of observation, computed by the old formula were + 5.75 vibrations at Sierra Leone, and + 6.27 vibrations at Spitzbergen, in a mean solar day. These corrections, multiplied by the proper factor, 1.65, to reduce them to the new formula, became + 9.52 and + 10.38 vibrations, so that the number of vibrations in a mean solar day at Sierra Leone required to be increased by (9.52—5.75) 3.77, and at Spitzbergen by (10.38—6.27) 4.11 vibrations. But the acceleration between the stations would only be *increased* by the difference between these numbers, or by 0.44 vibrations. It so happened, however, that even this difference was too large, for in the deduction of the temperature correction, the old buoyancy formula had of course been used; on applying a correction on this account, the above difference required to be *reduced* by 0.36 vibrations, so that the whole error on the acceleration of the pendulum between Sierra Leone and Spitzbergen was only + .08 vibrations.

Captain Sabine subsequently determined the difference in the number of vibrations made by an invariable pendulum between London and Paris, London and Greenwich, and London and Altona. He also determined the true buoyancy correction for Kater's convertible pendulum.

In 1825 M. Bessel made his experiments for determining the length of the seconds' pendulum at Königsberg, with an apparatus constructed and partly designed by Repsold, the celebrated artist of Hamburg. The apparatus was contrived so as to avoid any uncertainty in the centre of oscillation of the pendulum, as well as any error in the measure of its length, by observing the times of vibration of a pendulum ball suspended alternately by two wires, whose difference in length was known.

A toise was set upright on a narrow horizontal plane firmly fixed to a perpendicular iron bar, and the contrivance by which the pendulums were suspended could be placed either on the horizontal plane, or on the top of the toise itself, so that the effective lengths of the wires differed in the two cases by an amount exactly equal to the length of the toise. The wires, which were of steel, were attached to a thin strip of brass which unwound itself over a small cylinder. The pendulum, thus suspended, described the curve called the evolute of the circle. At the lower end of the iron bar there was a micrometer screw, for measuring small differences in the height of the ball.

The system of observation was as follows. At the commencement of a series of coincidences with the longer pendulum, the thermometers attached to the toise were recorded, and the reading of the lower surface of the ball was taken with the micrometer screw; the pendulum was then set in motion, and after a sufficient number of coincidences had been observed, the readings of the ball and thermometers were again taken. Exactly the same process was then gone through with the shorter pendulum: then, from the times of vibration of the two pendulums, whose absolute lengths were unknown, but whose difference in length was accurately known, the length of the seconds' pendulum was easily computed.* There were a great many minute details to b^e attended to, all of which were carried out with the greatest ingenuity and nicety, and all conceivable sources of error were considered, and their effects computed and allowed for.

The coincidences were observed in a slightly different way from any preceding method. The pendulum was enclosed in a wooden case, faced with glass to keep out currents of air, as well as to preserve as constant a temperature as possible; the clock was placed about $8\frac{1}{2}$

* Let t_1 & l_1 be times of vibration and length of longer pendulum.

t_2 l_2 „ „ „ shorter „

$l_1 - l_2$ = difference in length = a

L = length of seconds' pendulum.

Then $t_1^2 = \pi^2 \frac{l_1}{g}$, $t_2^2 = \pi^2 \frac{l_2}{g}$, $1 = \pi^2 \frac{L}{g}$

$$\therefore \frac{t_1^2}{t_2^2} = \frac{l_1}{l_2}, \frac{t_1^2 - t_2^2}{t_1^2} = \frac{l_1 - l_2}{l_1} \text{ or } \frac{l_1}{t_1^2} = \frac{a}{t_1^2 - t_2^2}$$

Again $\frac{1}{t_1^2} = \frac{L}{l_1}$ or $L = \frac{l_1}{t_1^2} = \frac{a}{t_1^2 - t_2^2}$

feet in front of the pendulum, and between the two, the object glass of a telescope was adjusted to form an image of the detached pendulum in the plane of the clock pendulum, to enable them both to be seen simultaneously through the observing telescope, which was set up at a distance of about 15 feet. On the wire of the detached pendulum was fixed a small brass cylinder, painted black and called the coincidence cylinder; it weighed something under 4 grains, and could be brought exactly opposite the scale for measuring the arc of vibration.

On this scale a black streak was painted, in the middle of which a space was left white, equal to the diameter of the coincidence cylinder, so that when the pendulum was at rest, the cylinder exactly covered it. Again, to the bottom of the clock pendulum a piece of blackened paper was attached, in which a hole had been cut of such a size that when both pendulums were at rest, it exactly coincided with the image of the white space on the black streak: hence when the pendulums were moving in coincidence, the coincidence cylinder was visible through the hole, and completely eclipsed the white space. Bessel's result was expressed in lines of the toise of Peru, the standard used in the measurement of the Peruvian arc.

In publishing these experiments, M. Bessel pointed out the true correction for buoyancy, which he had investigated by swinging in air two spheres of equal diameters, but of different densities, one being of brass and the other of ivory, suspended by a fine steel wire; and again by swinging the same brass sphere first in air and then in water. These experiments showed that the old formula for reducing observations in air to a vacuum gave too small a correction, and that it should be multiplied by a factor.

Mr. Francis Baily made a long series of experiments on the correction for buoyancy, which were published in the Philosophical Transactions for 1832. He used about 80 pendulums, all differing in form, weight, and mode of suspension. From these experiments he deduced factors for pendulums of almost every description that have ever been used, and computed also the weight of the air adhering to each, in other words deduced the *vibrating* specific* gravity of the

* "The vibrating specific gravity of a compound pendulum is *ordinarily* found "as follows; Let d', d'' d''' ...denote the distance of the centre of gravity of each "body respectively from the axis of suspension: w', w'', w''', ...the weight (in air) "of each body: s', s'', s''', ...the specific gravity of each body determined in the

pendulum. He concluded from all his results, that even if a pendulum is formed of materials having the same specific gravity, yet if it be not of an uniform shape throughout, each distinct portion must be made the subject of a separate computation, in order to determine the correct vibrating specific gravity of the whole body, since each part will be differently affected by the surrounding air.

The last extensive series of experiments were those taken in 1828-31 by Captain Henry Foster, who was sent out on a scientific mission by the Board of Admiralty. He took out with him four invariable pendulums of different metals, two of Captain Kater's pattern, and two of Baily's convertible pattern. These last consisted of a plain straight bar, 2 inches wide, $\frac{1}{2}$ inch thick, and 5 feet $2\frac{1}{2}$ inches long, having two knife edges 39.4 inches apart, but no heavy bob or sliding weights, as in Captain Kater's pattern; the synchronism was adjusted by filing away at one end of the bar. Baily's intention was, that the pendulum should either be used as two different invariable pendulums, or applied as a single convertible one for absolute determinations at any station. The objection to the form is, that both the knife edges must be exactly perpendicular to the bar, or error is entailed, as the bar is not flexible like Kater's. Captain Foster swung pendulums at all his stations, 14 in number, which were chiefly in the southern hemisphere. He made a set of observations at Mr. Browne's house before the voyage; on the return of the pendulums to England, they were again swung at the same place, but by Mr. Baily, Captain Foster having been most unfortunately drowned in the River Chagres, in February 1831, just as his mission was completed. His observations were reduced by Mr. Baily, who obtained from them an ellipticity of $\frac{1}{289 \cdot 5}$.

About this time the Russian government sent out an expedition under Captain Lütke, who used an invariable pendulum, formerly used by Captain Basil Hall. He swung it first at Greenwich, and afterwards at Ualan, in the Caroline islands, Guam, Bonin island (to the

"usual manner. Then will the required *vibrating* specific gravity of the pen-
"dulum be

$$S = \frac{w'\,d' + w''\,d'' + w'''\,d''' + \ldots}{\frac{w'\,d'}{s'} + \frac{w''\,d''}{s''} + \frac{w'''\,d'''}{s'''} + \ldots}\ ,,$$

(Philosophical Transactions, 1832.)

south-east of Japan), at Sitka in Russian North America, at Petropaulowski, Valparaiso, St. Helena, and St. Petersburg. He deduced an ellipticity of $\frac{1}{267}$ from his observations.

Schumacher, the celebrated astronomer of Altona, conducted in 1829-30 a series of experiments with Bessel's apparatus, at the castle of Guldenstein, in order to determine the Danish standard, which was to be a certain fractional part of the length of the seconds' pendulum, at the level of the sea, in latitude 45.° In order to estimate the influence of the air, he used, instead of a ball, a hollow cylinder of platinum, made by Repsold, inside which a second solid cylinder, also of platinum, fitted perfectly true. The outer cylinder was closed by covers of the same diameter screwing on to it, which were both perforated; the clamp holding the wire was fastened on to the top, and into the bottom was screwed a point with which the contact was made in measuring the height of the cylinder by the micrometer screw.

The pendulum was swung under four different circumstances, viz. the long pendulum, with and without the inner cylinder, and the short pendulum, also with and without it; and as exactly the same surface was exposed to the air in each case, the influence of it could be computed, which was done by a formula deduced by Bessel. The reduction of the observations was made by Professor Peters. One novelty was introduced, viz. that of computing out the attraction of the ground on which the observations were taken. A square space having a side of 600 toises (1279 yards), in the middle of which the observatory was situated, was subdivided again into 36 squares of 100 toises (213 yards) a side; in each of these borings were made, and specimens of the earth removed and their specific gravities determined; as these were very nearly the same, a mean of the whole was taken. The height of the floor of the pendulum room was $34\frac{1}{2}$ toises (220.6 feet) above the mean sea level, and the attraction of this plateau of the earth's crust introduced a change in the length of the second's pendulum of 0.000215 English inches.

Carlini, whilst measuring the Piedmontese arc in 1821-23, took a series of pendulum experiments at the Hospice on Mount Cenis, with the view of determining the density of the earth. His pendulum was formed of a heavy sphere suspended by a wire, which was attached to

a kind of inverted stirrup; in the part corresponding to the foot plate there was fixed a wheel with a sharp edge turning on its axis. This wheel was placed on a grooved plate and formed the knife edge for suspension; the arrangements for observing were similar to Bessel's. Corresponding observations, though not with the same apparatus, were taken by Biot and Mathien at Bordeaux. The result was a density of 4.95.

One more attempt to determine the density of the earth, by means of the pendulum, was made in 1854, by the Astronomer Royal, Professor Airy, at the Harton Colliery pit. Two invariable pendulums were set up in the same vertical line, one at the top, the other at the bottom of the pit; and their coincidences with the pendulums of two clocks were simultaneously observed, the relative rates of the clocks being determined by a galvanic apparatus. After each series of coincidences the pendulums were interchanged. The distance between the upper and lower pendulums was 1256 feet; a careful description of the intervening strata was prepared and specimens submitted to Professor W. H. Miller who determined their specific gravities. The acceleration of the seconds' pendulums below was 2.24 seconds per diem, and the resulting mean density of the earth was 6.565.

The best value of the earth's ellipticity as yet deduced from pendulum observations is undoubtedly that of Mr. Baily's. He combined all the observations taken with invariable pendulums, and after applying to them all corrections, obtained a mean ellipticity of $\frac{1}{289 \cdot 3}$. The latest value of the same, from geodetic observations, is Captain Clarke's R. E. which includes the new Russian arc and is $\frac{1}{294 \cdot 36}$. The ellipticity obtained from observations of precession and nutation is $\frac{1}{303 \cdot 3}$ (Airy's tracts).

The apparatus for the Indian experiments consists of two invariable pendulums on Kater's principle, a vacuum apparatus with air pump for exhausting, an astronomical clock by Shelton, a good battery of thermometers, and a transit instrument. Both pendulums have already done good service: one having been used by General Sabine in his extensive range of experiments, the other by Professor Airy in his Harton pit experiments; they cannot be considered, however, to have retained their original length, as their knife edges have been reground. Each is composed of a bar of plate brass 1.6 inches wide and rather less

than an $\frac{1}{8}$th of an inch thick; a strong cross piece of brass is rivetted and soldered to the top to hold the knife edge, which consists of a prism of very hard steel, passing through the bar and adjusted at right angles to its surface. The prism is equilateral in section, but the edge on which it vibrates is ground to an angle of about 120°; the length of the bar from knife edge to the extremity is about 5 feet $1\frac{1}{2}$ inches. At 3′ $2\frac{1}{4}$″ from the knife edge, a flat circular bob, also of brass nicely turned and pierced in the direction of its diameter, is firmly soldered on; the part of the bar beneath the weight, called the tail-piece, which is about 17″ in length, is reduced to a breadth of 0.7 of an inch and is varnished black, in order to contrast better with the white disc on the clock pendulum, in the observation of the coincidences.

The knife edges rest on agate planes set in a solid brass frame, which is provided with three levelling screws. On the outer side of each plane are Y's, which are moveable in a vertical direction by means of an eccentric; the knife edges rest in them when the pendulum is not in use, and by their means the observer is enabled to lower the pendulum down gently so as to bear always on the same parts of the agate planes. Each pendulum has its own set of planes, and will give different results, if swung on any others.

It has been decided to swing the Indian pendulums in vacuo, in order to secure the following advantages. When the pendulum has been set in motion, it will vibrate for a whole day; its temperature will be more equable; it will not be disturbed by currents of air; and errors in the formula for the correction for buoyancy are unimportant. The vacuum apparatus consists of a cylinder of sheet copper about 1 foot in diameter and rather more than 5 feet long, with hemispherical caps, the upper one of glass and moveable, the lower one of sheet copper and soldered to the cylinder. The upper end of the cylinder carries a strong brass plate, to which are attached the frames containing the agate planes and a bar of the same metal and shape as the pendulums; placed side by side with a pendulum inside the apparatus, the bar and pendulum will be of the same temperature, and it is evident that thermometers attached to the former will give the required temperature of the latter. Two delicate thermometers are attached to the bar, their bulbs being sunk in the metal at points

equidistant from each other and the ends of the bar. The stem of the upper thermometer is inverted, and placed side by side with that of the lower thermometer, in order that they may both be viewed through a moderate sized glass plate let into the cylinder. In the lower part of the cylinder there are four other windows, two on the line of the pendulums, to enable their coincidences to be observed; the other two at right angles to these, to give additional light and enable the observer to ascertain whether the detached pendulum is vibrating truly without wabble. There are two scales fixed at right angles to each other, inside the cylinder, on a level with these windows, one of which is used for measuring the arc of vibration of the pendulum, and the other to measure the distance of the pendulum from the former scale, which is necessary to furnish the correction for parallax in the readings of the arc of vibration: it is useful also in placing the pendulum at a constant distance from the clock, which is found convenient in practice.

The upper 4″ of the cylinder is made of greater thickness than the rest, and at the top is a strong projecting flange which is intended to rest on a strong cast iron frame made in two pieces, so as to grip the cylinder round the thicker part just below the flange; the halves of the frame are then firmly bolted together with nuts and screws. The upper surface of the flange is ground perfectly true to receive a bell glass, the cap already mentioned, which is like the receiver of an ordinary air-pump. The eccentric for raising and lowering the pendulum on to the agate planes passes through a stuffing box in the upper part of the cylinder. Motion is imparted to the pendulums by means of a fork and crutch turned by a spindle which passes through another stuffing box.

The clock with which the vibrations are compared is firmly secured to a wall, and the vacuum apparatus is erected in front, at a distance of about 2 feet from it. The diaphragm for limiting the view of the disc is fitted inside the clock case.

The telescope, for observing the coincidences, is placed on a small masonry pier, at a distance of about 8 feet from the vacuum apparatus, and is mounted so as to slide laterally on a graduated horizontal bar; it has also a slight vertical motion. The thermometers and barometers are read from alongside of this pillar by means of a cathetometer, viz.

a telescope sliding up and down on a vertical rod. The object of this is to obviate the ill effects of any defect in the isolation of the apparatus, as well as the influence of the observer's person on the thermometers.

As the disc on the bob of the clock and the tail-piece of the detached pendulum are too far apart to be viewed simultaneously by the telescope, a lens is placed between them, so as to throw the image of the white disc upon the tail-piece of the pendulum. The vacuum cylinder and all its adjuncts, air-pump, &c. were made by Adie, and are the only new portions of the apparatus.

The method of operation is as follows. After setting up the clock, the vacuum apparatus is inserted in the iron frame and suspended either on wooden trestles or masonry piers; the frame is roughly levelled; the temperature bar is fixed in position; the agate planes are screwed on firmly to their bed plate, and are very carefully levelled by means of delicate spirit levels provided for the purpose. A pendulum is now inserted and let down upon its planes, but the clock must not yet be set in motion. The telescope is next set up on the prolongation of the line which passes through the two pendulums, when both are at rest. For this purpose it is moved laterally on its graduated support, until a very small portion of the paper disc, on the bob of the clock pendulum, is visible on one side of the tail-piece of the detached pendulum. The reading is noted, and the telescope is then moved in the opposite direction, until an equal portion of the disc is visible on the other side of the tail-piece; the reading is again noted and the telescope is set to the mean position. The pendulum is then removed, and the diaphragm in the clock case adjusted, until its cheeks are tangents to the disc. The pendulum may now be replaced, and nothing remains to be done but to exhaust the air out of the apparatus and to set the pendulum in motion.

The observations are made in exactly the same way as already described in the account of Captain Kater's apparatus; the times of the disappearance and reappearance are both noted, and the mean taken as the true time of coincidence. The arc of vibration is then determined by noting the reading of the arc, when it is cut by the same edge of the tail-piece on each side of the vertical line. The thermometers and barometer are read by means of the cathetometer. It is usual to

observe not every coincidence, but the first three consecutive coincidences, and than the 11th, 12th, 13th, then the 21st, 22nd, 23rd, and so on; after observing the first two or three, the times of the after coincidences can be easily computed with sufficient accuracy to intimate when the observer should be ready to note them.

It is intended to have observations made generally along the Great Arc at stations 2″ apart in latitude, and at other points where it may be desirable to obtain data regarding local variations in the intensity of gravity.

The pendulum experiments in this country will afford an independent value of the ellipticity of the Indian arc. It is also hoped that they will throw some light on the existing discordances between the astronomical and geodetic latitudes of the Indian survey.

The amount of the deflections of the plumb line, due to the Himalayas and elevated table lands to the north of India, have been computed by Archdeacon Pratt for the different terminal stations of the Indian arcs; but these determinations are so much in excess of the results of the survey, that it is evident that the effects of the mountain attraction must be in a considerable degree compensated, either by a deficiency of density in the strata to the north, or by an excess of density in the strata to the south of the survey stations.

Now, the pendulum can undoubtedly be made the means of showing whether the compensation is to be attributed to either of these causes; for, whilst the effect of a distant range of mountains on the vibrations would be quite inappreciable, any local variation in the density of the underlying strata would show itself most unmistakably; so that by taking observations both at a normal station, and at a few points in its vicinity symmetrically situated around it, should there be any considerable excess or defect in the density of the strata to counteract the disturbance due to the mountain mass, the pendulum observations would not fail to point it out.*

* Professer Stokes remarks in his letter on these operations: "The pendu-
"lum no doubt indicates only the vertical component of the disturbing force,
"whereas it is the *horizontal component in the plane of the meridian* that affects
"the measures of arcs; at any one station, of course, a horizontal disturbance
"may exist without a vertical disturbance, and vice versâ; but in a *system* of
"stations disturbances of the one kind must necessarily be accompanied by dis-
"turbances of the other kind. Indeed, it is theoretically possible, from the ver-
"tical disturbances, supposed to be known, *actually to calculate* the horizontal
"diturbances, and that without assuming anything beyond the law of universal

The Indian operations will eventually be combined with those taken previously with similar instruments in other parts of the world, to deduce the ellipticity of the earth's mean figure. Both Sir John Herschel and Professor Stokes have remarked, in their letters on the proposed Indian operations, that almost all observations hitherto made have been taken at stations either on islands or coasts, so that a series along the centre of a continent is very much needed. A complete set of observations has been already taken at the Kew observatory by Mr. B. Loewy, with the Indian apparatus; and on the completion of the experiments in this country it will be returned to Kew, in order that final observations may be taken, to show whether the pendulums have undergone any change in the interim.

It is to be hoped, however, that so good an opportunity will not be lost of extending these observations to stations easily accessible from India, though not included within its limits. On this head Professor Miller's opinion may be quoted at length, "Much would be added to the value of the observations made at the stations of the Indian survey, if, before the pendulums were brought back to England, observations could to be made with them at some other points, especially points nearer to the equator, such, for instance, as the south coast of Ceylon, Singapore, or on the coast of Borneo. Another accessible point, interesting from being in a long line of depression, where a large gravitation might be expected, is Aden."

The intention of the Russian government, to have similar observations made along the Russian arc, has already been alluded to. If, after the return of the pendulums to England, they were to be swung at one of the Russian stations, it will be possible to combine the Russian with the Indian operations, and deduce a value of the earth's ellipticity from exclusively Continental observations, extending from cape Comorin to the northernmost part of Finmark.

"gravitation. Actually to carry this out, would probably require observations "to be made at stations more numerous than can be thought of, but the fact of "its possibility shows how severe a check pendulum observations are capable of "exercising on the results of geodetic observations."

Notes on a collection of Land and Freshwater Shells from the Shan States.—Collected by F. Fedden, *Esq.*, 1864-65.—*By* W. Theobald, *Junior, Esq.*

[Received 17th July, 1865.]

Mr. Fedden having kindly placed in my hands for examination a small collection of shells from the Shan states, I am led to offer the following brief remarks, though I have not the requisite time at my disposal at present, to describe the many novelties which the collection contains, most of which, however, Mr. Benson will shortly describe in the Annals of Natural History. Although the condition of many of the specimens is very poor, for purposes of describing specific characters, and many species are represented by a single individual, still the collection affords conclusive evidence of the great richness in terrestrial mollusca of the region where it was made, and interesting proof of the distribution of some shells, hitherto rather scarce in Indian collections.

Fam. Melaniadæ.

1. 1 *Melania tuberculata*, Mull. Species.
   Large and fine ... 1.90 × 0.60.
2. 2 *M. variabilis* ... Common. Melania, 2.
   Of this melania there are five marked varieties, some of which could doubtless be separated specifically by many systematists.
3. 1 *Glabra*. A smooth var. from the tepid springs of Nam-moo. This var., in common with all the others, has the apex but little eroded, and differs but little from the ordinary smooth var. found in Pegu and Bengal.

An average specimen measures 2.00 × 0.75, the measurement being taken along the long axis of the shell, and the transverse diameter of the last whorl.

2*nd*. *Vittata*. This var. is also smooth, but with more convex whorls than the last. The shell too is paler, with a dark median stripe becoming obsolete on the last whorls, but well marked on the earlier ones. Average size 2.00 × 0.75.

3*rd*. *Turrita*. A black turrited var. sometimes slightly eroded at the extreme apex, and with the whorls ornamented with two or more,

usually three, series of prominent tubercles, ranged in symmetrical spiral order with four non-tubercular spiral keels on the last whorl towards the mouth. The tubercles form oblique transverse ribs, but the ribs are a subordinate feature to the spiral ornamentation. 2.00 × 0.75.

4*th*. *Pyramidalis*. Ornamentation like the last var. but form very squat, with rapidly increasing whorls. The shell is slightly cœrulescent, with four dark brown stripes visible in the interior, corresponding with the spiral keels outside. Columella slightly yellowish, apex but little eroded. 1.90 × 0.85.

Grotto in Nam-mah stream.

2*nd*. *Baccifera*. This var. is intermediate in its character between vars. 2 and 3. Its whorls are ornamented with four or five rows of beaded keels, the transverse ribbing being often well marked likewise. Most of the specimens were dead shells. 1.90 × 0.75.

It is noteworthy that the ordinary type of *M. variabilis*, or the huge specimens of the race met with in the Arakan hills, are not represented in the collection, though the abundance of calcareous rocks and calc tuff would, *primâ facie*, lead us to expect shells of similar, if not greater, dimensions. Climate and a lower average temperature of the streams in the Shan country may possibly explain the small size *M. variabilis* there attains, since I have a Maulmein shell which measures 4.00 × 1.30, and Arakan specimens not rarely attain (decollated shells). 3.00 × 1.30.

3. 1 *Paludomus*.

A single specimen of a large paludomus, which I have not yet identified, occurred in the collection.

Fam. Paludinidæ.

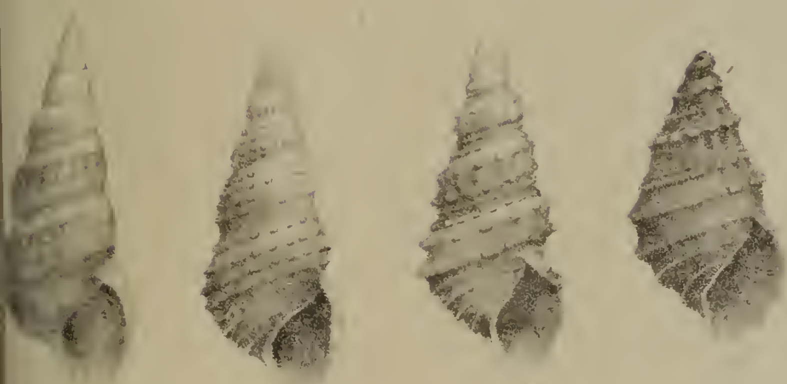
4. 1 *Paludina naticordes*, n. s.

Two marked varieties of this shell occur. A smooth one with one, two or three filiform keels, and a strongly keeled var. with prominent, rugose keels. The species is probably undescribed and may be thus characterised.

P. naticordes, Th.—Testâ turbinatâ, sub-politâ, solidâ, pallide flavescente corneâ ad peripheriam carinâ munita; marginibus callo junctis, callo columellari non raro valde incrassato, umbilicum obtegente.

Varietas fasciata, fasciis duabus castaneis ornatur, hâc superperipheriali, illâ juxta suturam positâ. Anfractu ultimo tertia notest a carinâ

1 Paludina naticoides [illegible] var fasciata.
2 3. d° d° var carinata.



4 5

4 Melania variabilis [illegible]
5 d° d° var [illegible]
6 d° d° var [illegible]
7 d° d° var [illegible]

DRAWN BY T. W. TURNER AND ON STONE BY KRIS [illegible]

LITH: BY H. M. SMITH, S. G. O. CALCUTTA NOV: 1865.

paulum remota. Callo flavescente, ore interiori cœrulescente. Anfractibus $6\frac{1}{2}$. 1.45 × 1.10

Var. carinata, Carinis quatuor fortissimis supra munitur, et infra peripheriam sex vel quinque lævioribus; colore albido; epidermide flavescente; fasciis nonnullis castaneis interdum ornata. 1.40 × 1.00.

These two varieties pass into each other, but the peculiar columellar callus is pretty constant in all specimens. But for this character, some of the smooth variety might be referred to *P. Bengalensis*, which is an extremely variable species.

The strongly corded var. is well marked, but I have preferred taking the smooth shell as the type of the species, and have regarded the keeled individuals as hypertrophied, placing the greatest value, as a specific character, on the columellar callus, occurring in both varieties.

2. *P. melanostoma.* *Paludina*..... 2.

1. *Bithinia nassa*, n. s.

Testâ elongatâ, turbinatâ, politâ, diaphanâ, solidiusculâ. Labio expansiusculo, plicâ callosâ externâ munitâ. Anfractibus quinque. 0.45 × 0.25.

This is the only species of *Bithinia* in the collection, and it is well characterised by the strong rib-like fold strengthening the lip outside, somewhat as in "nassa."

1. *Ampullaria, sp.*

A small species similar to that found at Maulmein, but distinct from the smaller species met with in the Arakan hills.

An ordinary specimen measures, 1.75. Aperture 1.25. A very large specimen of the Arakan species. 1.45. Aperture 0.95.

Fam. Helicidæ.

Of Helices of all sections, the collection comprises twenty-three species, nearly one half of which seem undescribed.

1. *Helix, n. s.*

A large dextral species of six whorls partaking the characters of *H. interrupta* and *H. semidecussata*, but very distinct from either. All the specimens are unfortunately dead shells. Lat. 1.55 × Alt. 0.75.

2. *H. Blanfordi, Th.*

This species was originally founded on a single shell from Darjiling in my cabinet, which, from its sculpture, I had no hesitation in separat-

ing from its nearest ally *H. cycloplax*. It appears to be a common shell in ths Shan states, though not so in the Eastern Himalayas, but all the specimens are dead shells. They agree well with the type, though a trifle larger and more convex.

3. *Helix ansorinus*, n. s. (MSS.)

A very marked form, but all the shells dead ones.

The sculpture is very ornate and well marked. Shape somewhat as in *H. Peguensis*. 1.20 × 0.60.

4. *H. delibrata*, B.
5. *H.* .....
6. *H.* .....
7. *H.* .....
8. *H.* ..... (approaches *H. Guerini*).
9. *H. sanis*, B.

Though a trifle larger than the type, I can see no sufficient reason for separating this from the Andaman shell. A few dead specimens only are contained in the collection.

10. *H. infula*, B. one or two specimens.
11. *H. attegia*, B. one specimen.
12. *H.* .....
13. *H.* .....
14. *H.* .....
15. *H. similaris*, Fer. *var.*

This shell is somewhat variable. It is usually banded, but occasionally the band is obsolete. It tends to unite *H. Zoroaster*, Th. and *H. bolus*, B., closely approaching the former, but being less depressed and more tumid, though not so globose as the smaller sized *H. bolus*, B. 0.75 × 0.40. Another variety occurs which might be ranked as a large *H. Zoroaster*, Th., but it is not larger than the type of that shell, bnt shows a tendency to approach *H. delibrata*, B. in form and expanded peristome. 0.80 × 0.40.

16. *H. Oldhami*, B.

A little larger than the type which was from near Ava.

17. *H. Huttoni*, Pf.

A single specimen of this widely spread species was in the collection.

18. *H. Arakanensis*, Th. A single specimen of this shell also accompanied the last, a trifle flatter that the type.

19. *H.* ..... *Helix*, ... 19

1. *Plectopylis*,..... sp. *Plectopylis*, ... 1

A described species, but not identified with certainty.

1. *Nanina vitrinoides.*

Abundant.

2. *N. consepta*, B. *Nanina*, ... 3

Closer armed and one more whorl than the type, which was from near Maulmein.

3. *N.* .....

1. *Streptaxis Birmanica*, Th.

The variety wanting the marginal tooth.

2. *S. Blanfordi*, Th. Three specimens, ... 2

1. *Vitrina* (*Cryptosonea*, Th.) *præstans*, Gould.

Tolerably common.

2. *V.* ....

Type as the last. A small species of the same, ... 2

1. *Bulimus Sinensis.*

A single specimen of this species which is tolerably common in the Pegu forests.

2. *B.* ..... of the "*Gracilis*" type, common, with deciduous epidermis.

3. *B.* ..... ditto, common.

4. *B. gracilis*,..... common.

5. *B.* .....

6. *B. Niligiricus.*

The occurrence of this shell is very interesting. It has eight whorls and differs slightly from the type, but not to a greater degree than Nilghiri specimens do from one another. *Bulimus*, ... 6

Achatina...four species.

A. .....

A. .....

A. .....

All of the ordinary Indian type. *Achatina*, ... 4

Pupa.....In species with new.

P. .....n. s. *Pupa*, ... 2

1. *Clausilia*, a large species, not rare.

2. *C.* ..... a small species, rather rare.

3. *C.* ..... a larger species, common.

All three seem new species. *Clausilia*, ... 3

Fam. Limnæidæ.

Lymnæa, a small species, *Lymnæa*, ... 1

Planorbis Coromandelianus, Fab.

Very common, rather small *Planorbis*, ... 1

Fam. Diplommatinidæ.

Diplommatina, five species.

As far as a cursory examination enables me to judge, all five seem undescribed: two are sinistral, the others dextral shells.

Diplommatina,... 4

Fam. Cyclostomidæ.

1. *Pterocyclos.*

Probably a new species. Of the type of *P. pullatus*, B., but three-fourths larger.

2. *P. insignis*, n. s.

Formâ typicâ. Testâ albidâ; epidermide flavescente sive castaneâ, deciduâ vestitâ, castaneo-fasciatâ. Peristomate duplici, antice valde expanso. Operculo intus concavo, extra planiusculo, margine valde radiate hirsuto. Lat. 1.20. Lat. oris intus 0.65.

This handsome shell seems tolerably abundant.

Pterocyclos, ... 2

1. *Cyclophorus speciosus*, Phil.

A common species, specimens of medium size.

2. *C. cornu-venatorium*, Sow.

A single specimen occurs in the collection, rather more tumid than Ava specimens.

3. *C.* n. s.

A distinct but not very well defined species, approaching near to *C. excellens*, but wanting the funiculate keel of that species. Only a few dead shells were collected.

4. *C.* n. s.

A single broken specimen, but evidently a new species, recalling in form *C. involvulus*, only larger, and for its size a lighter shell.

5. *C.* n. s. a very minute shell, smaller than *C. Scissimargo.*

Cyclophorus, ... 5

1. *Pupina arula*, B. Two specimens.
2. *P. artata*, B. Two specimens. *Pupina*, ... 2
1. *Alycæus*, n. s. type of *A. Ingrami*, Bl.
2. *A.* n. s. type of *plectocheilus*, B.
3. *A.*
4. *A.*
5. *A. amphora*, B. Two small specimens.
6. *A.* *Alycæus*, ... 6
1. *Pomatias*, n. s.
2. *P.* n. s. near *P. Peguense*, but with more convex whorls.
Pomatias, ... 2

CONCHIFERA.

Fam. Unionidæ.

1. *Unio cæruleus.* Very fine.
2. *U. marginalis.* Fine.
3. Sp. fine. *Unio*, ... 3

One specimen occurs of a unio, remarkable for having two rounded osculating teeth, one in each valve, very near the anterior end. These teeth are smooth and apposed without interlocking. The species is also found in the Pegu Yoma hill streams.

Fam. Cycladidæ.

1. *Corbicula* ..... Common.

A small species with yellowish epidermis. *Corbicula*,..... 1

Genera 24, species 77.

Scientific Intelligence.

London, Sept. 17, 1865.

My dear Grote,

As you will doubtless print much of my last letter, I will add a few more items of intelligence concerning matters ornithological, as I have still been steadily engaged in my commentary on Jerdon's work. This has now grown so extensive that I have divided it into four parts, which will probably spread over the *Ibis* for next year. The first three, treating respectively of Jerdon's three volumes, and the fourth, of Ceylon birds, not included by him, and a final tabular expo-

sition of the *Ornis* of the Indian special province of the Indian region. This I divide into 24 districts, and give one to four asterisks to each square, according to the amount of commonness of the species, and a cross where I regard it only as a casual straggler. So that considerable information is conveyed at a glance. I next take up the *Indo-Chinese* or *Ultra-Indian* province, for which I have a fair amount of material. You will have received from Col. Phayre a short note from me respecting the middle-sized Indian Cormorant and one of the Ring-plovers. I now tell you about them more in detail. No. 1006 of Jerdon will stand as *G. fuscicollis*, Stephens: Syn. *sulcirostris*, Brandt (figured in Gould's *B. Austr.)*, *sulcirostris et stictocephalus*, Bonap., *leucogaster*, Meyer (apud Jerdon), *leucotis*, Blyth, *albiventer*, Tickell and *purpuragula*, Peale,—*Sinensis* (apud Jerdon), *G. K. Gray*, *cat. of Nipalese birds*, Jerdon,—a somewhat formidable array of synonyms. Also, one common small Cormorant is the true *pygmœus* of Pallas. Next, about the Ring-plovers. No. 849. This is, as I mentioned, *Æ. curonicus*, (Beseke), *minor*, Meyer, and *Indicus*, Latham: distinct from *Æ. philippensis*, (Scop.), which is a species intermediate to *Æ. curonicus* and *Æ. cantianus*, obtained by Wallace in Borneo, *Æ. philippensis* in nuptial dress, has the usual white forehead surmounted by a black band, also a black loral streak and auriculars in part; crown rufescent-brown with a more rufous periphery; some black behind the nuchal collar above; the black pectoral streak narrow or interrupted in front; and the tail unbanded, with the outermost three feathers white; legs pale in the dry specimens: length of wing 4 inch; of tarse $1\frac{1}{8}$ inch. It should be looked for in S. India. Of No. 850, there are two specimens in the India museum, one of which is the *philippensis* of Sykes's list. After learning of the distinctness of *philippensis* from *curonicus*, I re-examined Horsfield's type specimen of his *pusillus;* and though in bad condition, especially about the nape, I now recognise it as distinct. It is in winter dress, and has not the white collar seen at all seasons in others of the present group. As compared with *curonicus*, the tail is more cuneated, with the dark band considerably less developed, shewing only as a narrow cross stripe on the outermost feathers. Perhaps it is *Ch. Peronii*, Sany., the description of which I have not yet seen. It should also be looked for in S. India. Jerdon omits to include the *Ch. nigrifrons*, (Cuv.), v.

melanops, (Vt.), his *russatus*, an Australian species, of which he obtained a single specimen near Madras in the month of June (*i. e.* during the southern winter), and which is now in the Society's museum: of course an exceedingly rare and accidental straggler. The Indian *Neophron* turns out to be distinct and new, *N. orientalis*, nobis. It is not the *Vultur meleagris* of Pallas, which he describes as a rarity in the Taurian Chersonesus, and which is the black-billed *N. percnopterus*. Four of our rarest *Falconidæ* I have made out to be Japanese species, all priorly named by us 'insulars.' 1. *Accipiter nisoides*, nobis (*gularis*, Schl., of which he notes a specimen from Nipál!)—2. *Buteo aquilinus* (*v. leucocephala*), Hodgson (*hemilasius*, Schl.),—3. *B. plumipes*, H. (*Japonicus*, Schl.),—and 4. *Poliornis pygmæus* (*Buteo pygmæus*, nobis, *B. pyrrhogmys*, Schl.), of which Helfer obtained a specimen in the Tenasserim provinces. *Athene castanotus*, nobis, of Ceylon, is recognised as distinct, from *castanopterus* of Java by Schlegel. Jerdon's No. 145 is not *Tockus gingalensis* (*verus*), but *T. griseus* (*Buceros griseus*, Latham, *B. cinereaceus*, Sem.), as distinguished from *T. gingalensis* of Ceylon, which, together with the other, inhabits that island. The two were discriminated by Layard (*Ann. Mag. N. H.* 1854, XIII, 260), though he describes both under *cingalensis*; and he also indicates a second *Hydrocissa* (akin to *H. albirostris* and *H. conoisus*) as inhabiting the mountains of Ceylon. *Spilornis bacha* inhabits Ceylon in addition to *Sp. cheela*; and the *Pardalotus pipra* of Lesson is a second Cinghalese *Prionochilus* (seu *Piprisoma*) unknown to Layard. The large crimson *Chrysocolaptes* of Ceylon will rank as *C. Stricklandi* (Layard, v. *carlotta*, Malherbe), erroneously figured by Jerdon in his *Ill. Ind. Orn.* as *Brachypternus Ceylonus!* No. 197 should be *Megalaima Hodgsoni*, Bonap, of N. E. India and the whole Indo-Chinese provinces, as far at least as Cambojia; where the species is mistaken by Schlegel for the Javanese *corvina*, which is wholly unknown in those parts: and *M. viridis* (apud Schlegel), of Java is quite distinct from *M. viridis* (*verus*) o S. India, and is probably the true *lineata*, Vt., as Schlegel himself suggests. He also recognises the identity of No. 42 with the *leucorypha* of Pallas. The latter holds just the same relationship to *H. rustica*, which *H. hyperythra* (of Ceylon) holds to *H. Daurica*; also *Falco rulen* apud Schlegel (the *Shâhia*) to *F. peregrinus*,

Hypotriorchis severus to *H. Subbuteo*, *Tinnunculus rupicolus* (of Africa) to *T. Alaudarius*, and *Athene castanotus* (of Ceylon) to *A. radiatus*. In all these cases the deeper coloured bird is more subtropical, less migratory (or even permanently resident), and does not visit temperate latitudes. Schlegel, with much probability, refers *F. perigrinator*, Sundevall, to *F. macropus*, Swainson (v. *melanogenys*, Gould), the Australian Falcon which occurs in the Malayan province. I think I mentioned that I found a fine female *Falco Babylonicus* in the Worcester Museum; and this is probably the 'Red-naped Falcon,' *F. peregrinoides* apud G. K. Gray, of his Catalogue of the Birds of Nepál. The specimen in Worcester is like an adult female Peregrine, only much paler, with all the markings considerably less developed; nape light cinnamon-rufous marked with dusky; the moustachial streak small; the upper parts cross-banded as in adult Peregrines: this rare Falcon belonging to the Peregrine subgroup, as distinguished from that of the Sakir, Lanan, and Lugger. About *Turnix*, I stated (*in Ibis*, 1865, p. 33) that *Ortygis luzoniensis* of Horsfield's list of Javanese birds was the species I now recognise as *T. tanki* (B. Ham., v. *joudera*, Hodgson); and such a distribution rather puzzled me, as I knew no instance of *T. tanki* out of India proper. It is, however, of a nearly allied but smaller species proper to the Malayan province, described by Wallace from Timor as *T. rufescens*. Thus are here three allied species, *T. maculosus* in the Indo-Chinese province with China, *T. tanki* in the Indian special province, and *T. rufescens* in the Malayan province. The proper name for the Indian Curlew will be *Numenius lineatus*, Cuv.: Syn. *N. Major*, Schlegel.

D. G. Elliot of New York was here the other day, and picked up a few new *Polyplectrons* from Cochin China at Paris. He is about to bring out the *Phasianidæ* in grand style, from drawings by Wolf, some already made, and which you would most heartily admire.

Now for some intelligence about what is doing in the Zoological Gardens, Regent's Park. There are *two* small female African elephants now in London, one of which is safe in the Zoological Gardens. Also a pair of the superb *Gazella Dama*. A fine healthy *Buceros Abyssinicus* (*Abba Gumba* of Appendix to Bruce's Travels), the long-legged ground Hornbill, a most curious kind, which stalks about in a style that would puzzle you altogether to make out

what it was, if you were to see it stepping about at a distance. Emphatically a snake-devourer. Two young Wapitis came to light this week, the daughters of the fine Californian buck! A lot of *Ammoperdix Heyi*; and different species of *Pterocles*. *Pt. alchata* (I may have told you) has bred, and I saw the newly hatched chick, *præcox* of course, but inactive, from the shortness of its legs. The *Felis macroceles* and two *Ursus Malayanus* which I brought doing well. A pair of common house Mainas at last; and I wish I could see a pair of common Indian crows, and the two common Indian vultures, *Gyps indicus* and *G. bengalensis*. Although the temperature has been extraordinarily high all this September, and people are panting and languishing as if they were in Sierra Leone, I observe with interest and considerable surprise that the Arctic Foxes are rapidly re-assuming their white winter coat! I hear of some extraordinary discoveries up one of the great tributaries of the Amazons, where the few scattered human inhabitants had never before been visited, and were unacquainted with the use of metal, using stone implements; and the animals quite tame and unscared by man—herds of Tapirs, which would allow their coats to be rubbed by a stick and enjoyed the titillation. I just lost a fine thing the other day at Stephens's auction, a splendid skull of *Bubalus brachyceros* had been knocked down for eight shillings; and the purchaser would not part with it. You would otherwise have had it.

P. S.—I have been thinking that you would do well to re-publish my commentary on Jerdon's Birds of India, if you could get Jerdon himself to annotate it, and thus afford him a convenient opportunity, of making known all that he may have to add, in order to complete our information on the subject up to the date of publication in the J. A. S. I much wish to know how his book has sold, and also what progress he is making with the other classes of vertebrata. *N. B. Felis rubiginosa* of the Coromandel Coast extends to Ceylon (Cinghalese specimen in Belfast Museum); and my Cinghalese *Sciurus Layardi* is in the Worcester Museum from Malabar, sent (with *Presbytis Johnii*, *verus*, &c.) by R. Cole of Madras. Also, in the Worcester Museum, a fine adult female of the rare *Falco Babylonicus*, alleged to be from Java, which I do not believe. I have seen a kitten of my *Felis Jerdoni* from Malabar, and I have little doubt that this jungle-cat there takes the place of *F. rubiginosa* of the Coromandel side of

the Peninsula. I add a list of *desiderata* for the Zoological Gardens. You may smile at my enumerating common Vultures, Kites and Crows, Frogs and Toads; but these are just what are wanted—what nobody thinks of sending. The *Batrachia* might be sent in damp jars, and would endure the voyage without food, though cockroaches might be given to them if available. *N. B.* There are Australian *Rallidæ* and Pelicans in the Zoological Gardens; also *Varanidæ*, *Scincidæ*, and Snakes. Why not also *Indian?* and operculated Shells (sent with opercle closed) as *Ampullaria* and *Cerithium telescopium;* even our big *Achatina* with its pseud-opercle closed.

Mammalia. Gibbons—Hunumán Monkey and other species of *Presbytis*—Wild Dog—Indian Wolf—common Bengal Fox, one in Dublin Zoological Gardens, labelled—*Jackal, C. aureus!*—*Viverra Zibetha*—*Arctonyx*—Jungle-cats—4-horned Antelope—Gayáls and common Buffaloes (fine, as those of Burma)—Tapir—*Rhinoceros Sondaicus* (from Sunderbáns or Burma) and *Rh. Sumatranus*—any of the Himalayan ruminants—*Tupaia*—*Melogale*—*Pteromys*—*Atherura*—Porcupine from Chittagong or Tippera.

Aves. Lories (any),—common Kites, 2 or 3 (*not* Brahmini)—*Limnaëtus niveus* (of Jerdon's work)—*Pontoaëtus icthyaëtus*—*Spilornis cheela* (especially, to contrast with *Sp. Elgini*)—*Poliornis teesa*—*Aquila fulvescens* (2 or 3 to contrast with the allied African species)—*Aq. hastata*—*Ketupa Ceylonensis*—*Urrua bengalensis*—*U. Coromanda*—*Ninox scutellatus*—*Gyps Indicus* and *G. Bengalensis* (not *Otogyps calvus*. With the exceptions of the two common Bengal species of *Gyps*, the series of Old World Vultures is complete. *N. B. Neophron percnopterus* of Africa has a black bill, in India a *flesh-coloured* bill!)—Barbets—*Centropus rufipennis* (very desirable. *N. B.* The two Indian Coëls are doing well)—*Corvus splendens* and *C. culminatus* (pair of each, especially the former)—*Dendrocitta rufa* (very acceptable—*Bhimraj*—*Shâma*—*Sát Bhai* (*Malacocircus*)—*Báyas* (*Ploceus*, 2 or 3 pairs of each, which would doubtless breed)—*Mainas* of each species, *Sturnopastor*, and especially *Temenuchus*, *pagodarum* (2 or 3 pairs of each)—*Bengal* Jungle-fowls, with white ear-lappet—*Adjutants*, both species—*Ciconia leucocephala*—*Geronticus papillosus*—*Threskiornis melanocephalus*; one already from Siam!—*Gallicrex cristatus*—*Gallinula*

phœnicura—Sarkidiornis melanonotus—Anas pœcilorhyncha—A. caryophyllacea—Fuligula rufina—Pelicanus Philippiensis (small Indian Pelican, common in South India). If Pelicans can be sent from Australia, why not from India? I have mentioned that we have Australian *Rallidæ* alive, and also *Œdienemus grallarius*. By the way, the *middle-sized* Indian Cormorant still remains an enigma. I have seen no specimen in England, nor is any such species recognised in Schlegel's elaborate notice of the genus. Specimens (skins) of this bird would be most acceptable! It appears to be common in Kashmir.

Tickell's supposed new Gadidous fish is precisely what I told you it would be. There should be a plentiful supply in the museum, several dozens, which I procured in the Akyab bazar. It was described and figured by Richardson, and since by McClelland (who associated it with the *Gadidæ*). I cannot refer just now, but the synonyms in my hand-writing should be on the label attached to the bottle; and that bottle I left near the specimens of *Polynemus*, which Jerdon agreed with me in considering the nearest ally. It just holds that sort of relationship to some of the *Gadidæ*, which the *Scopelidæ* do to the *Salmonidæ;* only the latter are really more nearly allied, I think. There is a *most interesting Australian Seal* on exhibition at Cremorne, which I am anxious to see, and will do so soon. Vide a notice of it, in a letter from Bartlett to Gray, in a late No. of the Annals. So high a price is wanted for it that the Zoological Secretary has declined to purchase hitherto; but I fear that the exhibition of it brings in some £11 or 12 per week to its proprietor! Of course I have been to see the African Elephant, which differs *very* much from the Asiatic. It is equally docile, but much more energetic and active, and Bartlett considers it the more intelligent of the two! Moreover it is very salacious, which the Asiatic is not (unless when regularly *must*). It was rather in bad case when it arrived, but is now in capital condition. A small African *female* Elephant is expected immediately; and with it one of the long-legged African ground Hornbills, *Bucorvus Abyssinicus*, or *Abba Gumba* of Bruce. The other Hornbills are doing admirably, *viz.* 3 Homrai, one *B. rhinoceros*, 1 *albirostris*, and one small African *Tockus*. Two or three more of *albirostris* would be acceptable, and as many more *species* as possible, especially the large kinds; for they

shew well in the spacious aviaries allotted to them. The yellow-quilled Porcupine (*Malabaricus*, Sclater,) turns out to be my *H. Bengalensis*, the yellow colour of the quills being only temporary. The 3 handed Armadillo is a most interesting form, very different from *Dasypus*, and considerably akin to *Glyptodon*. There are a fine healthy pair of Chimpanzees, and female Orang-utan; but no Gibbons, which are particularly wanted; especially as there seems every prospect now of these Apes living, as they are so very much better accommodated. The *Gazella dama* lately added to the Garden is a fine acquisition; and Burchell's Zebra has bred. The Eagle you sent has assumed the mature plumage; and I think I may say that *all*, which you have sent, are doing well, the 2 *Mycteriæ*, 2 *Tantali*, also pair of *Hæmatornis Elgini*, and pair of *Eudynamys orientalis* &c. *Gallophasis lineatus* has bred; and there is a young hen ½ *Swinhoei;* also a half-bred Ocellated Turkey. Males of *Phœnicura Reevesii* and *Diardigallus*. Also the *Heliornis* or 'Sun Bittern' (a very curious form); and the black-necked Swans. Bengal Floriken in first-rate summer dress. It was sent by Babu Rajendro Mullick in 1857. How is he getting on, and his store of live-stock? Three living *Apteryx!* Sturgeon still doing well. *Garrulax Sinensis* from China, quite lively and well: the same as the Tenasserim species. The new Cassowary which I described turns out to be the finest of them all. A living female at Amsterdam; and its egg quite different from that of common Cassowary, or of Mooruk. I have seen the magnificent fossil head in the British Museum of *Elephas primigenius* lately dug up near Ilford in Essex, with superb tusks in socket—not curled up as in the Siberian specimens so often figured. Head very different from that of *E. Indicus*, more like *Africanus*, but the grinders are of the same type as the former. Another fine accession to the B. M. is an enormous aërolite from Australia.

I must now tell you a few results of interest at which I have arrived concerning Indian birds. The paper is a very long one, and will probably spread over the *Ibis* for all next year. When I have quite finished it, I contemplate working out the birds of the Indo-Chinese province or sub-region, and then those of the Malayan Peninsula. You may begin by expunging from your list *Cotyle sub-soccata* (identical with *Sinensis*), *Ruticilla phœnicura* (as distinct from *phœnicuroides*), *Phylloscopus trochilus* (disavowed now as Indian by Gould), and I suspect

also *Sturnus unicolor* (for which I believe old spotless specimens of *S. vulgaris* have been mistaken); *Rhodophila melanoleuca*, *Genus* quite identical with *Oreicola*, Bonap., as founded on two Timor species, *melanoleuca* and *luctuosa ;* and therefore I now call the Indian one *O. Jerdoni*, and do not agree that *Pratincola ferrea* should range with it. (Vide Jerdon's Appendix). The *Horornis* and *Horeites* series puzzled us much. *Horornis fulviventer* = *Phylloscopus fuscatus*, nobis !—*H. fuliginiventro*, also a *Phylloscopus*, akin to last.—*H. flaviventris* a true *Dumeticola ;* and *H. fortipes*, I suspect, another *Dumeticola*, (to judge from my description of Hodgson's specimen in J. A. S. XIV, 585, for I cannot find a specimen in the museums here.) This disposes of the four species admitted by Jerdon ; but both in the British and India museums, I find numerous specimens marked *Horornis assimilis*, Hodg., and these are identical with the bird I formerly described as *Drymoica brevicaudata*. Afterwards I thought that this was the adult of *Neornis flavolivocea*, Hodg., of which I had only seen the young ; and this view is accepted by Jerdon. It turns out that the two are allied species, and Horsfield's *Sylvia montana* constitutes a third ; so I bring these three together under *Neornis*, and sink *Horornis* altogether. As for *Horeites*, I know but of two species, the large *H. major*, and the small *H. brunneifrons*, (v. *schistilatus*), of which *pollicaris* is the young ! Jerdon sends me a new *Dumeticola ;* making 3 (if not 4) of this form, which I think might be very well merged under *Locustella*. Jerdon tells me that my *Accipiter nisoides* is common in the interior of the Himalaya ; I can find no specimens, and two that he has sent me (as I presume for this) are decidedly *A. Virgatus*, which he should know well. His new swallow, *Hirundo Tytleri* (in Appendix), I cannot distinguish from *H. cahirica* of Palestine and Egypt ; but Adam's species (referred to by Jerdon and *H. fluvicola*) is distinct, and Gould has named it *empusa*. Two species of Woodpecker are confounded under *Chrysocolaptes sultaneus*, viz. true *sultaneus*, H. (*strenuus*, Gould), which is considerably larger, rare, and known only from Nipál ; and *C. Delesserti*, Malherbe, from all India, Indo-China, and Malayan Peninsula. *Zoothera imbricata*, Layard—*Oreocincla Nilgiriensis*, nobis. Of Cuckoos, our *Himalayanus* is the *canoroides*, Muller, and *optatus*, Gould; and this species is accepted as *striatus*, Drapeiz, by Schlegel.

It would seem to be the commonest species of the archipelago. Wallace has also *C. poliocephalus* from Java. In the British Museum there is a Nipál specimen of what seems to me a small race of *H. sparverioides*, which I have named *nisoides:* wing $7\frac{1}{2}$ in.—Of *H. nisicolor* I have now seen several specimens. *H. strenuus*, Gould (*B. As.*), I think doubtfully separable from *sparveroides;* and his *hyperythrus* is just the adult of Horsfield's *fugax*, which I consider to be distinct from the Indian *varius*. The *fugax* I now recognise as *H. flaviventris*, (Scopoli. Syn. *C. radiatus*, Gm.; *H. pectoralis*, Cabanis, and *H. hyperythrus*, Gould,—the adult; and *C. fugax*, Horsf., *sparveroides* apud von Schrenck,—the young.)—From China, Philippines, Borneo, and Java. My *Geocichla dissimilis* is *Turdus chrysolaus*, Temm., *nec cardis* (Jerd. No. 358). The *Tragopan Duvaucelii*, Temm., is *Pucrasia castanea*, Gould; and its true habitat probably Kashmir (*Káfiristan* being altogether out of the question). I suspect that *nipalensis*, Gould, is merely a hybrid between it and the common Himalayan species, *Arboricola*. I have made out a list of 12 species of this group! *Turnix Dussumierii* (verus) = Sykesi; and *T. Dussumieri* apud Jerdon must stand as *tancki*, B. Ham. (v. *joudera*, Hodgson). *Casarca leucoptera*, nobis, is *Anas scutulata*, Müller.

This must do for the present. I may add that the large striped Derbian Eland has a very different form of ear-conch from the common Eland, broad like that of the Kandoa, instead of lanceolate as in the humped cattle. This is a notable distinction.

Note on the Peura Patridges (*Arboricola*, Hodgson). This group of hill Partridges, with long (or moderately long) straight claws and spurless, is greatly developed in the jungle-clad hills of S. E. Asia and its islands, where probably several species yet remain to be discovered. I think we can already enumerate—

a. With the throat well feathered.

1. A torqueola. (Tem., *p. c.* 462-3.) The only species known to me in which the sexes present a marked difference of plumage. Himalaya.

2. A. rufogularis, nobis. S. E. Himalaya (at a lower altitude than the preceding race,) and also the Tenasserim mountains. (*J. A. S.* XXIV, 276.)

3. A. BRUNNEOPECTUS, Tickell. (*J. A. S.* XXIV, 276.) Tenasserim mountains.

4. A. JAVANICA. (Brown, *J. A. Zool.* pl. XVII; Temm., *p. c.* 1488: but *quære*—the red surrounding the eye?) Java.

5. A. (?) ÆRUGINOSA. (Eyton. *P. Z. S.* 1839, p. 106.) Malayan peninsula.

b. With the throat thinly clad with feathers, shewing the crimson skin beneath.

6. A. PERSONATA. (Horsfield, *Zool. Pcs.* in Java, fig.; *Tr. Lim. Soc.* XIII, 184.) Sumatra (?) and Java.

7. A. ATROGULARIS, nobis. (*J. A. S.* XVIII, 819; *Perdix olivacea* of Buchanan Hamilton's drawings, not of Gray, Hardw. *Ill. Ind. Zool.*) Hills bordering the valley of the Brahmaputra southward.

8. A. INTERMEDIA, nobis. (*J. A. S.* XXIV, 277.) Probably from Arakan.

9. A. CHARLTONI. (Eyton. *Ann. Mag. M. H.* 1845, XVI, p. 235.) Malayan peninsula: not uncommon about Pinang and Province Wellesley. (Type of *Tropicoperdix*, nobis, *passim?*)

10. A. CHLOROPUS. (Tickell. *J. A. S.* XXVIII, 415, 453,) Tenasserim mountains.

c. With large bare space in front of neck.

11. A. PUNCTULATA. (Hardw. *Ill. Ind. Zool.*) Hab. ——— ?

12. A. CRUDIGULARIS. (Swinhoe, *Ibis*, 1864, p. 426.) Formosa. Type of *oreoperdix*, Swinhoe.

N. B. The *Perdix oculea*, Tem. (*Pig. et Gall.* III, 408; *Tetrao ocellatus*, Raffles, *Tr. Lin. Soc.* XIII, 332; Hardw. *Ill. Ind. Zool.*;) of Mergui province and Sumatra, is the type of my *Caloperdix*; and *P. thoracica*, Tem. (*Pig. et Gall.* III, 335, *P.* and *Arboricola sphenurus*, Gray,) is the type of *Bambusicola*, Gould, to which a second species has been added by Mr. Swinhoe from Formosa, *B. Sonorivox*, Gould. (*B. As.* pt. XVI.)

The Partridges of the *Peura* group are best obtained from natives of the country who understand netting them. Comparatively few fall

to the gun. They rise singly in such difficult places, in steep bamboo-clad hills, that even if occasionally hit by a snap-shot, they are oftener lost than picked up, in localities where a trained dog is an impracticable desideratum: but there are ways of netting them, for I have received from Sylhet several dozens at a time of live *A. atrogularis;* and a lot of *A. torqueola* is similarly now and then obtainable at different hill stations. A pair of *A. torqueola* are now doing well in the Zoological Gardens, Regent's Park, London.

Ed. Blyth.

Erratum in Mr. Parish's paper in Part II. No. III. of the Journal.

Page 139 Line 35, for *Pinus longifolia* read *Pinus Massoniana.*

Abstrac of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of January, 1865.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11. Feet

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	*Sunday.*							
2	30.083	30.159	30.044	0.115	68.0	77.4	59.2	18.2
3	.090	.158	.046	.112	68.4	77.8	59.2	18.6
4	.151	.222	.105	.117	69.4	78.8	61.2	17.6
5	.150	.238	.099	.139	68.8	77.8	60.4	17.4
6	.113	.209	.047	.162	68.2	77.8	60.5	17.3
7	.055	.137	29.997	.140	68.7	77.5	59.8	17.7
8	*Sunday.*							
9	.075	.156	30.017	.139	68.6	76.8	62.0	14.8
10	.075	.148	.019	.129	65.7	73.4	59.0	14.4
11	.058	.132	29.992	.140	64.6	73.2	57.0	16.2
12	.058	.120	30.010	.110	66.4	75.7	58.6	17.1
13	.073	.136	.026	.110	67.2	76.4	59.2	17.2
14	.105	.178	.051	.127	69.7	79.6	60.6	19.0
15	*Sunday.*							
16	.119	.191	.065	.126	68.8	78.0	61.4	16.6
17	.089	.165	.040	.125	69.0	78.4	60.8	17.6
18	.110	.181	.062	.119	70.0	81.0	60.8	20.2
19	.102	.185	.035	.150	70.7	81.0	60.8	20.2
20	.089	.169	.030	.139	70.1	80.9	61.0	19.9
21	.073	.146	.006	.140	70.6	81.0	62.0	19.0
22	*Sunday.*							
23	.095	.175	.052	.123	71.7	81.2	63.8	17.4
24	.086	.169	.017	.152	72.7	83.0	65.6	17.4
25	.054	.149	29.993	.156	72.4	82.0	64.2	17.8
26	29.979	.053	.908	.145	73.1	83.2	64.1	19.1
27	.914	29.993	.844	.149	73.6	79.1	69.2	9.9
28	.926	30.002	.869	.133	72.8	81.6	66.2	15.4
29	*Sunday.*							
30	30.003	.090	.922	.168	70.9	80.3	62.4	17.9
31	29.973	.050	.908	.142	69.0	77.2	65.5	11.7

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the 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 January, 1865.

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	*Sunday.*							
2	61.6	6.4	56.5	11.5	0.465	5.13	2.40	0.68
3	62.4	6.0	57.6	10.8	.483	.32	.30	.70
4	62.8	6.6	57.5	11.9	.481	.30	.56	.67
5	61.6	7.2	55.8	13.0	.455	.02	.69	.65
6	61.7	6.5	56.5	11.7	.465	.13	.45	.68
7	62.5	6.2	57.5	11.2	.481	.31	.38	.69
8	*Sunday.*							
9	61.9	6.7	56.5	12.1	.465	.13	.54	.67
10	58.7	7.0	53.1	12.6	.415	4.61	.41	.66
11	57.7	6.9	52.2	12.4	.402	.48	.30	.66
12	59.1	7.3	53.3	13.1	.418	.64	.53	.65
13	60.4	6.8	55.0	12 2	.442	.90	.45	.67
14	61.9	7.8	55.7	14.0	.453	.99	.94	.63
15	*Sunday.*							
16	61.3	7.3	55.5	13.1	.450	.97	.70	.65
17	61.6	7.4	55.7	13.3	.453	5.00	.76	.64
18	62.5	7.5	56 5	13.5	.465	.11	.89	.64
19	62.6	8.1	56·1	14.6	.459	.04	3.14	.62
20	62.1	8.0	55.7	14.4	.453	4.99	.04	.62
21	63 2	7.4	57.3	13.3	.478	5.25	2.90	.64
22	*Sunday.*							
23	64.9	6.8	59.5	12.2	.515	.64	.79	.67
24	65.1	7.6	59.0	13 7	.506	.53	3.15	.64
25	64.1	8.3	57.5	14.9	.481	.27	.33	.61
26	66.2	6.9	60.7	12.4	.536	.86	2.93	.67
27	68.8	4.8	65.4	8.2	.626	6.84	.09	.77
28	67.2	5.6	62.7	10.1	.572	.26	.45	.72
29	*Sunday.*							
30	62.8	8.1	56.3	14.6	.462	5.07	3.16	.62
31	64.9	4.1	61.6	7.4	.552	6.08	1.68	.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 January, 1865.

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.	o	o	o	o
Mid-night.	30.068	30.139	29.884	0.255	65.5	70.8	61.4	9.4
1	.061	.134	.878	.256	64.8	71.0	61.0	10.0
2	.052	.128	.872	.256	64.1	70.8	60.6	10.2
3	.041	.113	.869	.244	63.6	70.8	59.0	11.8
4	.046	.112	.883	.229	62.7	66.8	58.8	8.0
5	.047	.130	.890	.240	62.6	70.6	58.0	12.6
6	.068	.149	.910	.239	62.1	70.4	57.4	13.0
7	.090	.180	.938	.242	61.8	70.2	57.0	13.2
8	.118	.210	.963	.247	64.6	70.2	59.4	10.8
9	.136	.235	.983	.252	69.0	74.0	63.8	10.2
10	.140	.238	.993	.245	72.1	75.6	65.0	10.6
11	.121	.210	.976	.234	74.8	78.2	69.0	9.2
Noon.	.094	.173	.938	.235	76.2	80.2	68.0	12.2
1	.060	.138	.917	.221	77.5	81.8	70.0	11.8
2	.038	.117	.890	.227	78.4	83.2	71.8	11.4
3	.019	.111	.868	.243	78.5	83.2	71.2	12.0
4	.013	.110	.848	.262	76.9	81.6	70.6	11.0
5	.020	.119	.844	.275	75.3	79.4	70.2	9.2
6	.027	.134	.862	.272	72.8	76.6	68.4	8.2
7	.041	.149	.870	.279	71.1	75.5	66.4	9.1
8	.057	.161	.932	.229	69.7	74.2	65.2	9.0
9	.067	.175	.912	.263	68.4	73.3	63.6	9.7
10	.070	.178	.883	.295	67.3	72.8	62.4	10.4
11	.071	.171	.950	.221	66.4	72.0	61.8	10.2

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means 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 January, 1865.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	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.	Troy grs.	Troy grs.	
Mid-night.	60.9	4.6	57.2	8.3	0.476	5.28	1.70	0.76
1	60.5	4.3	57.1	7.7	.475	.27	.56	.77
2	60.1	4.0	56.5	7.6	.465	.18	.49	.78
3	59.7	3.9	56.2	7.4	.461	.14	.43	.78
4	59.0	3.7	55.7	7.0	.453	.06	.33	.79
5	59.1	3.5	55.9	6.7	.456	.09	.28	.80
6	58.5	3.6	55.3	6.8	.447	.00	.27	.80
7	58.3	3.5	55.1	6.7	.444	4.97	.24	.80
8	60.1	4.5	56.5	8.1	.465	5.18	.60	.76
9	62.2	6.8	56.8	12.2	.470	.18	2.58	.67
10	63.7	8 4	57.0	15.1	.473	.18	3.35	.61
11	65.0	9.8	58.1	16.7	.491	.34	.92	.58
Noon.	65.5	10.7	58.0	18.2	.489	.31	4.35	.55
1	65.8	11.7	57.6	19.9	.483	.22	.82	.52
2	66.3	12.1	57.8	20.6	.486	.25	5.06	.51
3	66.1	12.4	57.4	21.1	.480	.18	.17	.50
4	65.3	11.6	57.2	19.7	.476	.16	4.70	.52
5	65.1	10.2	58.0	17.3	.489	.32	.08	.57
6	65.3	7.5	59.3	13.5	.511	.58	3.13	.64
7	64.7	6.4	59.6	11.5	.516	.66	2.62	.68
8	63.9	5.8	59.3	10.4	.511	.63	.30	.71
9	63.1	5.3	58.9	9.5	.504	.56	.06	.73
10	62.4	4.9	58.5	8.8	.498	.50	1.87	.75
11	61.7	4.7	57.9	8.5	.488	.39	.78	.75

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 January, 1865.

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	...	...	*Sunday.*	
2	136.0	...	N.	Cloudless: also slightly foggy at midnight.
3	137.4	...	S. E. & S. & N. E.	Cloudless: also slightly foggy at 7 A. M.
4	139.0	...	N. W. & N.	Cloudless: also slightly foggy at 10 & 11
5	136.2	...	N. & N. W.	Cloudless. [P. M.
6	133.0	...	N.	Cloudless till noon: \i till 5 P. M. cloudless afterwards also foggy at 10 P. M.
7	139.0	...	E. & N.	Cloudless: also foggy from midnight to 2 A. M.
8	...	...	*Sunday.*	
9	132.4	...	N.	Cloudless.
10	132.0	...	N. & N. W.	_i till 4 A. M. cloudless afterwards.
11	131.8	...	N. W. & N.	Cloudless till 1 P. M. \i & _i afterwards.
12	133.0	...	W. & N. W.	_i till 7 A. M. cloudless afterwards.
13	131.4	...	N. W. & W. & N.	Cloudless: also slightly foggy at 9& 10 P.M.
14	135.0	...	N.	Cloudless.
15	...	...	*Sunday.*	
16	132.4	...	N. W. & S. & N.	Cloudless till noon: Scatd. clouds till 6 P. M. cloudless afterwards.
17	136.0	...	W. & N. W.	Cloudless till 8 A. M. _i till 5 P. M. cloudless afterwards: also foggy from 8 to 11 P. M.
18	138.4	...	W.	Cloudless: also foggy at 7 A. M. & from 9 to 11 P. M.
19	142.4	...	W. & N. W.	Cloudless.
20	137.4	...	S.	\i & _i till 7 A. M. cloudless afterwards.
21	137.0	...	S. & E. & N.	Cloudless.
22	...	...	*Sunday.*	
23	134.0	...	N.	Cloudless till 5 A. M. _i & \i till 6 P. M. cloudless afterwards; also foggy at 6 & 7 A. M. & at 8 & 9 P. M.
24	141.0	...	N. W. & N.	Cloudless till 4 A. M. \i till 7 P. M. cloudless afterwards.
25	142.2	...	N. W. & W.	Cloudless till noon: \i & _i till 7 P. M. cloudless afterwards.
26	140.0	...	S.	Cloudless till 11 A. M. _i till 8 P. M. cloudless afterwards.
27	...	0.16	S. W. & S.	Cloudy: also raining at 3 A. M. 8 & 9 P. M. & thundering & lightning at 8 P. M.
28	139.2	...	S. W.	Scatd. clouds till 10 A. M. _i afterwards.
29	...	...	*Sunday.*	
30	133.0	...	N. & S. & N. W.	Cloudless till 9 A. M. Scatd. clouds till 8 P. M. cloudless afterwards.
31	...	0.32	S. & N. W.	Cloudless till 5 A. M. cloudy afterwards: also thundering & raining at noon.

\i Cirri,—i Strati, ∩i Cumuli, _i Cirro strati, ∩i Cumulo strati, _i Nimbi \ 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, 1865.

Monthly Results.

	Inches
Mean height of the Barometer for the month, ...	30.066
Max. height of the Barometer occurred at 10 A. M. on the 5th, ..	30.238
Min. height of the Barometer occurred at 5 P. M. on the 27th, ..	29.844
Extreme range of the Barometer during the month, ...	0.394
Mean of the Daily Max. Pressures, ...	30.143
Ditto ditto Min. ditto, ...	30.008
Mean daily range of the Barometer during the month, ...	0.135

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	o
Mean Dry Bulb Thermometer for the month, ...	69.5
Max. Temperature occurred at 2 & 3 P. M. on the 26th, ...	83.2
Min. Temperature occurred at 7 A. M. on the 11th, ...	57.0
Extreme range of the Temperature during the month, ...	26.2
Mean of the daily Max. Temperature, ...	78.9
Ditto ditto Min. ditto, ...	61.7
Mean daily range of the Temperature during the month, ...	17.2

Mean Wet Bulb Thermometer for the month, ...	62.7
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, ..	6.8
Computed Mean Dew-point for the month, ...	57.3
Mean Dry Bulb Thermometer above computed Mean Dew-point, ..	12.2
	Inches
Mean Elastic force of Vapour for the month, ...	0.478

	Troy grains
Mean Weight of Vapour for the month, ...	5.26
Additional Weight of Vapour required for complete saturation, ..	2.62
Mean degree of humidity for the month, complete saturation being unity,	0.67

	Inches
Rained 2 days, Max. fall of rain during 24 hours, ...	0.32
Total amount of rain during the month, ...	0.48
Prevailing direction of the Wind, ...	N. & N. W.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of January, 1865.

Monthly Results.

Tables 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.	Missed.
					No. of days.														
Midnight.	8		1		1		1		3		1		6		5				
1	8		1		1		1		3		1		7		4				
2	6		1		1		1		3		1		7		6				
3	7		2						3	1	1		5		5				3
4	8		1		1				2		2		4		4				4
5	7		1		1				3		1		5		6				2
6	8		1		1				3		2		5		6				
7	8		2		2				2		4		4		4				
8	7		1		1		2		3		2		4		4				2
9	12				1		3		5		2		1		2				
10	10		2		3		1		4		1		3		2				
11	11		3		1		1		3		2		3		2				
Noon.	10		1		3				1		4		1	1	6				
1	9		2		1						2		3		9				
2	13				1						2		1		9				
3	10		1		1						2		4		8				
4	9						1		2		1		3		10				
5	9		1				1		1		2				10				2
6	6		1		1		1		5		1		4		7				
7	7		1		1		1		5		1		4		6				
8	6		1		2		1		4		2	1	5		5				
9	7				2		1		4		2		6	1	4				
10	7				2		1		4		2		6		4				
11	6				2		1		4		3		4		4				2

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February, 1865.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11. Feet.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	30.002	30.070	29.946	0.124	71.8	79.2	64.4	14.8
2	.043	.106	.993	.113	72.1	79.6	66.6	13.0
3	.036	.115	.986	.129	73.0	81.2	67.4	13.8
4	.007	.086	.933	.153	73.0	81.3	66.2	15.1
5	*Sunday.*							
6	.008	.087	.948	.139	72.4	80.4	64.4	16.0
7	29.986	.092	.909	.183	71.2	80.1	61.2	18.9
8	.907	29.990	.829	.161	74.5	84.6	66.0	18.6
9	.891	.976	.846	.130	72.8	79.5	69.2	10.3
10	.873	.953	.802	.151	73.0	81.2	68.6	12.6
11	.900	.998	.835	.163	70.3	76.0	66.6	9.4
12	*Sunday.*							
13	30.008	30.101	.939	.162	72.8	80.1	67.2	12 9
14	.038	.128	.985	.143	71.5	80.6	62.2	18.4
15	.060	.157	30.015	.142	71.7	81.4	63.8	17.6
16	.062	.139	.004	.135	72.9	83.3	62.6	20.7
17	29.982	.064	29.901	.163	74.8	84.6	65.4	19.2
18	.913	29.986	.851	.135	77.0	87.1	68.0	19.1
19	*Sunday.*							
20	.929	30.025	.876	.149	78.6	87.8	70.2	17.6
21	.903	.002	.826	.176	78.4	86.1	70.6	15.5
22	.888	.000	.830	.170	77.0	85.0	71.1	13.9
23	.910	.040	.853	.187	76.3	85.4	67.6	17.8
24	.963	.066	.870	.196	76.6	87.0	66.2	20.8
25	.919	.058	.880	.178	74.3	80.8	68.8	12.0
26	*Sunday.*							
27	.994	.081	.886	.195	71.6	78.2	67.1	11.1
28	30.065	.157	30.013	.144	72.2	80.2	64.6	15.6

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the 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 February, 1865.

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	67.0	4.8	63.2	8.6	0.582	6.37	2.08	0.75
2	67.0	5.1	62.9	9.2	.576	.31	.22	.74
3	67.3	5.7	62.7	10.3	.572	.26	.50	.72
4	65.0	8.0	58.6	14.4	.499	5.46	3.30	.62
5	*Sunday.*							
6	63.6	8.8	56.6	15.8	.467	.11	.49	.59
7	62.5	8.7	55.5	15.7	.450	4.94	.36	.60
8	69.3	5.2	65.7	8.8	.632	6.89	2.29	.75
9	68.8	4.0	65.6	7.2	.630	.90	1.81	.79
10	69.1	3.9	66.0	7.0	.638	.98	.78	.80
11	66.7	3.6	63.8	6.5	.593	.52	.56	.81
12	*Sunday.*							
13	64.4	8.4	57.7	15.1	.485	5.30	3.41	.61
14	62.8	8.7	55.8	15.7	.455	4.99	.39	.60
15	63.0	8.7	56.0	15.7	.458	5.01	.42	.59
16	64.1	8.8	57.1	15.8	.475	.19	.54	.60
17	66.0	8.8	59.8	15.0	520	.66	.60	.61
18	69.7	7.3	64.6	12.4	.609	6.62	.27	.67
19	*Sunday.*							
20	70.6	8.0	65.0	13.6	.617	.68	.70	.64
21	70.1	8.3	64.3	14.1	.603	.53	.78	.63
22	67.3	9.7	60.5	16.5	.532	5.77	4.12	.58
23	65.5	10.8	57.9	18.4	.488	.29	.40	.55
24	68.1	8.5	62.1	14.5	.561	6.08	3.69	.62
25	67.1	7.2	62.1	12.2	.561	.12	.00	.67
26	*Sunday.*							
27	66.5	5.1	62.4	9.2	.567	.22	2.18	.74
28	63.9	8.3	57.3	14.9	.478	5.23	3.32	.61

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 February, 1865.

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.	o	o	o	o
Mid-night.	29.967	30.053	29.873	0.180	70.2	74.6	66.6	8.0
1	.957	.051	.863	.188	69.5	74.6	65.6	9.0
2	.947	.044	.853	.191	69.1	73.6	64.6	9.0
3	.937	.035	.845	.190	68.7	73.0	64.0	9.0
4	.937	.036	.842	.194	68.1	72.2	63.0	9.2
5	.951	.044	.854	.190	67.4	71.8	62.7	9.1
6	.969	.068	.862	.206	66.8	71.1	62.2	8.9
7	.994	.086	.888	.198	66.7	71.6	61.2	10.4
8	30.023	.112	.913	.199	69.4	74.8	66.0	8.8
9	.048	.141	.915	.196	72.8	78.6	67.8	10.8
10	.059	.157	.953	.204	75.3	81.0	69.0	12.0
11	.048	.157	.917	.240	77.1	83.2	70.6	12.6
Noon.	.020	.134	.904	.230	79.3	85.5	71.4	14.1
1	29.985	.081	.867	.214	80.6	86.4	72.2	14.2
2	.951	.048	.843	.205	81.6	87.0	75.2	11.8
3	.932	.025	.843	.182	81.9	87.8	76.0	11.8
4	.921	.015	.826	.189	81.3	86.8	75.6	11.2
5	.922	.019	.822	.197	79.9	86.0	74.0	12.0
6	.927	.033	.802	.231	77.5	83.0	73.0	10.0
7	.943	.047	.824	.223	75.5	80.6	72.2	8.4
8	.958	.055	.858	.197	74.0	78.8	71.1	7.7
9	.974	.070	.858	.212	72.8	77.3	70.1	7.2
10	.983	.077	.866	.211	71.7	76.4	68.6	7.8
11	.980	.073	.878	.195	70.8	75.2	67.4	7.8

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means 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 February, 1865.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	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.	Troy grs.	Troy grs.	
Midnight.	66.1	4.1	62.8	7.4	0.574	6.32	1.73	0.79
1	65.8	3.7	62.8	6.7	.574	.32	.56	.80
2	65.6	3.5	62.8	6 3	.574	.33	.45	.81
3	65.3	3.4	62.6	6.1	.570	.29	.40	.82
4	64.8	3.3	62.2	5.9	.563	.21	.34	.82
5	64.3	3.1	61.8	5.6	.555	.14	.25	.83
6	63.6	3.2	61.0	5.8	.541	5.99	.27	.83
7	63.6	3.1	61.1	5.6	.543	6.01	.22	.83
8	64.8	4.6	61.1	8.3	.543	5.98	.88	.76
9	65.8	7.0	60.2	12.6	.527	.76	2.95	.66
10	66.7	8.6	60.7	14.6	.536	.82	3.58	.62
11	67.3	9.8	60.4	16.7	.530	.75	4.17	.58
Noon.	67.9	11.4	59.9	19.4	.521	.63	.96	.53
1	68.1	12.5	59.3	21.3	.511	.50	5.51	.50
2	68.5	13.1	59.3	22.3	.511	.49	.85	.48
3	68.3	13 6	58.8	23.1	.503	.39	6.05	.47
4	68.0	13.3	58.7	22.6	.501	.38	5.86	.48
5	67.9	12.0	59.5	20.4	.515	.55	.23	.52
6	68.1	9.4	61.5	16.0	.550	.96	4.08	.59
7	68.0	7.5	62.7	12.8	.572	6.22	3.24	.66
8	67.5	6.5	62.9	11.1	.576	.29	2.75	.70
9	66.8	6.0	62.0	10.8	.559	.11	.60	.70
10	66.5	5.2	62.3	9.4	.565	.20	.23	.74
11	66.1	4.7	62.3	8.5	.565	.20	.00	.76

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 February, 1865.

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	130.9	...	S. W. & variable.	\i & ⌐i till 3 P. M. cloudy afterwards, also drizzling at 3 A. M. 10 & 11 P. M.
2	139.0	0.10	N. & N. W.	Cloudy till 8 A. M. Seatd. clouds till 5 P. M. cloudless afterwards also drizzling from midnight to 5 A. M. & foggy from 8 to 10 P. M.
3	140.4	...	W.	Cloudy till 3 P. M. cloudless afterwards.
4	139.0	...	N. W. & W.	Cloudless till 3 A. M. cloudy till 8 A. M. \i & ⌐i afterwards.
5	...	...	*Sunday.*	
6	145.5	...	W. & N. W.	⌐i.
7	140.0	...	N. W. & W.	Cloudless till 10 A. M. \i afterwards.
8	137.2	...	S. W. & S.	Cloudless till 8 A. M. ∩i till 6 P. M. cloudy afterwards also drizzling at 8 & 9 P. M.
9	...	...	S. W. & N. W.	Cloudy till 6 P. M. \i & ⌐i afterwards; also drizzling at 1 & 9 A. M. & at 1, 5 & 6 P. M.
10	134.8	0.72	S. & N. W.	\i & ⌐i till 4 A. M. cloudy afterwards, also thundering at 10 A. M. & raining between 10 & 11 A. M. & at 4, 5 & 11 P. M.
11	...	0.20	S. & S. E. & E.	Cloudy: also drizzling after intervals.
12	...	...	*Sunday.*	
13	140.4	...	N. W. & N. & N. E.	⌐i till 4 A. M. cloudless afterwards: also slightly foggy at 11 P. M.
14	141.2	...	N. W.	Cloudless.
15	139.5	...	N. W. & W.	Cloudless till 2 A. M. Seatd. clouds till 11 A. M. cloudless afterwards.
16	138.0	...	W. & N. W.	Cloudless.
17	139.2	...	W. & S.	Cloudless till 6 A. M. \i till 10 A. M. ⌐i till 6 P. M. cloudless afterwards.
18	140.7	...	S. W.	Cloudless till 7 A. M. \i till 6 P. M. cloudless afterwards, also foggy at 5 & 6 A. M.
19	...	...	*Sunday.*	
20	143.0	...	S. & S. E.	Cloudless.
21	141.4	...	N. W. & W.	Cloudless.
22	139.6	...	S. & N. W.	Cloudless till 5 A. M. Seatd. clouds till 2 P. M. cloudless afterwards, also slightly drizzled between 10 & 11 A. M.
23	140.6	...	W. & S. W. & N.	Cloudless.
24	143.0	...	S. W. & S.	Cloudless till 11 A. M. ∩i till 6 P. M. cloudless afterwards.

\i Cirri, —i Strati, ∩i Cumuli, ⌐i Cirro strati, ⌒i Cumulo strati, ⌐\i Nimbi \⌐i Cirro cumuli.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February, 1865.

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		
25	139.5	...	E. & variable.	Cloudless till 7 A. M. Scatd. clouds afterwards, also foggy between 4 & 7 A. M. & slightly drizzling at 9 A. M. & 4 P. M.
26	...	0.66	*Sunday.*	
27	136.0	0.18	N. W. & N.	Cloudy nearly the whole day; also thundering and raining betweeu 1 & 2 A. M.
28	138.0	...	N. W.	Cloudless till 5 A. M. \—i till 9 A. M. cloudless afterwards.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February, 1865.

Monthly Results.

	Inches
Mean height of the Barometer for the month, ...	29.972
Max. height of the Barometer occurred at 10 & 11 A. M. on the 15th & 28th,	30.157
Min. height of the Barometer occurred at 6 P. M. on the 10th, ..	29.802
Extreme range of the Barometer during the month, ...	0 355
Mean of the Daily Max. Pressures, ...	30.062
Ditto ditto Min. ditto, ...	29.907
Mean daily range of the Barometer during the month, ...	0.155

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	o
Mean Dry Bulb Thermometer for the month, ...	73.7
Max. Temperature occurred at 3 P. M. on the 20th, ...	87.8
Min. Temperature occurred at 7 A. M. on the 7th, ...	61.2
Extreme range of the Temperature during the month, ...	26.6
Mean of the daily Max. Temperature, ...	82.1
Ditto ditto Min. ditto, ...	66.5
Mean daily range of the Temperature during the month, ...	15.6

Mean Wet Bulb Thermometer for the month, ...	66.5
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, ..	7.2
Computed Mean Dew-point for the month, ...	61.5
Mean Dry Bulb Thermometer above computed Mean Dew-point, ..	12.2
	Inches
Mean Elastic force of Vapour for the month, ...	0.550

	Troy grains
Mean Weight of Vapour for the month, ...	6.01
Additional Weight of Vapour required for complete saturation, ..	2.95
Mean degree of humidity for the month, complete saturation being unity,	0.67

	Inches
Rained 10 days, Max. fall of rain during 24 hours, ...	0.72
Total amount of rain during the month, ...	1.86
Prevailing direction of the Wind, ...	N. W. & W.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February, 1865.

Monthly Results.

Tables 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.	Missed.
					No. of days.														
Midnight.					1	1			8		3		4	1	6				2
1	1				1	1			8	2	4		4		6	1			
2	1				1				5		4	1	6		7	1			
3	1				1				2		3		9	2	7				1
4	1						1		1		2		6	1	10	1			3
5	3						1		1		2		7	1	7	1			3
6	3		1		1		1		2		1		8		7				
7	5		2		1				1		3		4		8				
8	6		2		2		1		2		3		2		6				
9	5	1	3		2		2		2	1	3	1	1		6				
10	3		5		2		3	1			4		3		4				
11	3		4		4		2		1	1	1		6		3	1			
Noon.	4		4		2		3		2		3		2		4				
1	5		4		1		1		1		3	1	4		5				
2	1		1		2		2		3		3		4		8				
3	1		1		1		2		1		3		7		8				
4	4				1	1	2		2		2		4		9	1			
5	3		1				1		5	1	2		6	1	6				
6	1				1		2		4	1	5	1	6		5				
7	1				1				5		6		6		5				
8	2				1				4		6	1	6		5				
9	2				1				5		5		4	1	7				
10	2				1				7		4	1	4		6				
11					1				8		2		6	2	7				

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1865.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11. Feet.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	30.017	30.094	29.957	0.137	73.0	82.3	63.6	18.7
2	29.966	.040	.907	.133	75.9	85.4	66.8	18.6
3	.923	.000	.832	.168	76.9	84.4	70.0	14.4
4	.909	29.971	.820	.151	75.4	83.8	68.8	15.0
5	*Sunday.*							
6	.927	.992	.852	.140	71.6	78.4	68.0	10.4
7	.930	30.021	.867	.154	73.1	81.2	68.1	13.1
8	.929	29.996	.880	.116	72.2	76.0	68.7	7.3
9	.924	30.005	.874	.131	76.4	83.0	69.2	13.8
10	.948	.043	.888	.155	77.9	85.4	72.4	13.0
11	.962	.023	.914	.109	78.3	85.8	71.5	14.3
12	*Sunday.*							
13	.937	.009	.893	.116	79.1	86.7	72.8	13 9
14	.951	.057	.887	.170	76.8	83.8	70.8	13.0
15	.957	.029	.900	.129	76.7	84 3	70.6	13.7
16	30.004	.094	.952	.142	76.9	86.6	68.0	18.6
17	29.998	.090	.937	.153	76.8	87.8	64.9	22.9
18	.961	.039	.886	.153	80.0	91.4	69.2	22.2
19	*Sunday.*							
20	.948	.032	.894	.138	83.3	93.2	73.6	19.6
21	.946	.039	.881	.158	82.9	91.2	75.2	16.0
22	.893	29.975	.819	.156	83.7	94.8	76.8	18.0
23	.859	.948	.774	.174	82.6	94.4	71.8	22.6
24	.838	.908	.790	.118	83.6	94.7	74.6	20.1
25	.848	.925	.795	.130	84.3	96.3	74.0	22.3
26	*Sunday.*							
27	.851	.932	.781	.151	86.3	97.6	76.8	20.8
28	.828	.912	.765	.147	85.7	97.8	76.2	21.6
29	.852	.921	.790	.131	84.5	94.3	78.4	15.9
30	.859	.940	.813	.127	83.8	93.8	76.9	16.9
31	.880	.963	.828	.135	84.6	95.0	76.7	18.3

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the 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 March, 1865.

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	64.5	8.5	57.7	15.3	0.485	5.30	3.46	0.61
2	69 3	6.6	64.7	11.2	.611	6.65	2.92	.70
3	69 6	7.3	64.5	12.4	.607	.60	3.26	.67
4	68.7	6.7	64.0	11.4	.597	.50	2.93	.69
5	*Sunday.*							
6	68.5	3.1	66.0	5.6	.638	7.00	1.40	.83
7	69.9	3.2	67.3	5.8	.666	.28	.51	.83
8	68.5	3.7	65.5	6.7	.628	6.88	.67	.81
9	70.9	5.5	67.0	9.4	.659	7.17	2.55	.74
10	72.0	5.9	67.9	10.0	.679	.36	.80	.72
11	72.3	6.0	68.1	10.2	.684	.40	.88	.72
12	*Sunday.*							
13	70.6	8.5	64.6	14.5	.609	6.58	3.95	.63
14	69.6	7.2	64.6	12.2	.609	.62	.21	.67
15	69.0	7.7	63.6	13.1	.590	.40	.40	.65
16	65.9	11.0	58.2	18.7	.493	5.34	4.52	.54
17	65.1	11.7	56.9	19.9	.472	.11	.72	.52
18	66.9	13.1	57.7	22.3	.485	.22	5.59	.48
19	*Sunday.*							
20	70.0	13.3	60.7	22.6	.536	.72	6.21	.48
21	70.5	12.4	61.8	21.1	.555	.95	5.84	.51
22	72.4	11.3	64.5	19.2	.607	6.50	.57	.54
23	72.4	10 2	65.3	17.3	.623	.69	4 99	.57
24	72.7	10.9	65.1	18.5	.619	.63	5.40	.55
25	73.7	10.6	66.3	18.0	.644	.89	.39	.56
26	*Sunday.*							
27	74.6	11.7	66.4	19.9	.646	.88	6.14	.53
28	74.3	11.4	66.3	19.4	.644	.88	5.92	.54
29	77.8	6.7	73.1	11.4	.803	8.60	3.75	.70
30	75.7	8.1	70.0	13.8	.727	7.78	4.32	.64
31	74.4	10.2	67.3	17.3	.666	.12	5.27	.58

All the Hygrometrical elements are computed by the Greenw ich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1865.

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.	o	o	o	o
Mid-night.	29.919	30.054	29.822	0.232	75.0	81.3	68.0	13.3
1	.910	.043	.813	.230	74.3	80.8	67.0	13.8
2	.898	.033	.805	.228	73.7	79.4	65.8	13.6
3	.888	.018	.798	.220	73.2	78.8	65.2	13.6
4	.888	.003	.802	.201	72.7	78.8	64.4	14.4
5	.905	.019	.813	.206	72 2	78.6	64.0	14.6
6	.926	.031	.832	.199	71 7	78.6	63.8	14.8
7	.948	.042	.854	.188	72.3	78.4	63.6	14.8
8	.975	.065	.888	.177	75.4	81.3	68 2	13.1
9	.993	.083	.906	.177	78.8	86.0	68.4	17.6
10	.998	.094	.905	.189	81.7	89.4	68.1	21.3
11	.987	.088	.896	.192	84.2	93.2	74.0	19.2
Noon.	.963	.071	.872	.199	85.9	95.0	74.2	20.8
1	.934	.040	.851	.189	87.1	96.2	75.0	21.2
2	.898	.005	.811	.194	88.0	97.6	76.0	21.6
3	.877	29.977	.776	.201	88.1	97.8	75.6	22.2
4	.867	.965	.770	.195	87.7	97.6	74.9	22.7
5	.865	.959	.765	.194	86.4	96.1	72.6	23.5
6	.872	.957	.777	.180	83.4	91.6	71.8	19.8
7	.888	.969	.791	.178	80.9	88.0	70.8	17.2
8	.906	.988	.812	.176	79.2	85.2	70.2	15.0
9	.918	30.001	.831	.170	78.0	83.8	69.6	14.2
10	.928	.015	.837	.178	77.0	82.2	70.3	11.9
11	.924	.008	.823	.185	76.1	81.4	70.0	11.4

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means 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 March, 1865.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	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.	Troy grs.	Troy grs.	
Mid-night.	69.7	5.3	66.0	9.0	0.638	6.95	2.36	0.75
1	69.5	4.8	66.1	8.2	.640	.99	.13	.77
2	69.3	4.4	66.2	7 5	.642	7.01	1.95	.78
3	69.2	4.0	66.0	7.2	.638	6.98	.84	.79
4	68.9	3.8	65.9	6.8	.636	.96	.72	.80
5	68.5	3.7	65.5	6.7	.628	.88	.67	.81
6	68.2	3 5	65.4	6.3	.626	.87	.56	.82
7	68.6	3.7	65.6	6.7	.630	.90	.68	.80
8	70.0	5.4	66.2	9.2	.642	.99	2.44	.74
9	70.9	7.9	65.4	13.4	.626	.77	3.67	.65
10	71.7	10 0	64.7	17.0	.611	.57	4.80	.58
11	72.0	12.2	63.5	20.7	.588	.27	5.97	.51
Noon.	72.0	13.9	62 3	23.6	.565	.01	6.86	.47
1	72.1	15.0	63.1	24.0	.580	.16	7.17	.46
2	72.4	15.6	63.0	25.0	.578	.13	.55	.45
3	72.3	15 8	62.8	25.3	574	.10	.62	.45
4	72.2	15.5	62.9	24.8	.576	.11	.45	.45
5	71.9	14.5	61.7	24.7	.554	5.89	.17	.45
6	71.7	11.7	63.5	19.9	.588	6.29	5.67	.53
7	71.9	9.0	65.6	15.3	.630	.79	4.31	.61
8	71.5	7.7	66.1	13.1	.640	.92	3.64	.66
9	71.2	6.8	66.4	11.6	.646	7.00	.19	.68
10	71.0	6.0	66.8	10.2	.655	.11	2.78	.72
11	70.7	5.4	66.9	9.2	.657	.15	.48	.74

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 March, 1865.

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	137.6	...	W. & N. W.	Cloudless.
2	136.0	...	S.	Cloudless till 9 A. M. Scatd. clouds afterwards.
3	134.0	...	S.	Cloudy till 7 A. M. Scatd. clouds till 8 P. M. cloudy afterwards.
4	135.0	...	S. & N. E.	Cloudy till 10 A. M. ⌒i & ⌣i till 4 P. M. cloudy afterwards.
5	...	1.08	*Sunday.*	
6	...	0.54	E. & N.	Cloudy also raining at midnight & 2 A. M. & drizzling from 4 to 8 P. M. & at 11 P. M. & thundering at midnight & 5 P. M. & lightning at 1 A. M. & at 8 P. M.
7	135.4	0.25	N. & N. W.	Cloudy till 10 A. M. ⌒i till 3 P. M. cloudy afterwards: also raining at 9 & 10 A. M. & drizzling from 5 to 9 P. M.
8	...	...	S. W. & W. & S.	Cloudy: also drizzling at 2, 5 & 7 P. M.
9	137.0	...	E. & W.	Cloudy till 7 A. M. ⌣i & ⌒i afterwards.
10	141.0	0.09	E. & N. E. & N. W.	⌣i till 6 A. M thin clouds till 10 A. M. ⌣i & ⌒i till 5 P. M. cloudy afterwards; also drizzling from 7 to 10 P. M. & lightning at 7 P. M.
11	139.8	...	W. & N. W.	Cloudless.
12	...	...	*Sunday.*	
13	145.8	...	N. W & N.	Cloudless till 3 A. M. ⌣i till 3 P. M. Scatd. clouds afterwards.
14	134.9	...	N. W. & W. & N.	\i & ⌣i till 2 P. M. Scatd. clouds afterwards.
15	135.0	...	N. W. & N.	⌣i till 4 P. M. cloudless afterwards.
16	140.1	...	W. & N. W.	Cloudless.
17	137.0	...	N. W. & W.	Cloudless till 11 A. M. ⌣i till 3 P. M. \i till 6 P. M. cloudless afterwards.
18	141.0	...	W. & N. W.	⌣i till 7 A. M. \i till 6 P. M. cloudless afterwards.
19	...	...	*Sunday.*	
20	146.4	...	W. & S. & N. W.	Cloudless till 10 A. M. \i & ⌣i till 2 P. M. cloudless afterwards.
21	141.0	...	S. W. & N. W. & S.	⌣i till 1 P. M. ⌒i afterwards.
22	142.2	...	S. W. & W. & S.	⌣i till 4 P. M. cloudy afterwards, also slightly drizzled at 8 P. M. & lightning at 7 P. M
23	142.0	...	S. & N. W.	⌒i till 6 A. M. cloudless afterwards.
24	141.0	...	W. & S. W.	Cloudless: also foggy from 3 to 6 A. M.

\i Cirri, —i Strati, ⌒i Cumuli, ⌣i Cirro strati, ⌒i Cumulo strati, ⌣i Nimbi ⌣ 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, 1865.

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		
25	142.0	...	S. W. & W.	Cloudless: also foggy from 5 to 8 A. M.
26	..	...	*Sunday.*	
27	141.6	...	S. & W. & S. W.	Cloudless.
28	141.0	...	S.	Cloudless.
29	137.0	..	S.	Cloudless till 3 P. M. _i afterwards.
30	137.6	...	S. & S. W.	Cloudless till 8 A. M. \i & _i till 4 P. M. Scatd. clouds afterwards, also raining, thundering and lightning at 8 P. M.
31	144.0	...	S. W. & S.	Scatd. clouds till 6 A. M. \i & _i till 6 P. M. cloudless afterwards.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1865.

Monthly Results.

	Inches
Mean height of the Barometer for the month, ...	29.920
Max. height of the Barometer occurred at 10 A. M. on the 1st & 16th, ..	30.094
Min. height of the Barometer occurred at 5 P. M. on the 28th, ..	29.765
Extreme range of the Barometer during the month, ...	0.329
Mean of the Daily Max. Pressures, ...	30.000
Ditto ditto Min. ditto, ...	29.859
Mean daily range of the Barometer during the month, ...	0.141

	o
Mean Dry Bulb Thermometer for the month, ...	79.4
Max. Temperature occurred at 3 P. M. on the 28th, ...	97.8
Min. Temperature occurred at 7 A. M. on the 1st, ...	63.6
Extreme range of the Temperature during the month, ...	34.2
Mean of the daily Max. Temperature, ...	88.5
Ditto ditto Min. ditto, ...	71.6
Mean daily range of the Temperature during the month, ...	16.9

Mean Wet Bulb Thermometer for the month, ...	70.7
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, ..	8.7
Computed Mean Dew-point for the month, ...	64.6
Mean Dry Bulb Thermometer above computed Mean Dew-point, . ..	14.8
	Inches
Mean Elastic force of Vapour for the month, ...	0.609

	Troy grains
Mean Weight of Vapour for the month, ...	6.58
Additional Weight of Vapour required for complete saturation, ..	4.04
Mean degree of humidity for the month, complete saturation being unity,	0.62

	Inches
Rained 6 days, Max. fall of rain during 24 hours, ...	1.08
Total amount of rain during the month, ...	1.96
Prevailing direction of the Wind, ...	S. & W. & N. W.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1865.

Monthly Results.

Tables 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.	Missed.
	No. of days.																		
Midnight.	2		1						8		7		2		5	1			3
1	3		1						8		5		7		3				
2	1		3	1					8		5		6		4				
3	1		2		1				5		5		8		4				1
4	2		1		1				5		4		8		4				2
5	2		1				1		5		5		8		4				1
6	2		1				1		5		6		9		3				
7	2		1						7		3		11		3				
8	2		1		2				5		6		4		7				
9	3		2		1		1	1	5		5		6		4				
10	4		2		2	1	1		1		7		5		5				
11	4		1		3		1		4		2		7		5				
Noon.	3		1		2		1		4		2		5		9				
1	1				2		1		5		1		6		11				
2	3		1		2				5		2		5	1	9				
3	2		1		2				6				7		9				
4	1	1	1		1				5		4		8		7				
5	2	1	1		2	1			6		3	1	8		5				
6	1	1	2	1	1				9		3		5		6				
7	2	1	2	2	1				10		2	1	5		5				
8	2	1			3	2			9		3	1	7	1	3				
9	1		1	1	2		1		10	1	4		4		4				
10	2				1				12	1	4		4		4				
11	3	1			1				11		5		4		3				

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April, 1865.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Height of the Cistern of the Standard Barometer above the Sea-level, 18 ft. 11 in.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.885	29.974	29.802	0.172	84.9	96.4	75.0	21.4
2	*Sunday.*							
3	.843	.908	.789	.119	83.6	94.6	78.4	16.2
4	.842	.918	.735	.183	83.8	98.2	73.4	24.8
5	.885	.947	.811	.136	80.4	90.0	72.4	17.6
6	.814	.888	.737	.151	83.6	93.0	77.0	16.0
7	.786	.878	.715	.163	85.3	94.6	79.0	15.6
8	.788	.853	.731	.122	87.5	96.5	81.6	14.9
9	*Sunday.*							
10	.811	.885	.746	.139	87.5	96.8	80.4	16.4
11	.825	.908	.771	.137	86.2	96.6	80.2	16.4
12	.872	.949	.785	.164	85.1	93.6	78.2	15.4
13	.897	.985	.833	.152	84.3	92.1	75.2	16.9
14	.877	.964	.794	.170	85.4	94.6	79.2	15.4
15	.816	.885	.731	.154	85.7	95.2	79.6	15.6
16	*Sunday.*							
17	.729	.795	.675	.120	81.5	90.8	76.4	14.4
18	.824	.905	.716	.189	82.6	92.4	75.4	17.0
19	.879	.969	.809	.160	84.4	92.5	78.2	14.3
20	.761	.852	.664	.188	85.4	93.6	79.6	14.0
21	.701	.778	.622	.156	86.2	94.8	80.6	14.2
22	.744	.795	.673	.122	79.6	91.1	73.4	17.7
23	*Sunday.*							
24	.714	.786	.647	.139	82.5	91.0	76.2	14.8
25	.706	.786	.629	.157	85.7	93.8	79.8	14.0
26	.736	.808	.653	.155	86.4	92.6	81.4	11.2
27	.782	.845	.693	.152	84.6	91.4	77.9	13.5
28	.729	.802	.637	.165	85.6	91.6	80.6	11.0
29	.639	.715	.526	.189	85.0	90.6	75.8	14.8
30	*Sunday.*							

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the 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 April, 1865.

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	78.2	6.7	73.5	11 4	0.814	8.70	3.79	0.70
2	*Sunday.*							
3	74.8	8.8	68.6	15.0	.695	7.44	4.59	.62
4	75.5	8.3	69.7	14.1	.720	.71	.39	.64
5	72.6	7.8	67.1	13.3	.661	.13	3.81	.65
6	77.8	5.8	73.7	9.9	.819	8.78	.25	.73
7	79.3	6.0	75.1	10.2	.857	9.15	.49	.72
8	80.8	6.7	76.8	10.7	.905	.61	.88	.71
9	*Sunday.*							
10	78.0	9.5	72.3	15.2	.783	8.32	5.17	.62
11	77.6	8.6	71.6	14.6	.766	.15	4.84	.63
12	77.7	7.4	72.5	12.6	.787	.41	.16	.67
13	75.1	9.2	68.7	15.6	.697	7.44	.84	.61
14	77.6	7.8	72.1	13.3	.778	8.31	.37	.66
15	77.8	7.9	72.3	13.4	.783	.36	.44	.65
16	*Sunday.*							
17	74.9	6.6	70.3	11.2	.734	7.90	3.41	.70
18	75.9	6.7	71.2	11.4	.756	8.12	.56	.70
19	77.8	6.6	73.2	11.2	.806	.63	.68	.70
20	78.3	7.1	73.3	12.1	.809	.63	4.05	.68
21	79.9	6.3	75.5	10.7	.868	9.25	3.74	.71
22	75.2	4.4	72.1	7.5	.778	8.39	2.30	.79
23	*Sunday.*							
24	78.8	3.7	76.2	6.3	.887	9.54	.10	.82
25	80.8	4.9	77.4	8.3	.922	.85	.95	.77
26	80.8	5.6	76.9	9.5	.908	.66	3.40	.74
27	78.9	5.7	74.9	9.7	.851	.09	.30	.73
28	79.3	6.3	74.9	10.7	851	.08	.68	.71
29	78.6	6.4	74.1	10.9	.830	8.87	.66	.71
30	*Sunday.*							

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 April, 1865.

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.	o	o	o	o
Mid-night.	29.806	29.904	29.700	0.204	80.3	83.4	73.6	9.8
1	.793	.899	.686	.213	79.9	83.0	73.8	9.2
2	.780	.884	.673	.211	79.5	82.6	74.0	8.6
3	.770	.878	.642	.236	79.2	82.6	73.8	8.8
4	.771	.875	.646	.229	79.1	82.8	72.8	10.0
5	.790	.898	.651	.247	78.5	82.6	72.8	9.8
6	.804	.913	.652	.261	78.5	82.4	72.4	10.0
7	.826	.930	.659	.271	79.6	84.0	72.6	11.4
8	.848	.962	.675	.287	82.2	85.4	76.0	9.4
9	.863	.974	.697	.277	85.2	87.8	79.4	8.4
10	.864	.985	.686	.299	87.6	89.6	82.0	7.6
11	.854	.971	.673	.298	89.7	92.7	84.0	8.7
Noon.	.830	.953	.651	.302	91.2	94.6	85.7	8.9
1	.799	.936	.623	.313	92.3	97.0	86.4	10.6
2	.769	.917	.598	.319	92.8	97.4	88.4	9.0
3	.744	.883	.558	.325	92.6	98.2	84.0	14.2
4	.729	.855	.543	.312	91.0	97.8	75.0	22.8
5	.725	.836	.526	.310	89.6	96.2	73.8	22.4
6	.740	.843	.539	.304	86.6	93.4	73.6	19.8
7	.763	.900	.599	.301	84.2	90.8	72.8	18.0
8	.784	.927	.647	.280	82.9	86.8	73.8	13.0
9	.805	.931	.694	.237	81.7	85.0	73.8	11.2
10	.815	.906	.648	.258	81.4	84.4	73.6	10.8
11	.811	.919	.648	.271	80.5	84.4	73.4	11.0

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means 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 April, 1865.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	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.	Troy grs.	Troy grs.	
Mid-night.	76.6	3.7	74.0	6.3	0.827	8.93	1.98	0.82
1	76.6	3.3	74.3	5.6	.835	9.01	.77	.84
2	76.3	3.2	74.1	5.4	.830	8.98	.68	.84
3	76.1	3.1	73.9	5.3	.824	.92	.64	.85
4	76.4	2.7	74.5	4.6	.840	9.09	.44	.86
5	75.6	2.9	73.6	4.9	.819	8.84	.51	.85
6	75.8	2.7	73.9	4.6	.824	.92	.43	.86
7	76.4	3.2	74.2	5.4	.832	9.00	.69	.84
8	77.7	4.5	74.5	7.7	.840	.03	2.51	.78
9	78.7	6.5	74.1	11.1	.830	8.87	3.74	.70
10	79.2	8.4	74.2	13.4	.832	.85	4.67	.66
11	79.6	10.1	73.5	16.2	.814	.62	5.75	.60
Noon.	79.7	11.5	72.8	18.4	.795	.40	6.62	.56
1	79.8	12.5	72.3	20.0	.783	.24	7.26	.53
2	79.6	13.2	71.7	21.1	.768	.08	.64	.51
3	79.5	13.1	71.6	21.0	.766	.05	.58	.52
4	78.8	12.2	71.5	19.5	.763	.04	6.89	.54
5	78.5	11.1	71.8	17.8	.771	.15	.18	.57
6	78.0	8.6	72.8	13.8	.795	.47	4.67	.65
7	77.6	6.6	73.0	11.2	.801	.57	3.67	.70
8	77.0	5.9	72.9	10.0	.797	.56	.23	.73
9	76.8	4.9	73.4	8.3	.811	.73	2.64	.77
10	76.8	4.6	73.6	7.8	.817	.79	.48	.78
11	76.5	4.0	73.7	6.8	.819	.83	.15	.80

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 April, 1865.

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	140.0	...	S.	Cloudless till 1 P. M. _i & ^i afterwards.
2	...	...	*Sunday.*	
3	138.4	...	S. E. & S.	Cloudy till 9 A. M. Scatd. clouds till 6 P. M. _i afterwards drizzled at 4 P. M.
4	141.0	0.73	S. W. & S. E.	_i till 9 A. M. _i till 4 P. M. cloudy afterwards, thundering, lightning, raining at 6-7-9 & 10 P. M. & hailstones fell between 5 & 6 P. M.
5	132.0	...	W. & S. & N. W.	_i till 1 P. M. cloudless till 7 P. M. _i afterwards.
6	136.0	...	S. & S. E.	Scatd. clouds till 9 A. M. _i till 3 P. M. cloudy afterwards, thundering, lightning & raining between 6 & 7 P. M.
7	137.2	...	S. & S E.	Cloudless till 4 A. M. cloudy till 10 A. M. cloudless afterwards.
8	139.0	...	S. & S. W. & W.	Cloudy till 8 A. M. ^i till 8 P. M. cloudless afterwards.
9	...	...	*Sunday.*	
10	136.0	...	S. W. & S.	Cloudy till 9 A. M. cloudless afterwards.
11	141.0	...	S. & S. W.	Flying clouds till 6 A. M. cloudless afterwards.
12	133.5	...	S.	Cloudless till 5 P M. cloudy afterwards.
13	132.0	...	S. & S W.	\ till 7 A. M. ^i till 3 P. M. _i afterwards.
14	134.5	...	S. & S. W.	Cloudy till 7 A. M. _i till 6 P. M. cloudless afterwards.
15	136.0	...	S. & S. W.	_i till noon, cloudless afterwards.
16	...	...	*Sunday.*	
17	136.5	...	S. E. & S.	_i till 10 A. M. cloudy afterwards, lightning at 9 & 11 P. M.
18	132.0	0.17	E. & S. & S. E.	Cloudy till 4 A. M. Scatd. clouds afterwards, raining & thundering at 4 P. M.
19	131.0	...	S. & S. W.	Cloudy till 7 A. M. _i & ^i till 8 P. M. cloudless afterwards.
20	137.0	...	S. & S. W.	Cloudless till 2 A. M. _i afterwards.
21	132.8	...	S. & S. W.	_i till 4 A. M. cloudy till 8 A. M. _i till 4 P. M. cloudless till 7 P. M. cloudy & lightning afterwards.
22	127.5	1.67	S. & S. E.	Scatd. clouds till 1 P. M. cloudy afterwards, raining between midnight & 1 A. M. & from 4 to 7 P. M. thundering & lightning from 5 to 7 P. M.
23	...	1.36	*Sunday.*	

\i Cirri, —i Strati, ^i Cumuli, _i Cirro strati, ^i Cumulo strati, _i Nimbi _ 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, 1865.

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		
24	128.9	...	S. E. & S.	Cloudless till 3 A. M. ⌒i & ⌣i till 7 P. M. cloudless afterwards.
25	135.8	...	S.	Cloudless till 5 A. M. ⌒i & ⌣i afterwards.
26	131.0	...	S.	⌣i till 4 A. M. ⌣i & ⌒i till 2 M. ⌒i till 6 P. M. cloudy afterwards, lightning at 7, 10 & 11 P. M.
27	131.0	...	S.	Cloudy till 11 A. M. ⌒i till 7 P. M. cloudless afterwards, drizzling at 2 A. M. & 1 P. M. lightning at midnight.
28	124.0	...	S. (high.)	⌒i till 8 A. M. ⌣i afterwards.
29	127.0	0.35	S.	Scatd. clouds till 6 P. M. cloudy afterwards, raining between 9 & 10 P. M. lightning & thundering from 8 to 10 P. M.
30	...	...	*Sunday.*	

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April, 1865.

Monthly Results.

	Inches
Mean height of the Barometer for the month, ...	29.795
Max. height of the Barometer occurred at 10 A. M. on the 13th, ..	29.985
Min. height of the Barometer occurred at 5 P. M. on the 29th, ..	29.526
Extreme range of the Barometer during the month, ...	0.459
Mean of the Daily Max. Pressures, ...	29.871
Ditto ditto Min. ditto, ...	29.717
Mean daily range of the Barometer during the month, ...	0.154

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	o
Mean Dry Bulb Thermometer for the month, ...	84.5
Max. Temperature occurred at 3 P. M. on the 4th, ...	98.2
Min. Temperature occurred at 6 A. M. on the 5th, ...	72.4
Extreme range of the Temperature during the month, ...	25.8
Mean of the daily Max. Temperature, ...	93.5
Ditto ditto Min. ditto, ...	77.8
Mean daily range of the Temperature during the month, ...	15.7

Mean Wet Bulb Thermometer for the month, ...	77.7
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, ..	6.8
Computed Mean Dew-point for the month, ...	72.9
Mean Dry Bulb Thermometer above computed Mean Dew-point, ..	11.6
	Inches
Mean Elastic force of Vapour for the month, ...	0.797

	Troy grains
Mean Weight of Vapour for the month, ...	8.52
Additional Weight of Vapour required for complete saturation, ..	3.83
Mean degree of humidity for the month, complete saturation being unity,	0.69

	Inches
Rained 8 days, Max. fall of rain during 24 hours, ...	1.67
Total amount of rain during the month, ...	4.28
Prevailing direction of the Wind, ...	S. & S. W.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April, 1865.

Monthly Results.

Tables 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.	Missed.
					No. of days.														
Midnight.					1		3		17		1		1						2
1	1						4	1	18		1		1						
2					2		2		18		2				1	1			
3			1		2		1		18		2		1						
4							2		15		2		2				1		3
5							2		12		4		2		1				4
6			1				3		13		7				1				
7					1		5		11		7				1				
8					2		5		9		7		1		1				
9					1		4		9		9		1		1				
10					1		3		10		7		3		1				
11					1		1		11		8		4						
Noon.							3		11		5		5		1				
1							6		10		6		3						
2					1		6		7		8		3						
3							9		7		6		3						
4							5	1	11		7	1	1		1	1			
5	1						4	1	16		3		1						
6	2	1					5	2	16		2								
7			1				4	1	18		1		1	1					
8	1				1		3		17	1	2		1						
9					1	1	3		18		1		2						
10					1	1	2		20	1	1								1
11					1		3		20		1								

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor-General's Office, Calcutta, in the month of May, 1865.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Height of the Cistern of the Standard Barometer above the Sea-level, 18 ft. 11 in.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.542	29.609	29.452	0.157	84.9	92.0	77.6	14.4
2	.698	.673	.551	.122	85.6	92.6	79.4	13.2
3	.557	.625	.438	.187	85.9	92.6	78.4	14.2
4	.506	.589	.447	.142	87.4	92.6	83.2	9.4
5	.545	.657	.476	.181	87.0	94.8	80.3	14.5
6	.682	.806	.590	.216	81.9	93.4	73.0	20.4
7	*Sunday.*							
8	.680	.745	.593	.152	79.8	85.6	77.0	8.6
9	.619	.678	.534	.144	81.9	89.8	74.9	14.9
10	.643	.729	.589	.150	79.3	86.3	73.0	13.3
11	.610	.669	.521	.148	84.0	90.5	78.0	12.5
12	.729	.824	.639	.185	79.8	86.6	73.0	13.6
13	.799	.854	.725	.129	83.3	89.0	77.0	12.0
14	*Sunday.*							
15	.707	.781	.598	.183	86.1	92.5	80.2	12.3
16	.712	.775	.639	.136	84.1	92.0	75.6	16.4
17	.754	.826	.684	.142	84.0	92.1	76.8	15.3
18	.764	.823	.701	.122	86.4	92.4	79.6	12.8
19	.786	.851	.716	.135	86.6	93.2	82.0	11.2
20	.767	.844	.674	.170	85.2	92.6	78.4	14.2
21	*Sunday.*							
22	.787	.831	.750	.081	79.8	87.8	76.6	11.2
23	.771	.844	.709	.135	82.4	90.0	77.1	12.9
24	.705	.785	.605	.180	82.1	88.2	76.8	11.4
25	.639	.692	.543	.149	78.8	84.6	76.8	7.8
26	.622	.681	.582	.099	81.1	86.3	78.0	8.3
27	.617	.652	.565	.087	82.3	88.5	79.0	9.5
28	*Sunday.*							
29	.487	.549	.427	.122	84.6	92.2	81.3	10.9
30	.459	.501	.415	.086	85.1	91.5	80.6	10.9
31	.486	.520	.442	.078	83.4	87.8	81.4	6.4

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the 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 May, 1865.

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	79 8	5.1	76.2	8.7	0.887	9.49	3.00	0.76
2	79.9	5 7	75.9	9 7	.879	.38	.38	.74
3	80.4	5.5	76.5	9.4	.896	.57	.30	.74
4	82.2	5 2	79.1	8.3	.973	10.36	.09	.77
5	81.0	6.0	77.4	9.6	.922	9.81	.48	.74
6	76.6	5.3	72.9	9.0	.797	8.57	2.87	.75
7	*Sunday.*							
8	76.3	3.5	73.8	6.0	.822	.87	1.88	.83
9	77.3	4.6	74 1	7.8	.830	.92	2.52	.78
10	75.2	4.1	72.3	7.0	.783	.46	.13	.80
11	80.2	3.8	77.5	6.5	.925	9 90	.27	.81
12	75.1	4.7	71.8	8.0	771	8.31	.44	.77
13	77.9	5.4	74.1	9.2	.830	.91	3.02	.75
14	*Sunday.*							
15	79.3	6.8	74.5	11.6	.840	.96	.99	.69
16	78.8	5.3	75.1	9.0	.857	9.17	.04	.75
17	79.4	4.6	76.2	7.8	.887	.51	2 66	.78
18	80.4	6.0	76.2	10.2	.887	.47	3.59	.73
19	80.1	6.5	76 2	10.4	.887	.47	.67	.72
20	78.9	6.3	74.5	10.7	.840	8.98	.63	.71
21	*Sunday.*							
22	77.0	2.8	75.0	4.8	.854	9.22	1.53	.86
23	78.5	3.9	75.8	6.6	.876	.41	2.20	.81
24	78.5	3.6	76.0	6.1	.882	.48	.03	.82
25	76.6	2.2	75.1	3.7	.857	.27	1.17	.89
26	77.8	3.3	75.5	5.6	868	.35	.82	.84
27	79.9	2.4	78.2	4.1	.946	10.17	.41	.88
28	*Sunday.*							
29	81.0	3.6	78.5	6.1	.955	2.3	2.16	.83
30	80.9	4.2	78.0	7.1	.940	.05	.52	.80
31	80.8	2.6	79.0	4.4	.970	.42	1.54	.87

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 May, 1865.

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.	o	o	o	o
Mid-night.	29.661	29.827	29.465	0.362	80.6	85.0	76.8	8.2
1	.651	.811	.458	.353	80.2	85.0	75.4	9.6
2	.635	.804	.417	.357	79.8	85.0	73.0	12.0
3	.642	.806	.463	.343	79 6	84 8	73.6	11.2
4	.630	.808	.445	.363	79.7	83.8	73 2	10.6
5	.651	.824	.449	.375	79.5	84.0	73.6	10.4
6	.667	.826	.468	.358	79.7	83.8	73.6	10.2
7	.681	.832	.477	.355	80.7	84.6	73.0	11.6
8	.693	.842	.475	.367	82.7	87.0	74.2	12.8
9	.705	.854	.492	.362	84.7	88.8	74.3	14.5
10	.702	.851	.497	.354	86.2	90.3	76.0	14.3
11	.692	.843	.482	.361	87.5	92.0	77.9	14.1
Noon.	.671	.827	.473	.354	88.6	92.6	80.8	11.8
1	.650	.806	.445	.361	88.7	93.6	77.3	16.3
2	.625	.784	.427	.357	88.8	94.3	77.5	16.8
3	.605	.773	.418	.355	88.5	94.8	76.4	18.4
4	.587	.750	.415	.335	87 8	94.8	77.3	17.5
5	.592	.759	.423	.336	86.5	94.4	78.0	16.4
6	.601	.753	.429	.324	84.6	90.2	77.8	12.4
7	.626	.771	.446	.325	82.7	87.9	75.6	12.3
8	.645	.773	.454	.319	81.6	87 7	75.6	12.1
9	.661	.786	.469	.317	81.3	86.7	76.3	10.4
10	.678	.815	.486	.329	81.1	85.6	75.8	9.8
11	.674	.824	.473	.351	80.6	85.0	73.0	12.0

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means 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 May, 1865.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	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.	Troy grs.	Troy grs.	
Mid-night.	77.6	3.0	75.5	5.1	0.868	9.37	1.64	0.85
1	77.5	2.7	75.6	4.6	.871	.39	.49	.86
2	77.2	2.6	75.4	4.4	.865	.35	.40	.87
3	77.0	2.6	75.2	4.4	.860	.30	.39	.87
4	77.3	2.4	75.6	4.1	.871	.40	.32	.88
5	77.3	2.2	75 8	3.7	.876	.46	.20	.89
6	77.3	2.4	75.6	4.1	.871	.40	.32	.88
7	77.9	2 8	75.9	4.8	.879	.47	.57	.86
8	78.9	3.8	76.2	6.5	.887	.52	2.20	.81
9	79.9	4.8	76.5	8.2	.896	.59	.83	.77
10	80.4	5 8	76.3	9.9	.890	.50	3.49	.73
11	80.9	6.6	76.9	10.6	.908	.64	.85	.72
Noon.	81 2	7.4	76.8	11.8	.905	.59	4.33	.69
1	81.3	7.4	76.9	11.8	.908	.62	.34	.69
2	81.2	7.6	76.6	12.2	.899	.54	.46	.68
3	80.9	7.6	76.3	12.2	890	.46	.42	.68
4	80.6	7.2	76 3	11,5	.890	.46	.14	.70
5	79.9	6.6	75.9	10.6	.879	.36	3.74	.72
6	79.5	5.1	75.9	8.7	.879	.40	2.99	.76
7	78.4	4.3	75.4	7.3	.865	.30	.42	.79
8	77.6	4.0	74.8	6.8	.849	.13	.21	.81
9	77.7	3.6	75.2	6.1	.860	.26	1.98	.82
10	77.9	3.2	75.7	5.4	.873	.41	.76	.84
11	77.7	2.9	75.7	4.9	.873	.41	.60	.86

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 May, 1865.

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	125.8	0.48	S. (high.)	⌣i to 8 A. M. Scatd. ⌒i & ⌣i to 4 P. M. overcast afterwards. Rain from 7 to 9 P. M.
2	129.0	...	S. & S. W. (high.)	Overcast to 8 A. M. ⌒i to 5 P. M. Scud. afterwards. Thin rain at 1 A. M.
3	123.0	0.39	S. & S. W. (high.)	Overcast to 4 A. M. ⌒i to 10 A. M. Scud to 2 P. M. Overcast afterwards. Rain between 5 & 6 P. M. Thunder & lightning from 7 to 9 P. M.
4	127.8	...	S. (high) & S. E.	⌣i to 4 A. M. Scatd. ⌒i & ⌣i afterwards lightning at 8 P. M.
5	132.7	...	S. & S. W.	Overcast to 9 A. M. Scatd. ⌒i & ⌣i to 5 P. M. overcast lightning & thunder afterwards. Thin rain at 6 A. M. & 7 & 8 P. M.
6	127.0	..	S. E. & S. & E.	Overcast light rain at 6, 7 & 11 P. M. thunder at 6 & 11 P. M. lightning at 11 P. M.
7	...	1.46	*Sunday.*	
8	124.0	0.36	S. E. & N.	Overcast to 7 A. M. Scatd. ⌒i & ⌣i to 6 P. M. ⌣i afterwards. Rain from 1 to 3 P. M. thunder at 2 P. M.
9	125.0	0.62	S. & S. E. & S. W.	⌣i & ⌒i to 5 P. M. overcast afterwards. Rain, thunder & lightning at 8 P. M.
10	126.0	1.65	S. & S. W.	Overcast to 11 A. M. Scatd. ⌒i & ⌣i to 6 P. M. overcast afterwards. Rain from 2 to 7 A. M. thunder & lightning from 1 to 7 A. M.
11	120.0	0.97	S.	Scatd. ⌒i & ⌣i to 5 P. M. overcast afterwards. Rain at 8 & 9 P. M. thunder & lightning from 7 to 10 P. M.
12	121.6	0.98	S. E. & E. & N. W.	Overcast to 7 A. M. Scatd. ⌒i & ⌣i afterwards. Rain from 2 to 7 A. M. lightning at midnight & 2 A. M. thunder at 2, 6 & 7 A. M.
13	128.0	...	E. & N. E.	Scatd. ⌒i & ⌣i to 4 A. M. ⌣i to 9 A. M. ⌒i to 5 P. M. cloudless afterwards.
14	...	...	*Sunday.*	
15	135.0	...	S. E. & S.	Cloudless to 4 A. M. ⌣i to 8 A. M. ⌒i afterwards.
16	133.0	0.71	S. & S. E.	Scatd. ⌒i & ⌣i to 6 P. M. overcast afterwards. Rain from 6 to 8 P. M. lightniug from 8 to 10 P. M.
17	127.0	...	S. & S. W.	Scatd. ⌒i & ⌣i to 9 A. M. ⌒i to 4 P. M. overcast afterwards, lightning at 9 P. M.

⌣i Cirri, —i Strati, ⌒i Cumuli, ⌣i Cirro-strati, ⌒i Cumulo-strati, ⌣i Nimbi ⌣i Cirro cumuli.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of May, 1865.

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		
18	126.5	...	S. & S. W.	Overcast almost all day: Lightning from 7 to 10 P. M. thunder at 8 & 9 P. M. light rain at 11 P. M.
19	128.0	...	S. & S W.	Scatd. ⌒i & ⌣i to 6 P. M. overcast afterwards.
20	130.0	...	S. & S. E.	Overcast to 6 A. M. ⌒i & ⌣i afterwards.
21	...	...	*Sunday.*	
22	116.0	2.77	S. & S. E.	Scatd. ⌒i & ⌣i whole day, Rain at 6, 8, 10 A. M. 2 & 3 P. M. thunder at 10 A. M. lightning at 9 P. M.
23	131.0	...	S. E. & S. & E.	Scatd. ⌒i & ⌣i to 7 P. M. cloudless afterwards. Thin rain between Noon & 1 P. M.
24	118.0	1.50	S. E. & S.	Cloudless to 3 A. M. Scatd. ⌒i & ⌣i to noon overcast afterwards. Rain at 10 A. M. 1, 5, 6, 8 & 9 P. M. lightning & thunder from 5 to 10 P. M.
25	...	1.08	E. & variable.	Overcast all day. Rain from noon to 5 P.M.
26	121.0	0.10	E. & S. & S. E.	⌣i to 5 A. M. overcast to 7 P. M. ⌒i afterwards, rain between 9 & 10 A. M.
27	130.0	1.02	E. & S. E. & S.	Scatd. ⌒i & ⌣i to 7 P. M. cloudless afterwards. Rain at 3 A. M. noon to 2 P. M.
28	...	...	*Sunday.*	
29	130.0	1.31	S. E. & S. & W.	Scatd. ⌒i & ⌣i to 2 P. M. overcast to 7 P. M. cloudless afterwards. Rain at 1 A. M. & at 4, 5 P. M.
30	130.0	...	E. & variable.	Scatd. ⌒i & ⌣i drizzled at 3 P. M.
31	...	0.54	S. & E. & S. E.	⌣i to 3 A. M. overcast to 5 P. M. Scatd. ⌒i & ⌣i afterwards. Rain from 10 A. M. to 2 P. M.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of May, 1865.

Monthly Results.

	Inches
Mean height of the Barometer for the month, ...	29.651
Max. height of the Barometer occurred at 9 A. M. on the 13th, ..	29.854
Min. height of the Barometer occurred at 4 P. M. on the 30th, ..	29.415
Extreme range of the Barometer during the month, ...	0.439
Mean of the Daily Max. Pressures, ...	29.719
Ditto ditto Min. ditto, ...	29.578
Mean daily range of the Barometer during the month, ...	0.141
	o
Mean Dry Bulb Thermometer for the month, ...	83.4
Max. Temperature occurred at 3 & 4 P. M. on the 5th, ...	94.8
Min. Temperature occurred at 7 A. M. on the 10th, ...	73.0
Extreme range of the Temperature during the month, ...	21.8
Mean of the daily Max. Temperature, ...	90.3
Ditto ditto Min. ditto, ...	78.0
Mean daily range of the Temperature during the month, ...	12.3
Mean Wet Bulb Thermometer for the month, ...	78.9
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, ..	4.5
Computed Mean Dew-point for the month, ...	75.7
Mean Dry Bulb Thermometer above computed Mean Dew-point, ..	7.7
	Inches
Mean Elastic force of Vapour for the month, ...	0.873
	Troy grains
Mean Weight of Vapour for the month, ...	9.36
Additional Weight of Vapour required for complete saturation, ..	2 60
Mean degree of humidity for the month, complete saturation being unity,	0.78
	Inches
Rained 22 days, Max. fall of rain during 24 hours, ...	2.77
Total amount of rain during the month, ...	15.94
Prevailing direction of the Wind, ...	S. & S. E.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of May, 1865.

Monthly Results.

Tables 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.	Missed.
	No. of days.																		
Midnight.	1				1		4		13		4		2				1		1
1	1				3		3		13		3		2	1			2	1	
2	1				2		3		15	1	1		1		1	1	2		1
3	1		2		1		6	1	8		4		1	1	1	1	1		2
4			1		2		5		10		3	1	2		1		1		2
5			2	1	5		6		7		3		2		1	1			1
6	1		4	1	5		7		6	1	2				2	2			
7	1		1		8	1	6		8		2				1	1			
8			2	1	8		7		6		4								
9			1		6		9		6		5								
10					7	1	6	1	11	2	3								
11					5		7		10		3		1		1				
Noon.			1	1	3	2	7		11		5								
1					4	2	5	1	9	1	5	1	3		1	1			
2	1	1			3	1	2		11	1	7	1	3	1					
3			1	1	2	1	4	1	14	1	6								
4			2	1	4	1	5		14		2								
5	1		3	2	2	1	7		12		1				1				
6			2	1	3		8	1	11	1	2	1			1				
7	1	1	1		3		9	1	11				1	1	1	1			
8					4		8	1	12	2	2	2	1	1					
9			1		3		6	1	15	2	1						1		
10	1				2		7		16		1								
11	1	1			2		8		12		3	1					1		

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June, 1865.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Height of the Cistern of the Standard Barometer above the Sea-level, 18 ft. 11 in.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.526	29.582	29.491	0.091	83.9	90.8	80.2	10.6
2	.585	.633	.539	.094	84.2	89.0	80.4	8.6
3	.634	.692	.574	.118	87.0	91.4	82.8	8.6
4	*Sunday.*							
5	.646	.701	.571	.130	88.3	93.6	83.4	10.2
6	.663	.722	.593	.129	88.4	94.4	83.2	11 2
7	.670	.740	.589	.151	88.3	94.6	83.8	10.8
8	.617	.688	.539	.149	88 6	94.4	84.2	10.2
9	.517	.569	.433	.136	88.4	93.0	85 0	8.0
10	.491	.567	.449	.118	87.5	91.8	84.0	7.8
11	.572	.628	.511	.117	84.7	87.8	82.8	5.0
12	.581	.632	.510	.122	86.4	95.4	80.0	15.4
13	.523	.572	.447	.125	84.8	92.3	80.5	11.8
14	.478	.524	.418	.106	86.5	92.4	80.8	11.6
15	.484	.526	.446	.080	83.9	86.7	82.0	4.7
16	.495	.541	.439	.102	82.5	87.1	79 6	7.5
17	.456	.488	.411	.077	81.5	83.2	80.4	2.8
18	.451	.533	.405	.128	79.7	81.0	78.6	2.4
19	.561	.642	.495	.147	82.0	86.7	77.0	9.7
20	.643	.700	.597	.103	85.8	91.2	81.4	9.8
21	.636	.674	.580	.094	87.4	93.2	83.1	10.1
22	.615	.662	.567	.095	88.2	93.8	84.0	9.8
23	.573	.619	.502	.117	89.0	95.0	84.2	10.8
24	.543	.607	.491	.116	88.3	96.0	81.0	15.0
25	.538	.600	.471	.129	89.0	96 0	85.4	10.6
26	.567	.605	.510	.095	87.8	94.2	84.2	10.0
27	.552	.613	.468	.145	88.9	95.4	84.3	11.1
28	.500	.551	.408	.143	86.2	89.0	83.4	5.6
29	.433	.492	.370	.122	85.2	90.8	82.2	8.6
30	.417	.507	.352	.155	84.2	88.8	82.0	6.8

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the 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 June, 1865.

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	80.9	3.0	78.8	5.1	0.964	10.34	1.79	0.85
2	81.1	3.1	78.9	5.3	.967	.37	.87	.85
3	82.6	4.4	80.0	7.0	1.001	.66	2.63	.80
4	*Sunday.*							
5	82.5	5.8	79.0	9.3	0.970	.31	3.49	.75
6	82.6	5.8	79.1	9.3	.973	.34	.50	.75
7	82.7	5.6	79.3	9 0	.979	.40	.40	.75
8	82.9	5.7	79 5	9.1	.986	.47	.45	.75
9	84.0	4.4	81.4	7.0	1 047	11.11	2.73	.80
10	82.9	4.6	80.1	7.4	.005	10.69	.80	.79
11	80.3	4.4	77.2	7.5	0.916	9 79	.63	.79
12	81.6	4.8	78.2	8.2	.946	10.09	.97	.77
13	80.8	4.0	78.0	6.8	.940	.05	.41	.81
14	81.6	4.9	78.7	7.8	.961	.24	.86	.78
15	81.4	2.5	79.6	4.3	.989	.60	1.53	.87
16	80.0	2.5	78.2	4.3	.946	.17	.47	.87
17	79.7	1.8	78.4	3.1	.952	.25	.06	.91
18	78.5	1 2	77.7	2.0	.931	.06	0.66	.94
19	79.3	2.7	77.4	4.6	.922	9.91	1.56	.86
20	82.2	3.6	79.7	6.1	.992	10.59	2.24	.83
21	83.2	4.2	80.7	6.7	1.024	.89	.56	.81
22	83.8	4.4	81.2	7.0	.040	11.05	.71	.80
23	84.3	4.7	81.5	7.5	.050	.13	.95	.79
24	83.2	5.1	80.1	8.2	.005	10.67	3.13	.77
25	84.4	4.6	81.6	7.4	.053	11.18	2.90	.79
26	83.3	4.5	80.6	7.2	.021	10.86	.74	.80
27	83.3	5.6	79.9	9.0	0 998	.59	3.45	.75
28	83.1	3.1	80.9	5.3	1.030	.99	2.00	.85
29	81.8	3.4	79.4	5.8	0.983	.49	.12	.83
30	81.5	2.7	79.6	4.6	.989	.58	1.66	.86

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 June, 1865.

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.	o	o	o	o
Mid-night.	29.564	29.684	29.416	0.268	83.9	86.8	79.4	7.4
1	.554	.682	.404	.278	83.5	86.4	78.3	8.1
2	.543	.677	.398	.279	83.2	86.0	78.2	7.8
3	.527	.667	.391	.276	82.9	86.0	78.2	7.8
4	.535	.653	.389	.264	82.9	86.0	77 5	8 5
5	.542	.669	.395	.274	82.9	86.0	77.0	9.0
6	.555	.689	.417	.272	83.0	86.2	77.2	9.0
7	.572	.706	.429	.277	83.7	87.0	78.2	8.8
8	.582	.737	.438	.299	85.1	88.6	79.0	9.6
9	.591	.740	.432	.308	86.5	89.8	79.6	10.2
10	.590	.728	.429	.299	87.8	92.0	80.4	11.6
11	.584	.722	.426	.296	88.8	94.0	79.8	14.2
Noon.	.570	.710	.405	.305	89.8	95.4	79.8	15.6
1	.552	.685	.384	.301	90.3	96.0	80.0	16.0
2	.532	.659	.369	.290	90.4	95.2	79.8	15.4
3	.513	.638	.356	.282	90.4	96.0	79.8	16 2
4	.497	.614	.352	.262	89.6	96.0	79 2	16.8
5	.496	.616	.366	.250	88 6	94.2	79 0	15.2
6	.508	.613	.370	.243	87.3	93 0	78.6	14.4
7	.525	.627	.385	.242	86.1	91.2	79.4	11.8
8	.548	.659	.394	.265	85.2	90.0	80.0	10.0
9	.567	.683	.405	.278	84.8	88.4	80.4	8.0
10	.578	.688	.426	.262	84.4	87.4	80.4	7.0
11	.575	.692	.432	.260	84.2	87.0	80.4	6.6

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means 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 June, 1865.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	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.	Troy grs.	Troy grs.	
Mid-night.	81.6	2.3	80.0	3.9	1.001	10.72	1.41	0.88
1	81.3	2.2	79.8	3.7	0.995	.66	.34	.89
2	81.2	2.0	79.8	3.4	.995	.69	.20	.90
3	81.0	1.9	79.7	3.2	.992	.66	.13	.90
4	81.0	1.9	79.7	3.2	.992	.66	.13	.90
5	80.9	2.0	79.5	3.4	.986	.60	.19	.90
6	81.1	1.9	79.8	3.2	.995	.69	.13	.90
7	81.2	2.5	79.4	4.3	.983	.54	.53	.87
8	81.8	3.3	79.5	5.6	.986	.53	2.04	.84
9	82.2	4.3	79.6	6.9	.989	.54	.56	.81
10	82.7	5.1	79.6	8.2	.989	.52	3.08	.77
11	83.1	5.7	79.7	9.1	.992	.53	.47	.75
Noon.	83.1	6.7	79.1	10.7	.973	.30	4.12	.71
1	83.5	6.8	79.4	10.9	.983	.39	.24	.71
2	83.4	7.0	79.2	11.2	.976	.33	.34	.70
3	83.4	7.0	79.2	11.2	.976	.33	.34	.70
4	83.1	6.5	79.2	10.4	.976	.35	3.98	.72
5	82.6	6.0	79.0	9.6	.970	.29	.63	.74
6	82.0	5.3	78.8	8.5	.964	.25	.16	.76
7	82.0	4.1	79.1	7.0	.973	.38	2.57	.80
8	81.7	3.5	79.2	6.0	.976	.43	.18	.83
9	81.7	3.1	79.5	5.3	.986	.55	1.91	.85
10	81.7	2.7	79.8	4.6	.995	.64	.67	.86
11	81.6	2.6	79.8	4.4	.995	.66	.58	.87

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 June, 1865.

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	123.0	0.30	E. & S. E. & S.	Overcast nearly the whole day. Lightning towards S. from 7 to 11 P. M. Rain at 11 P. M.
2	...	0.09	S. & S. W.	Overcast. Light rain between Noon & 1 P. M. Thunder & Lightning at midnight & 1 A. M. 2, 5 & 8 P. M.
3	128.0	...	S. & S. W.	Overcast to 6 A. M. Scud afterwards.
4	...	...	*Sunday.*	
5	129.6	...	S. & S. W.	Cloudless to 7 A. M. ⌒i afterwards.
6	131.0	...	S.	⌣i to 6 A. M. ⌒i to 2 P. M. ⌣i & ⌒i to 7 P. M. Cloudless afterwards.
7	131.0	...	S.	Cloudless to 2 A. M. ⌣i to 6 A. M. ⌒i to 6 P. M. overcast afterwards.
8	130.0	...	S.	Scud to 9 A. M. ⌒i to 5 P. M. Scud afterwards.
9	124.2	...	S.	Scud to 2 A. M. overcast to 8 A. M. ⌒i & ⌣i afterwards.
10	124.0	...	S. & S. E.	Overcast to 3 A. M. ⌒i & ⌣i to 1 P. M. overcast afterwards. Thin rain at 1 A. M.
11	...	...	S. E. & E. & S.	Overcast. Drizzled at 1 A. M.
12	134.0	0.91	S. W. & E.	Light clouds to 6 A. M. ⌣i & ⌒i to 4 P. M. overcast afterwards. Rain at 6, 8 & 9 P. M. Thunder at 6 P. M.
13	129.6	0.10	S. W. & N. & W.	Overcast to 8 A. M. ⌒i & ⌣i to 6 P. M. Overcast afterwards, light rain from 7 to 10 P. M.
14	126.8	...	W. & S. W. & S.	Light clouds to 2 A. M. ⌣i to 11 A. M. ⌒i & ⌣i afterwards.
15	...	0.53	S. & S. W.	⌣i to 3 A. M. overcast afterwards. Rain at 6 & 7 A. M. noon, 3 & 4 P. M.
16	...	1.16	W. & S. W.	Overcast. Rain from 1 to 3 A. M. light rain at 1 P. M. & from 7 to 10 P. M.
17	...	0.14	W. & S. W.	Overcast. Light rain after intervals.
18	...	*2.62	W. & S. W.	Overcast. Rain whole day. Lightning at 10 P. M.
19	...	†1.26	S. W. & S.	Overcast. Light rain from Midnight to 7 A. M.
20	129.0	0.41	S. & S. W.	Overcast to 7 A. M. \i & ⌣i to 11 A. M. ⌣i & ⌒i afterwards. Rain at 1 & 4 A. M. & at 5 P. M.

\i Cirri, —i Strati, ⌒i Cumuli, ⌣i Cirro-strati, ⌒i Cumulo-strati, ⌣i Nimbi, \i Cirro cumuli.

* Fell from 9 P. M. of the 17th to Noon of the 18th.

† Fell from 1 P. M. of the 18th to 7 A. M. of the 19th.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June, 1865.

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		
21	137.5	...	S.	Light clouds to 8 A. M. ⌒i to 4 P. M. ⌣i to 7 P. M. cloudless afterwards.
22	130.2	...	S.	Cloudless to 4 A. M. ⌒i afterwards.
23	133.0	...	S.	⌣i to 4 A. M.; light clouds to noon, ⌒i afterwards.
24	138.0	0.12	S.	Overcast to 10 A. M. \i & ⌣i to 4 P. M. ⌣i & ⌒i afterwards. Rain at 6 & 7 A. M. Lightning towards W. at midnight.
25	128.0	...	S.	Cloudless to 5 A. M. ⌒i to 3 P. M. overcast to 8 P. M. ⌒i & ⌣i afterwards.
26	127.0	...	S. & S. E.	⌣i & ⌒i to 3 P. M. overcast afterwards; Lightning towards S. at 8 P. M. Light rain at 9 P. M.
27	137.0	...	S. E. & E.	⌒i & ⌣i to 8 A. M. ⌒i to 7 P. M. cloudless afterwards.
28	...	...	E. & S. & variable.	Cloudless to 3 A. M. overcast to 3 P. M. ⌒i & ⌣i afterwards: Light rain from noon to 3 P. M.
29	120.8	0.28	E. & N. E.	⌣i & ⌒i to 8 A. M. overcast to 6 P. M. ⌒i & ⌣i afterwards. Rain at 3 P. M.
30	...	0.71	S. E. & N. E. & E.	Overcast. Rain after intervals from noon to 11 P. M.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June, 1865.

Monthly Results.

	Inches
Mean height of the Barometer for the month, ...	29.550
Max. height of the Barometer occurred at 9 A. M. on the 7th, ..	29.740
Min. height of the Barometer occurred at 4 P. M. on the 30th, ..	29.352
Extreme range of the Barometer during the month, ...	0.388
Mean of the Daily Max. Pressures, ...	29.607
Ditto ditto Min. ditto, ...	29.489
Mean daily range of the Barometer during the month, ...	0.118

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	o
Mean Dry Bulb Thermometer for the month, ...	86.1
Max. Temperature occurred at 4 P. M. on the 24th, ...	96.0
Min. Temperature occurred at 5 A. M. on the 19th, ...	77.0
Extreme range of the Temperature during the month, ...	19.0
Mean of the daily Max. Temperature, ...	91.3
Ditto ditto Min. ditto, ...	82.2
Mean daily range of the Temperature during the month, ...	9.1

Mean Wet Bulb Thermometer for the month, ...	82.1
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, ..	4.0
Computed Mean Dew-point for the month, ...	79.3
Mean Dry Bulb Thermometer above computed Mean Dew-point, ..	6.8
	Inches
Mean Elastic force of Vapour for the month, ...	0.979

	Troy grains
Mean Weight of Vapour for the month, ...	10.14
Additional Weight of Vapour required for complete saturation, ..	2.51
Mean degree of humidity for the month, complete saturation being unity,	0.81

	Inches
Rained 17 days, Max. fall of rain during 24 hours, ...	2.62
Total amount of rain during the month, ...	8.63
Prevailing direction of the Wind, ...	S. & S. W.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June, 1865.

Monthly Results.

Tables 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.	Missed.
									No. of days.										
Midnight.	1		1		1		4		17		3	2	1						1
1	1		1		1		4	1	16	2	4	2	2	1					
2	1		1		1		3		17		3	1	3	2					
3	1				2		2		14		2	1	2	2					6
4	1				3		2		17	1	2	1	4	1					
5	1		2				4		15		3	1	4	2					
6	1		1		3	1	3		15	1	3	1	2	1	1	1			
7	1				3		1		11		6	2	5	2	2	1			
8			3		1		2		10		6		6	1	1				
9	1		1		3		1		11		7		5	1					
10	1		1		4		2		12		4	1	4	1	1				
11	2		2		3		2		12		6	1	1	1	1				
Noon.	1		2	1	4	2	2		12		5	1	3						
1	1		1		2		3	2	13		5	2	2		2	1			
2	2				3	1	4	1	10		5	1	4	1	1				
3			1	1	5	1	2		10		6	1	5	1					
4					5		2		13	1	6	1	3	1					
5			2		3		3		14		7	2							
6			1		4		2		15		5	1	2	1					
7			1		3		4	1	16		4	2			1	1			
8					1		4	1	18	1	4	2	1	1			1		
9					1		3	1	19	2	4	3	1	1			1		
10					1		3		18		5	3	1	1			1		
11					1		5	1	17	1	3	2	1		1		1		

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of July, 1865.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Height of the Cistern of the Standard Barometer above the Sea-level, 18 ft. 11 in.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.523	29.584	29.465	0.119	84.3	88.6	80.8	7.8
2	.550	.590	.487	.103	85.2	90.8	81.7	9.1
3	.548	.596	.477	.119	85.5	92.6	82.0	10.6
4	.491	.573	.417	.156	85.0	89.5	82.0	7.5
5	.445	.484	.381	.103	84.6	88.5	81.4	7.1
6	.455	.490	.410	.080	84.6	88.3	81.6	6.7
7	.440	.484	.380	.104	83.7	86.9	81.6	5.3
8	.434	.483	.388	.095	83.4	88.0	80.2	7.8
9	.457	.506	.411	.095	84.2	89.0	81.0	8.0
10	.494	.547	.456	.091	85.4	91.4	81.6	9.8
11	.539	.605	.482	.123	83.8	90.1	78.0	12.1
12	.522	.577	.444	.133	81.4	85.0	78.4	6.6
13	.512	.553	.465	.088	84.2	91.2	81.4	9.8
14	.537	.592	.483	.109	84.8	90.6	79.0	11.6
15	.535	.587	.482	.105	82.6	85.6	79.6	6.0
16	.524	.562	.486	.076	82 5	87.1	79.2	7.9
17	.536	.587	.495	.092	82.7	85.6	80.0	5.6
18	.558	.597	.503	.094	84.2	87.4	81.8	5.6
19	.540	.585	.479	.106	85.4	90.5	81.4	9.1
20	.582	.631	.536	.095	85.2	88.6	82.6	6.0
21	.598	.656	.537	.119	85 3	88.9	82.9	6.0
22	.604	.655	.557	.098	85.7	90.8	82.5	8.3
23	.640	.699	.585	.114	85.2	89.6	80.2	9.4
24	.687	.739	.628	.111	83.5	89.0	79.8	9.2
25	.725	.774	.666	.108	81.7	83.8	80 2	3.6
26	.719	.772	.678	.094	83.4	88 4	79.5	8.9
27	.708	.758	.659	.099	83.2	87.7	79.8	7.9
28	.749	.803	.700	.103	83.3	87.6	79.4	8.2
29	.759	.798	.707	.091	82.1	85.2	78.5	6.7
30	.714	.772	.646	.126	82.0	88.4	77.4	11.0
31	.678	.726	.601	.125	82.6	88.6	78.8	9.8

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the 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 July, 1865.

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	81.4	2.9	79.4	4.9	0.983	10.51	1.77	0.86
2	81.9	3.3	79.6	5.6	.989	.56	2.05	.84
3	82.1	3.4	79.7	5.8	.992	.59	.13	.83
4	81.9	3.1	79.7	5.3	.992	.61	1.92	.85
5	81.8	2.8	79.8	4.8	.995	.64	.75	.86
6	81.4	3.2	79.2	5.4	.976	.45	.94	.84
7	80.7	3.0	78.6	5 1	.958	.28	.79	.85
8	80.1	3.3	77.8	5.6	.934	.01	.95	.84
9	79.8	4.4	76.7	7.5	.902	9.64	2.60	.79
10	81.0	4.4	77 9	7.5	.937	10.00	.68	.79
11	80.5	3.3	78.2	5.6	.946	.13	1.97	.84
12	79.5	1.9	78.2	3.2	.946	.19	.08	.90
13	81.3	2.9	79.3	4.9	.979	.48	.76	.86
14	81.3	3.5	78.8	6.0	.964	.31	2.15	.83
15	80.4	2.2	78.9	3.7	.967	.39	1 29	.89
16	79.9	2 6	78.1	4.4	.943	.14	.50	.87
17	79.9	2.8	77.9	4.8	.937	.06	.66	.86
18	81.4	2.8	79.4	4.8	.983	.51	.73	.86
19	81.3	4.1	78 4	7.0	.952	.17	2.51	.80
20	81.8	3.4	79.4	5.8	.983	.49	.12	.83
21	81.8	3.5	79.3	6.0	.979	.46	.18	.83
22	81.5	4.2	78 6	7.1	.958	.23	.57	.80
23	81.1	4.1	78.2	7.0	.946	.11	.50	.80
24	80.8	2.7	78.9	4.6	.967	.37	1.63	.86
25	79.7	2.0	78.3	3 4	.949	.22	.15	.90
26	80.7	2 7	78.8	4.6	.964	.34	.62	.87
27	80.4	2.8	78.4	4.8	.952	.21	.68	.86
28	80.7	2.6	78.9	4.4	.967	.39	.54	.87
29	79.6	2.5	77.8	4.3	.934	.05	.46	.87
30	79.6	2.4	77.9	4.1	.937	.08	.39	.88
31	79.7	2.9	77.7	4.9	.931	.00	.68	.86

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 July, 1865.

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.	o	o	o	o
Mid-night.	29.587	29.778	29.432	0.346	82.1	84.0	77.4	6.6
1	.574	.761	.421	.340	82.0	83.8	77.9	5.9
2	.563	.756	.410	.346	81.9	83.8	77.8	6.0
3	.554	.737	.395	.342	81.7	83.4	77.8	5.6
4	.564	.740	.393	.347	81.6	83.5	77.8	5.7
5	.561	.752	.388	.364	81.5	83.4	77.9	5.5
6	.577	.765	.409	.356	81.6	83.0	78.0	5.0
7	.591	.777	.421	.356	82.2	84.0	79.2	4.8
8	.604	.790	.438	.352	83.6	85.4	80.2	5.2
9	.615	.803	.476	.327	84.7	87.5	81.8	5.7
10	.615	.803	.469	.334	85.8	88.9	81.9	7.0
11	.608	.798	.457	.341	86.5	90.4	80.8	9.6
Noon.	.595	.788	.444	.344	86.8	91.4	82.2	9.2
1	.576	.768	.431	.337	87.4	92.6	82.6	10.0
2	.553	.737	.413	.324	87.2	91.4	83.2	8.2
3	.535	.729	.380	.349	87.1	91.2	83.1	8.1
4	.525	.711	.381	.330	86.2	90.0	81.4	8.6
5	.527	.708	.381	.327	85.8	89.4	80.2	9.2
6	.535	.739	.384	.355	84.4	87.6	79.4	8.2
7	.553	.753	.414	.339	83.2	86.4	79.8	6.6
8	.577	.771	.431	.340	82.9	85.8	79.4	6.4
9	.594	.789	.445	.344	82.4	84.8	78.6	6.2
10	.606	.793	.458	.335	82.3	84.6	78.0	6.6
11	.606	.784	.468	.316	82.2	84.4	78.1	6.3

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means 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 July, 1865.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	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.	Troy grs.	Troy grs.	
Mid-night.	80.1	2.0	78.7	3.4	0.961	10.35	1.16	0.90
1	80.0	2.0	78.6	3.4	.958	.32	.15	.90
2	79.9	2.0	78.5	3.4	.955	.29	.15	.90
3	79.7	2.0	78.3	3.4	.949	.22	.15	.90
4	79.6	2.0	78.2	3.4	.946	.19	.15	.90
5	79.6	1.9	78.3	3.2	.949	.22	.09	.90
6	79.7	1.9	78.4	3.2	.952	.25	.09	.90
7	80.1	2.1	78.6	3.6	.958	.30	.24	.89
8	80.8	2.8	78.8	4.8	.964	.34	.69	.86
9	81.2	3.5	78.7	6.0	.961	.29	2.13	.83
10	81.6	4.2	78.7	7.1	.961	.26	.57	.80
11	81.9	4.6	79.1	7.4	.973	.38	.72	.79
Noon.	82.0	4.8	79.1	7.7	.973	.36	.85	.78
1	82.5	4.9	79.6	7.8	.989	.52	.93	.78
2	82.4	4.8	79.5	7.7	.986	.49	.88	.79
3	82.4	4.7	79.6	7.5	.989	.52	.81	.79
4	82.0	4.2	79.1	7.1	.973	.38	.61	.80
5	81.7	4.1	78.8	7.0	.964	.29	.54	.80
6	80.9	3.5	78.4	6.0	.952	.19	.12	.83
7	80.4	2.8	78.4	4.8	.952	.21	1.68	.86
8	80.3	2.6	78.5	4.4	.955	.27	.52	.87
9	80.1	2.3	78.5	3.9	.955	.27	.34	.89
10	80.1	2.2	78.6	3.7	.958	.30	.28	.89
11	80.1	2.1	78.6	3.6	.958	.30	.24	.89

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 July, 1865.

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	113.8	0.60	S. E. & E.	⌒i & ⌣i. Rain after intervals.
2	129.4	0.43	S. E. & E. & S.	⌒i & ⌣i. Rain at 1 A. M. noon 4, 6 & 8 P. M.
3	123.4	0.20	N. E. & S. E.	⌒i & ⌣i. Rain at 2 & 4 P. M.
4	125.4	0.21	N. E. & E.	Overcast to 10 A. M. ⌒i afterwards. Thin rain after intervals.
5	...	0.43	S. E.	Overcast to 3 P. M. ⌒i afterwards. Rain occasionally.
6	...	...	S.	Scud from S. to 5 A. M. Overcast to 1 P. M. ⌒i & ⌣i afterwards. Thin rain at 6 A. M. & noon.
7	...	0.25	S.	⌒i & ⌣i to 11 A. M. ⌣i to 5 P. M. \i & ⌒i afterwards. Thin rain at 5 A. M. from noon to 3 P. M. & at 11 P. M.
8	...	...	S.	⌣i to 11 A. M. ⌒i to 7 P. M. ⌣i afterwards. Light rain from 6 to 8 A. M.
9	119.6	...	S.	⌣i to 4 P. M. ⌣i afterwards. Thin rain at 10 A. M. & 4 P. M.
10	127.5	0.18	S. & S. W.	⌣i to 7 A. M. ⌣i & ⌒i to 4 P. M. ⌣i afterwards. Rain from 7 to 9 P. M.
11	...	2.43*	S. & S. W.	⌒i to 6 A. M. ⌣i & ⌒i to noon: ⌣i to 7 P. M. Overcast afterwards. Rain between 1 & 2 P. M. & from 4 to 11 P. M. Lightning towards W. at 11. P. M.
12	...		S. & S. E.	⌣i nearly the whole day. Rain after intervals. Lightning towards W. at midnight.
13	114.0	0.57	S.	⌒i & ⌣i to 2 P. M. ⌣i afterwards. Rain from 3 to 6 P. M.
14	119.0	2.79	S.	⌒i & ⌣i to 9 A. M. ⌒i to 7 P. M. ⌣i afterwards. Rain from 6 to 9 P. M.
15	...	0.35	S. & S. W.	Overcast nearly the whole day. Rain from 5 to 8 A. M.
16	...	0.31	S.	Overcast nearly the whole day. Rain after intervals.
17	...	0.11	S. E. & S.	Overcast nearly the whole day. Thin rain at 8 A. M. & from 10 to 1 P. M.
18	114.5	...	S. E.	Overcast to 5 A. M. ⌒i & ⌣i to 6 P. M. Cloudless afterwards. Light rain at midnight, 1 & 9 A. M.

\i Cirri, —i Strati, ⌒i Cumuli, ⌣i Cirro-strati, ⌒i Cumulo-strati, ⌣i Nimbi, ⌣i Cirro cumuli.

* Fell on the 11th & 12th.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of July, 1865.

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		
19	121.0	...	S. & S. E.	Cloudless to 5 A. M. ⌒i & \i to 3 P. M. _i to 7 P. M. cloudless afterwards.
20	115.0	0.33	S. & S. E.	Cloudless to 4 A. M. \i & ⌒i to 7 A. M. _i to 2 P. M. _i & ⌒i afterwards Rain at 11 A. M. 1 & 7 P. M.
21	121.5	0.39	S. & S. E.	\i & _i to 9 A. M. ⌒i & Scud. from S to 4 P. M. Overcast to 8 P. M. cloudless afterwards. Rain at 5 P. M.
22	119.0	...	S.	Cloudless to 4 A. M. ⌒i & _i to 7 P. M. Overcast afterwards.
23	124.4	0.15	S.	Overcast to 5 A. M. ⌒i & Scud from S. to 5 P. M. _i afterwards. Thin rain between 7 & 8 A. M. & at 9 & 10 P. M.
24	119.0	0.52	S.	_i to 2 A. M. \i & Scud from S. to 10 A. M. Overcast afterwards. Rain between noon & 1 P. M. & from 4 to 11 P. M.
25	...	0.15	S.	Overcast. Rain from 7 to 11 A. M. & from 3 to 11 P. M.
26	130.1	0.53	S.	Overcast nearly the whole day. Rain at midnight & 1 & 10 A. M. & from 5 to 9 P. M.
27	121.0	...	S.	Overcast to 2 P. M. ⌒i & _i afterwards. Light rain from 7 to 10 A. M. & between 6 & 7 P. M.
28	112.6	0.25	S.	Overcast to 9 A. M. ⌒i to 5 P. M. Overcast afterwards. Light rain at 4, 6, 7 A. M. 4 P. M. & from 6 to 10 P. M.
29	...	1.01*	S.	Overcast, drizzled after intervals.
30	119.7		S. & W.	Overcast to 8 A. M. _i afterwards. Light rain from midnight to 3 A. M. & at 3 & 6 P. M.
31	...	...	S. & W.	Overcast nearly the whole day. Lightning & Thunder from 5 to 9 P. M. Rain from 2 to 11 P. M.

* Fell on the 29th & 30th.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of July, 1865.

Monthly Results.

	Inches
Mean height of the Barometer for the month, ...	29.575
Max. height of the Barometer occurred at 9 & 10 A. M. on the 28th, ..	29.803
Min. height of the Barometer occurred at 3 P. M. on the 7th, ..	29.380
Extreme range of the Barometer during the month, ...	0.423
Mean of the Daily Max. Pressures, ...	29.625
Ditto ditto Min. ditto, ...	29.519
Mean daily range of the Barometer during the month, ...	0.106
	o
Mean Dry Bulb Thermometer for the month, ...	83.9
Max. Temperature occurred at 1 P. M. on the 3rd, ...	92.6
Min. Temperature occurred at Midnight on the 30th, ...	77.4
Extreme range of the Temperature during the month, ...	15.0
Mean of the daily Max. Temperature, ...	88.5
Ditto ditto Min. ditto, ...	80.5
Mean daily range of the Temperature during the month, ...	8.0
Mean Wet Bulb Thermometer for the month, ...	80.8
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, ..	5.3
	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, ..	1.85
Mean degree of humidity for the month, complete saturation being unity,	0.85
	Inches
Rained 29 days, Max. fall of rain during 24 hours, ...	2.79
Total amount of rain during the month, ...	12.19
Prevailing direction of the Wind, ...	S. & S. E.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of July, 1865.

Monthly Results.

Tables 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.	Missed.
									No. of days.										
Midnight.			1		1		5		22	4	2	1							
1			1		1	1	7	2	20	3	2	1							
2			1		1		6	1	21	1	1								1
3			1				7		21		1		1	1					
4					1		6	1	18	2	1								5
5			1				8	1	21	2	1	1							
6			1		2		4		22	3	2	1							
7			2		1		7		19	4	2	1							
8			2	1			8	1	17	5	3	1	1						
9			2				6	1	20	4	2		1						
10			2	1			6	2	20	3	2		1						
11			2				6	2	18	3	4	1	1						
Noon.			2	1	1	1	7	1	20	5	1								
1			2	1	1		6	1	21	5	1								
2			2	1	2	1	5	1	20	2	2	1							
3			2		1		5	2	21	6	2								
4			2	1	2	1	6	1	20	6	1								
5			1		1		7	2	22	7									
6			1		2	1	6	1	18	6	1		3	3					
7			1		1		4		20	8	3	2	2	2					
8			1		1		3		23	7			3	3					
9			1		1	1	6	2	19	5	2	2	2	2					
10			1		1		7	2	19	5	1		2	2					
11			2				5	3	21	3	2	1	1	1					

Meteorological Observations taken at Gangaroowa near Kandy, Ceylon, in the month of January, 1864.

Alt. 1560 ft.; E. Long. 80° 37′, N. Lat. 7° 17′.

All the Instruments have been compared with standards.

The tension of aqueous vapour, dew point and humidity, have been found from the readings of the dry and wet bulb Thermometers by Mr. Glaisher's Hygrometrical tables (Ed. 1863).

The dew is the weight in grains deposited on a square foot of ordinary woollen cloth exposed on a board from 6 P. M. to 6 A. M. or for as many hours as there is no rain.

The rain guage is $4\frac{1}{2}$ feet above the ground.

The ozone cage is hung about 25 feet above the ground.

The direction of the wind given, is that of the lowest current by the vane, and of the currents above this by the direction in which the Nimbi and Cumulo-Strati clouds are moving.

In this column a "calm" signifies that the clouds are apparently motionless: "variable," that the clouds apparently in the same or nearly the same stratum move in no fixed direction, but their parts move as if in vortices, or different masses of them move up from different quarters as if into a vast vortex, this being nearly always the case before thunder storms.

Entries, such as W S W and N N W or $\frac{\text{W S W}}{\text{N N W to calm,}}$ signify that the clouds are evidently in strata of different altitudes, that those in the lowest stratum move from W S W; those in the next higher from N N W; those in the next are apparently becalmed, and so on.

The velocity and distance in 24 hours are given by Robinson's Anemometer.

In the column for Lightning and Thunder

L = "Lightning" when the flash is near enough to be visible.

L R = "Lightning Reflection" when the flash is so distant that only its reflection on the clouds or in the air is visible.

"Morn," is 6 A. M., "Even," 6 P. M. and "Night," 12 P. M. and "fore" and "after" are prefixed to these, as ordinarily to "Noon," to denote the 3 previous and 3 following hours.

R H. Barnes.

Gangaroowa near Kandy, Ceylon.

January, 1864.	Barometer reduced to 32°.			Pressure of Dry Air.			Thermometer.			Dew Point.		
	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0
1	28.393	28.265	28.362	27.769	27.677	27.780	72.8	75.1	70.2	65.3	63.6	63.3
2	.370	.254	.376	.757	.606	.782	72.5	76.8	68.8	64.8	66.4	63.9
3	.372	.256	.371	.765	.666	.840	70.0	75.0	66.1	64.5	63.7	60.7
4	.406	.269	.349	.828	.628	.714	70.2	73.4	69.0	63.1	66.1	65.8
5	.365	.229	„	.717	.498	„	71.5	75.7	„	66.4	69.9	„
6	.360	.268	„	.776	.723	„	73.5	75.0	„	63.4	61.4	„
7	.392	„	„	.783	„	„	72.0	„	„	64.6	„	„
8	„	„	„	„	„	„	„	„	„	„	„	„
9	„	„	„	„	„	„	„	„	„	„	„	„
10	„	„	„	„	„	„	„	„	„	„	„	„
11	„	„	„	„	„	„	„	„	„	„	„	„
12	.410	.284	„	.795	.597	„	73.6	75.0	„	64.9	68.1	„
13	.420	.279	„	.736	.599	„	72.0	73.7	„	68.0	67.8	„
14	.374	.266	.372	.788	.665	.808	72.1	75.0	68.2	63.5	64.2	62.4
15	.378	.238	.343	.767	.623	.773	70.7	76.5	68.3	64.7	64.9	62.7
16	.369	.239	.345	.843	.653	.791	70.0	77.3	65.0	60.4	63.5	61.9
17	.382	.254	.369	.804	.653	.785	69.7	77.8	69.4	63.1	64.2	63.4
18	.375	.247	.365	.772	.749	.898	70.5	76.8	69.7	64.3	58.9	57.1
19	.393	.254	.380	.928	.692	.879	67.6	76.0	67.7	57.0	62.3	59.1
20	.419	.290	.396	.937	.799	.905	69.2	75.0	67.6	58.0	58.5	58.5
21	.442	.294	.404	28.011	.782	.929	71.1	76.3	68.7	54.9	59.7	57.6
22	.400	.291	.408	27.957	.745	.933	71.9	76.0	68.1	55.6	61.5	57.6
23	.380	.262	.380	.868	.733	.856	71.5	76.0	70.4	59.7	60.6	60.3
24	.380	.268	.378	.810	.633	.765	72.0	77.2	70.8	62.7	65.8	64.8
25	.401	.277	.383	.833	.715	.848	73.0	76.3	69.8	62.6	62.3	60.9
26	.387	.263	.374	.882	.689	.802	71.4	76.4	68.9	59.3	62.9	62.8
27	.383	.268	.373	.823	.646	.842	72.9	77.1	69.6	62.2	65.2	60.7
28	.381	.260	.371	.872	.748	.906	72.0	75.2	68.8	59.5	59.7	57.0
29	.403	.284	.379	.942	.792	.881	71.0	76.8	69.1	56.7	58.6	58.9
30	.395	.289	.398	.877	.830	.895	71.6	77.9	69.5	60.0	56.6	59.2
31	.403	.286	.404	.911	.797	.931	71.2	76.9	68.9	58.6	58.4	57.5
	28.390	28.267	28.376	27.835	27.690	27.843	71.4	76.0	68.8	61.8	62.9	60.7

Gangaroowa near Kandy, Ceylon.

Humidity.			In Sun's Rays at 12 o'clock.	Minimum on the Grass.	Maximum in Air.	Minimum in Air.	Difference.	Mean.	Dew.	Rain.		
A. M. 9.30	P. M. 3.30	P. M. 10.0								A. M. 9.30	P. M. 10.0	Total.
779	672	785	„	62.1	76.2	66.2	10.0	71.2	179	0.000	0.000	0.000
774	706	838	„	56.0	76.9	61.7	15.2	69.3	269	0.000	0.000	0.000
825	676	830	„	55.6	75.2	60.2	15.0	67.7	348	0.000	0.000	0.000
780	783	892	„	51.0	75.5	57.2	18.3	66.4	464	0.000	0.009	0.009
835	820	„	„	64.7	76.0	68.0	8.0	72.0	67	0.006	0.392	0.398
708	624	„	„	„	77.1	66.5	10.6	71.8	188	0.000	0.000	0.000
780	„	„	„	„	75.5	68.5	7.0	72.0	130	0.000	0.000	0.000
„	„	„	„	„	73.2	66.4	6.8	69.8	138	0.309	0.029	0.338
„	„	„	„	„	„	„	„	„	49	0.110	0.000	0.110
„	„	„	„	„	„	„	„	„	140	0.010	0.046	0.056
„	„	„	„	„	73.3	66.6	6.7	69.9	119	0.000	0 000	0.000
746	790	„	„	„	75.0	66.1	8.9	70.6	109	0.000	0.000	0.000
875	820	„	„	„	73.7	68.6	5.1	71.1	112	0.000	0.000	0.000
746	688	820	„	„	74.5	66.7	7.8	70.6	98	0.000	0.000	0.000
810	678	824	„	55.8	76.1	60.6	15.5	68.4	204	0.000	0.000	0.000
728	634	910	„	52.7	76.7	57.2	19.5	66.9	427	0.000	0.000	0.000
796	631	813	„	55.1	77.2	60.2	17.0	68.7	427	0.000	0.000	0.000
805	563	636	136.5	54.1	76.4	59.7	16.7	68.1	457	0.000	0.000	0.000
685	630	740	135.8	50.8	76.0	54.9	21.1	65.4	344	0.000	0.000	0.000
668	562	725	132.4	50.0	75.0	56.7	18.3	65.9	327	0.000	0.000	0.000
563	565	670	134.1	53.3	76.5	59.8	16.7	68.1	250	0.000	0.000	0.000
561	610	685	136.0	54.4	76.2	60.4	15.8	68.3	84 ?	0.000	0.000	0.000
662	590	706	131.9	52.2	76.2	58.2	18.0	67.2	162	0.000	0.000	0.000
725	682	810	139.6	59.6	78.5	64.3	14.2	71.4	113	0.000	0.000	0.000
700	624	732	135.9	59.0	77.6	64.6	13.0	71.1	30 ?	0.000	0.000	0.000
654	636	833	135.2	56.2	77.2	63.0	14.2	70.1	181	0.000	0.000	0.000
694	670	760	137.4	59.9	78.2	64.6	13.6	71.4	278	0.000	0.000	0.000
646	582	650	141.6	55.9	77.2	61.8	15.4	69.5	151	0.000	0.000	0.000
606	530	696	133.2	51.2	76.9	57.2	19.7	67.1	199	0.000	0.000	0.000
666	536	695	136.6	51.2	77.7	57.8	19.9	67.7	251	0.000	0.000	0.000
642	523	660	132.7	53.2	77.0	58.7	18.3	67.9	232	0.000	0.000	0.000
721	647	760	135.6	55.2	76.2	62.2	14.0	69.2	6527	0.435	0.476	0.911

Gangaroowa near Kandy, Ceylon.

	A. M. 9.30							P. M. 3.30						
January, 1864.	Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.	Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.
1	8.0	0	0	0	S	0	8.0	8.7	0	0	0	1.0	0	9.7
2	0.1	0	0	0	0.1	0	0.2	5.7	0	0	0	1.0	0	6.7
3	0.1	0	0	0	0	0	0.1	7.8	0	0	0	0.2	0	8.0
4	0	0	0	0	2.0	0	2.0	0	0	0	0	0	10.0	10.0
5	0	0	9.6	0	0	0.3	9.9	0.3	0	0	0	0	9.2	9.5
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	9.6	0	0	0.2	0	9.8	8.3	0	0.2	0	1.5	0	10.0
15	0.6	0	0.3	0	S	0	0.9	9.4	0	0	0	0.2	0	9.6
16	5.0	0	0	0	0	0	5.0	3.0	0	0	0	0.3	0	3.3
17	9.5	0	0	0	0	0	9.5	5.3	0	0	0	1.7	0	7.0
18	0.1	0	0	0	0	0	0.1	0	0	0	0	S	0	0
19	9.5	0	0	0	0	0	9.5	8.6	0	0	0	0.4	0	9.0
20	10.0	0	0	0	0	0	10.0	10.0	0	0	0	0	0	10.0
21	6.0	0	0	0	0	0	6.0	8.0	0	0	0	0.4	0	8.4
22	0.6	0	0	0	0	0	0.6	1.0	0	0	0	4.4	0	5.4
23	9.8	0	0	0	0.2	0	10.0	7.6	0	2.0	0	0.4	0	10.0
24	8.0	0	0	0	0	0	8.0	6.7	0	0	0	3.3	0	10.0
25	7.3	0	0	0	0.2	0	7.5	0	6.4	0	0	0	3.5	9.9
26	0	9.8	0	0	0	0	9.8	0	9.0	0.1	0	0.8	0	9.9
27	7.5	0	0	0	0.5	0	8.0	4.0	0	0	0	5.0	0	9.0
28	9.0	0	0	0	0	0	9.0	0	10.0	0	0	0	0	10.0
29	0	0	1.0	0	0	0	1.0	7.0	0	0.2	0	S	0	7.2
30	0	0	0	0	0.5	0	0.5	0	0	1.4	0	4.0	0	5.4
31	0	0	0	0	S	0	0	0	0	0	0	S	0	0
	4.0	0.8	0.5	0.0	0.2	0.0	5.5	4.4	1.1	0.2	0.0	1.1	1.0	7.8

Gangaroowa near Kandy, Ceylon.

P. M. 10.0							Ozone.		9.30 A.M. Direction of wind.		Velocity in feet per Second.
Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.	6 A. M.	6 P. M.	Vane.	Lower Clouds.	
0.2	0	0	0	0	0	0.2	0	0	E N E	Calm ?	3.08
0	0	0	0	0	0	0	0	0	N N E	E N E ?	8.18
0.5	0	0	0	0	0	0.5	0	0	E	None	2.90
1.6	0	0	0	0	3.4	5.0	0	0	Variable	N E by Var.	2.20
0	0	0	0	0	0	0	0	0	W N W	?	0.26
0	0	0	0	0	0	0	0	0	......	......	0
0	0	0	0	0	0	0	0	0	......	......	0
0	0	0	0	0	0	0	0	0	......	......	0
0	0	0	0	0	0	0	0	0	......	......	0
0	0	0	0	0	0	0	0	0	......	......	0
0	0	0	0	0	0	0	0	0	......	......	0
0	0	0	0	0	0	0	0	0	......	......	0
0	0	0	0	0	0	0	0	0	......	......	0
3.0	0	0	0	0	0	3.0	0	0	N E	N E	11.09
0.5	0	0	0	0	0	0.5	0	0	E N E	None	8.27
6.0	0	0	0	0	0	6.0	0	0	N E	None	2.73
5.0	0	0	0	0	0	5.0	0	0	S S E	None	0.70
2.5	0	0	0	0	0	2.5	1	1	E S E	None	2.11
0	0	0	0	0	0	0	2	2	W by S	None	1.14
7.5	0	0	0	0	0	7.5	2	2	N E by E	None	5.81
2.5	0	0	0	0	0	2.5	4	2	E by N	None	7.83
8.0	0	0	0	0	0	8.0	3	2	N E by E	None	10.47
0.3	0	0	0	9.7	0	10.0	2	3	E N E	E N E	9.86
0	0	0	0	9.5	0	9.5	5	1	N E	None	7.30
7.4	0	0	0	0.1	0	7.5	7	2	E N E	N E	4.31
8.5	0	0	0	0.2	0	8.7	4	3	E N E	None	6.42
9.8	0	0	0	0	0	9.8	3	2	E N E	E N E	6.69
0	10.0	0	0	0	0	10.0	3	2	N E by N	None	6.34
0	0	0	0	0	0	0	3	2	N E by E	None	10.21
0	0	0	0	0	0	0	3	1	Variable	E	3.52
0	0	0	0	9.0	0	9.0	3	1	E by N	None	8.45
2.9	0.4	0.0	0.0	1.3	0.2	4.8	3.2	1.8	......	......	5.65

Gangaroowa near Kandy, Ceylon.

January, 1864.	3.30 P. M. Direction of wind.		Velocity in feet per Second.	10.0 P. M. Direction of wind.		Velocity in feet per Second.
	Vane.	Lower Clouds.		Vane.	Lower Clouds.	
1	E	N E	3.52	E N E	None	5.19
2	N W by N	Calm	3.70	N E	None	5.28
3	W by N	Calm	5.28	E N E	None	1.41
4	N	N E	4.49	N N E	?	6.51
5	W N W	Calm	3.26	.....	.....	0
6	.....	.....	0	.....	.....	0
7	.....	.....	0	.....	.....	0
8	.....	.....	0	.....	.....	0
9	.....	.....	0	.....	.....	0
10	.....	.....	0	.....	.....	0
11	.....	.....	0	.....	.....	0
12	.....	.....	0	.....	.....	0
13	.....	.....	0	.....	.....	0
14	N W	N E	3.80	N E	None	0
15	W N W	Calm	5.28	N E	None	6.95
16	.....	Calm	4.14	Calm	None	0.00
17	N W	S E, N N W & Calm	4.58	N E	None	3.34
18	W N W	None	4.05	N N E	None	2.64
19	W N W	Variable	4.22	N E by E	None	3.87
20	N W by W	None	2.64	E N E	None	4.22
21	E	?	5.28	E by N	None	10.91
22	E N E	Variable	6.69	N E	None	8.54
23	S E by E	Calm	9.59	N E by E	W S W	5.28
24	W	W, Calm	6.42	W	E N E	0.09
25	W N W	S S E (?)	4.58	N E by E	None	5.54
26	E S E	E N E	9.59	N E	None	7.13
27	N W	Variable	2.38	N N E	None	9.94
28	E S E	None	8.71	N E	None	8.62
29	E N E	Calm	7.48	E N E	None	1.85
30	E	Variable	7.48	N E by E	None	10.03
31	E by S	None	8.10	E	?	7.04
	.....	.....	5.45	.....	.....	5.45

GANGAROOWA NEAR KANDY, CEYLON.

Distance in Miles in 24 Hours.	Lightning and Thunder.
87.10	
49.24	
48.26	
52.14	
,,	
,,	
,,	
,,	
746.30	
,,	
,,	
,,	
,,	
,,	
35.82	
22.48	
20.41	
36.29	
38.10	
54.41	
95.95	
142.18	
81.44	
44.17	
46.55	
104.87	
90.45	
103.91	
72.78	
59.33	
93.37	
68.57	

Gangaroowa near Kandy, Ceylon.

January, 1864.	GENERAL REMARKS.
1	Cool to warm, dry and fresh all day.
2	Cool to warm, dry and fresh all day.
3	Fog till 8 A. M.; then fine, warm, dry and fresh.
4	Fine & fresh till noon; heavy nimb and drizzling rain after.
5	Fine till 8 A. M.; then nimb & light rain; cloudy all day & rain in fore even.
6	Fine, dry & fresh all day.
7	
8	Cloudy with nimb; showery & damp all day.
9	Light rain fore and after morn; fine afterwards, squally wind.
10	Cloudy with nimb; damp & showery nearly all day.
11	
12	A little very light rain at 1 P. M.
13	Dull & cloudy with nimbus but no rain; squally wind in after even.
14	Cool to warm, dry and fresh all day.
15	Fog till 8 A. M.; cool to warm, dry and fresh afterwards.
16	Fog till 8 A. M.; cool to warm, dry and fresh afterwards.
17	Cold & damp at morn, mild to very warm, dry and fresh day.
18	Fog till 8 A M.; after, mild to very warm, dry and fresh day.
19	Fog till 8 A. M.; cool to warm, dry and fresh afterwards.
20	Fog till 8 A. M,; cool to warm, dry and fresh afterwards.
21	Cool to warm, dry and fresh all day.
22	The same as above; high wind till noon; moderate after.
23	Cold to warm, fresh; very dry afternoon; squally wind. [after even.
24	Fine, dry and pleasant till noon; close and oppressive afternoon, fore and
25	Damp at morn; very warm & close after 8 A. M. threatening nimb. in afternoon
26	Cool to warm, dry & fresh day; squally wind, at times high. [& fore even.
27	Cool to warm and fresh till noon, then sultry till 8 P. M. and again fresh.
28	Fine, dry & fresh all day; in after even, squally wind, at times high.
29	Cold to hot, dry and fresh all day.
30	Cold to hot, dry and fresh all day.
31	Cold to hot, dry and fresh all day.
	Solar Halo on 15th. Lunar Halos on 14th, 15th and 16th.

Meteorological Observations taken at Gangaroowa near Kandy, Ceylon, in the month of February, 1864.

Alt. 1560 ft.; E. Long. 80° 37′, N. Lat. 7° 17′.

All the Instruments have been compared with standards.

The tension of aqueous vapour, dew point and humidity, have been found from the readings of the dry and wet bulb Thermometers by Mr. Glaisher's Hygrometrical tables (Ed. 1863).

The dew is the weight in grains deposited on a square foot of ordinary woollen cloth exposed on a board from 6 P. M. to 6 A. M. or for as many hours as there is no rain.

The evaporation is given by a Babington's Atmidometer placed under cover so as to be protected from the sun, rain and dew, but freely exposed to the wind.

The rain guage is $4\frac{1}{2}$ feet above the ground.

The ozone cage is hung about 25 feet above the ground.

The direction of the wind given, is that of the lowest current by the vane, and of the currents above this by the direction in which the Nimbi and Cumulo-Strati clouds are moving.

In this column a "calm" signifies that the clouds are apparently motionless: "variable," that the clouds apparently in the same or nearly the same stratum move in no fixed direction, but their parts move as if in vortices, or different masses of them move up from different quarters as if into a vast vortex, this being nearly always the case before thunder storms.

Entries, such as W S W and N N W, or $\frac{\text{W S W}}{\text{N N W to calm,}}$ signify that the clouds are evidently in strata of different altitudes, that those in the lowest stratum move from W S W; those in the next higher from N N W; those in the next are apparently becalmed, and so on.

The velocity and distance in 24 hours are given by Robinson's Anemometer.

In the column for Lightning and Thunder

L = "Lightning" when the flash is near enough to be visible.

L R = "Lightning Reflection" when the flash is so distant that only its reflection on the clouds or in the air is visible.

"Morn," is 6 A. M., "Even," 6 P. M. and "Night," 12 P. M. and "fore" and "after" are prefixed to these, as ordinarily to "Noon," to denote the 3 previous and 3 following hours.

R. H. Barnes.

Gangaroowa near Kandy, Ceylon.

February, 1864.	Barometer reduced to 32°.			Pressure of Dry Air.			Thermometer.			Dew Point.		
	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0
1	28.433	28.335	28.433	27.907	27.759	27.892	72.5	75.2	70.6	60.4	63.0	61.2
2	.454	.374	.454	.832	.713	.880	73.2	73.9	70.2	65.2	67.0	62.9
3	.443	.335	.451	.772	.660	„	71.3	73.7	69.6	67.4	67.6	„
4	.466	.369	.509	.795	.739	.859	73.0	72.8	69.2	67.4	65.6	66.5
5	.509	.386	.511	.911	.796	28.041	73.8	77.0	69.2	64.1	63.7	57.3
6	.507	.389	.488	.909	.769	27.898	71.1	71.5	67.1	64.1	65.1	63.7
7	.480	.359	.469	.894	.822	.919	71.6	76.8	70.7	63.5	61.0	61.7
8	.453	.319	.428	.944	.828	.885	73.6	78.9	71.5	59.5	58.5	61.3
9	.426	.309	.418	.902	.797	.872	75.1	79.9	72.5	60.3	59.7	61.5
10	.421	.293	.399	.954	.748	.815	75 6	80.4	72.2	57.1	61.4	63.4
11	.417	.300	.409	.903	.763	.885	75.0	80.0	71.2	59.8	61.0	60.3
12	.444	.336	.426	.933	.807	.898	74.6	78.3	70.8	59.6	60.6	60.5
13	.432	.293	.387	.912	.764	.801	73.8	80.0	71.8	60.1	60.6	63.5
14	.391	.262	.333	.829	.688	.705	75.2	79.4	71.0	62.3	62.9	65.5
15	.330	.210	.316	.802	.813	.770	73.0	82.3	67.1	60.5	52.6	61.5
16	.333	.219	.326	.923	.730	.665	71.6	80.0	71.4	53.5	58.4	67.0
17	.369	.217	.334	.861	.691	.650	71.8	82.1	73.2	59.3	60.4	68.0
18	.358	.188	.297	.879	.697	.677	72.3	82.2	69.8	57.8	58.5	65.1
19	.325	.183	.306	.769	.676	.633	73.9	82.9	71.7	62.0	59.4	67.5
20	.332	.181	.314	.715	.661	.648	75.0	83.2	71.2	65.0	60.1	67.2
21	.374	.244	.370	.701	.713	.676	77.0	82.6	74.1	67.5	60.7	68.4
22	.408	.276	.391	.834	.773	.831	75.4	82.2	68.5	62.9	59.2	62.2
23	.358	.218	.342	.844	.720	.727	73.2	82.4	69.4	59.8	58.9	64.9
24	.346	.197	.295	.790	.686	.727	73.4	81.8	68.0	62.0	59.6	62.6
25	.344	.214	.335	.786	.650	.722	73.4	82.6	69.8	62.1	62.4	64.8
26	.372	.235	.375	.839	.737	.714	73.2	82.6	74.1	60.8	58.9	67.0
27	.384	.227	.341	.800	.830	.625	75.7	84.6	74.8	63.4	52.6	69.3
28	.335	.178	.312	.757	.722	.637	75.6	85.6	72.0	63.1	56.4	67.6
29	.348	.204	.336	.815	.808	.608	74.8	84.5	75.0	60.8	52.5	69.8
	28.400	28.271	28.383	27.845	27.743	27.774	73.7	80.0	71.0	61.8	60.3	64.4

GANGAROOWA NEAR KANDY, CEYLON.

Humidity.			In Sun's Rays at 12 o'clock.	Minimum on the Grass.	Maximum in Air.	Minimum in Air.	Difference.	Mean.	Dew.	Evaporation.	Rain.		
A. M. 9.30	P. M. 3.30	P. M. 10.0									A. M. 9.30	P. M. 10.0	Total.
654	656	719	149.0	56.0	77.0	61.3	15.7	69.2	146	9686	0.000	0.000	0.000
762	791	775	136.4	64.4	76.2	68.0	8.2	72.1	35	8289	0.010	0.029	0.039
871	815	„	120.2	„	76.0	67.9	8.1	71.9	56	4346	0.019	0.468	0.487
830	783	911	118.0	67.0	74.9	68.5	6.4	71.7	0	3569	0.026	0.037	0.063
718	638	660	139.9	62.3	77.2	68.0	9.2	72.6	111	8954	0.000	0.000	0.000
780	800	886	137.8	57.1	74.6	62.5	12.1	68.6	156	4019	0.000	0.013	0.013
750	586	728	144.5	56.8	77.1	62.8	14.3	69.9	334	5662	0.000	0.000	0.000
619	497	698	138.5	60.0	78.8	67.2	11.6	73.0	181	8391	0.000	0.000	0.000
597	500	680	138.5	60.7	79.8	68.3	11.5	74.1	158	8644	0.000	0.000	0.000
526	521	742	141.9	56.3	80.5	63.5	17.0	72.0	157	7734	0.000	0.000	0.000
588	521	682	149.2	61.2	80.5	68.8	11.7	74.6	91	5359	0.000	0 000	0.000
592	545	698	139.4	60.0	78.6	68.0	10.6	73.3	84	8341	0.000	0.000	0.000
624	515	745	142.6	54.2	80.2	62.0	18.2	71.1	131	3185	0.000	0.000	0.000
641	566	825	149 1	56.0	80.7	64.0	16.7	72.4	153	5945	0.000	0.000	0.000
652	351	825	144.5	56.3	81.8	63.4	18.4	72.6	228	5915	0.000	0.000	0.000
524	476	855	148.0	49.8	79.9	57.7	22.2	68.8	211	5662	0.000	0.000	0.000
646	480	840	144.3	57.0	81.7	63.4	18.3	72.5	139	5358	0.000	0.000	0.000
598	444	850	141.9	55.3	81.6	61.8	19.8	71.7	234	6724	0.000	0.000	0.000
664	447	863	141.8	54.4	82.0	61.5	20.5	71.8	252	6419	0.000	0.000	0.000
708	455	865	146.0	60.0	82.4	66.8	15.6	74.6	98	5763	0.000	0.000	0.000
726	485	825	148.6	61.3	83.5	67.5	16.0	75.5	141	5288	0.000	0.000	0.000
648	456	805	143.8	59.1	82.2	67.3	14.9	74.7	225	6268	0.000	0.000	0.000
633	447	853	147.8	52.0	82.0	59.7	22 3	70.9	286	6268	0.000	0.000	0.000
676	465	830	144.8	59.3	81.7	65.0	16 7	73.3	182	5985	0.000	0.000	0.000
680	507	840	147.6	53.9	82.2	61.3	20.9	71.8	272	5510	0.000	0.000	0.000
656	444	785	150.2	55.4	82.7	63.0	19.7	72.8	235	6066	0.000	0.000	0.000
652	334	830	149.7	57.5	84.1	64.7	19 4	74.4	196	7330	0.000	0.000	0.000
648	366	865	149.8	58.0	85.2	64.9	20.3	75.1	187	6774	0.000	0.000	0.000
616	334	840	150.6	55.0	84.5	62.2	22.3	73.4	288	7229	0.000	0.000	0.000
685	525	797	142.9	57.7	80.3	64.5	15.8	72.4	4967	6437	0.055	0.547	0.602

Gangaroowa near Kandy, Ceylon.

	A. M. 9.30							P. M. 3.30						
February, 1864.	Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.	Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.
1	0	0	4.0	0	0.4	0	4.4	0	0	0	0	10.0	0	10.0
2	0	0	0.2	0	5.0	0	5.2	0	0	0.2	0	0	9.7	9.9
3	0	0	0	0	0	10.0	10.0	0	0	8.3	0	0	1.7	10.0
4	0	0	3.0	0	0	7.0	10.0	0	0.6	0.4	0	0	9.0	10.0
5	0	0	0	0	1.3	0	1.3	0	0	0	0	4.0	0	4.0
6	0	0	0	0	0	9.8	9.8	0	0	0	0	0	10.0	10 0
7	0.2	0	0	0	0	9.0	9.2	0.6	0	0.8	0	6.2	0	7.6
8	0.2	0	0	0	0	0	0.2	5.0	0	0	0	0.5	0	5.5
9	0.4	0	0	0	0	0	0.4	0	0	0	0	4.0	0	4.0
10	0	0	0	0	0	0	0	0	0	0	0	1.5	0	1.5
11	0	0	0	0	0.1	0	0.1	0.2	0	0	0	1.2	0	1.4
12	0	0	0	0	0.5	0	0.5	0	0	9.0	0	0.3	0	9.3
13	0.1	0	0	0	0	0	0.1	0	0	0	0	0.8	0	0.8
14	0	0	0	0	0	0	0	0	0	0	0	9.0	0	9.0
15	0.3	0	0	0	0	0	0.3	0.3	0	0	0	0	0	0.4
16	9.0	0	0	0	0	0	9.0	9.5	0	0	0	0	0	9.5
17	3.3	0	0	0	0	0	3.3	0.5	0	0	0	1.0	0	1.5
18	0.2	0	0	0	0	0	0.2	7.4	0	0	0	0.6	0	8.0
19	10.0	0	0	0	0	0	10.0	4.6	0	0	0	0.7	0	5.3
20	0	0	0	0	0.5	0	0.5	8.7	0	0	0	0.3	0	9.0
21	0	0	0	0	0.7	0	0.7	0	0	0	0	0.6	0	0.6
22	0.9	0	0	0	0.1	0	1.0	6.6	0	0	0	0.4	0	7.0
23	0.4	0	0	0	0	0	0.4	3.3	0	0	0	0.1	0	3.4
24	0	0	0	0	1.0	0	1.0	1.5	0	0	0	0.2	0	1.7
25	0.2	0	0	0	1.5	0	1.7	1.0	0	0	0	3.3	0	4.3
26	10.0	0	0	0	0	0	10.0	0	0	0	0	0	0	0
27	8.9	0	0	0	0.1	0	9.0	0.2	0	0	0	0.2	0	0.4
28	0	0	0	0	0	0	0	0	0	0	0	0.7	0	0.7
29	0	0	0	0	0	0	0	0.1	0	0	0	0.3	0	0.4
	1.5	0.0	0.3	0.0	0.4	1.2	3.4	1.8	0.0	0.7	0.0	1.6	1.1	5.2

Gangaroowa near Kandy, Ceylon.

P. M. 10.0							Ozone.		9.30 A.M. Direction of wind.		Velocity in feet per Second.
Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.	6 A. M.	6 P. M.	Vane.	Lower Clouds.	
0	0	0	0	9.8	0	9.8	2	2	E by S	W	7.85
0	0	0	0	2.0	0	2.0	3	2	E	E N E	5.35
0	0	0	0	0	10.0	10.0	3.5	8	N E	E N E	0.22
0	0	0	0	0	10.0	10.0	9	3	E	E	4.86
0	0	0	0	0	0	0	5	2	E by N	E by N	14.91
0	0	0	0	1.0	0	1.0	2	3	N	N E by E	3.52
0	0	0	0	0.2	0	0.2	1.0	2	N E	E by N	4.40
0	0	0	0	0	0	0	1	1	E	None	11.79
0	0	0	0	0	0	0	1	2	E N E	E	8.45
0	0	0	0	0.2	0	0.2	4	2	N E	None	9.50
0	0	0	0	2.0	0	2.0	2	2	E by N	N E	11.18
0.2	0	0	0	0	0	0.2	2	1	E	E	17.69
0	0	0	0	3.3	0	3.3	3	1	N E	None	14.52
3.5	0	3.5	0	0	0	7.0	3	0	E N E	None	8.01
10.0	0	0	0	0	0	10.0	0	0	S E	None	2.64
0	0	0	0	10.0	0	10.0	0	0	W S W	None	1.94
0	0	0	0	9.0	0	9.0	0	0	N	None	1.58
0	0	0	0	4.0	0	4.0	0	0	Variable	None	1.32
0	0	0	0	8.5	0	8.5	0	0	S W	None	3.52
0	0	0	0	9.0	0	9.0	0	1	S W by S	Calm	3.08
0	0	0	0	9.2	0	9.2	1	1	N N W	Calm	2.38
9.5	0	0	0	0	0	9.5	2	1	W by N	Calm	3.52
0.2	0	0	0	0	0.5	0.7	0	0	Variable	None	2.46
0.3	0	0	0	0	0	0.3	0	0.5	Variable	Calm	1.58
4.0	0	0	0	0	0	4.0	0	0.5	W S W	Variable	4.05
0.4	0	0	0	9.6	0	10.0	0	0	N W by N	None	1.41
0	0	0	0	9.3	0	9.3	0	0	S S E	Calm	1.85
0	0	0	0	0	10.0	10.0	0	0	S W	None	2.82
0	0	0	0	0	8.0	8.0	0	0	N W	None	2.11
1.0	0.0	0.1	0.0	3.0	1.3	5.4	1.8	1.2	.....	.....	5.46

Gangaroowa near Kandy, Ceylon.

February, 1864.	3.30 P. M. Direction of wind.		Velocity in feet per Second.	10.0 P. M. Direction of wind.		Velocity in feet per Second.
	Vane.	Lower Clouds.		Vane.	Lower Clouds.	
1	E N E	Calm	5.14	N N E	Too dark	4.27
2	E	N E	2.43	Variable	Too dark	0.39
3	E by N	E by N	12.32	E by N	Too dark	6.16
4	E by N	E	16.63	N E by E	Too dark	8.62
5	E by S	E N E	9.94	E	None	16.98
6	E	E N E	1.41	W N W	Too dark	2.82
7	E by N	E N E	17.60	E by N	Too dark	7.66
8	E by S	Calm	14.52	E N E	None	11.00
9	E N E	Variable	3.87	E N E	None	12.85
10	E N E	E N E Calm	7.57	E N E	Too dark	9.50
11	E	Calm ?	14.26	N E	Calm	8.10
12	E by S	N N E	18.39	E N E	None	17.51
13	E N E	Calm	9.59	E by N	Calm	11.62
14	W N W	Calm	6.51	S W by W	None	1.06
15	Variable	None	2.73	Calm	None	0.00
16	N W	None	5.98	N	Calm	1.41
17	Variable	Calm	4.49	N W	Calm	1.06
18	W S W	Calm	8.27	N N W	Variable	2.38
19	W	Calm	5.81	S W by S	Calm	0.18
20	W	Calm	8.18	W N W	N	2.99
21	Variable	Calm	4.22	W N W	E N E	0.62
22	N	Calm	4.22	Calm	None	0.00
23	W N W	N N E ?	5.98	N N W	E by S	3.08
24	W S W	Calm	5.90	N N W	None	2.99
25	W S W	Variable	5.19	N N W	None	2.20
26	W N W	Calm	5.90	N N W	Calm	0.44
27	W N W	Calm	6.60	W	Calm	0.88
28	W N W	Calm	8.45	N W	?	2.64
29	E	Calm	10.30	N by E	Variable	1.14
	.....	.....	8.01	.....	.....	4.85

GANGAROOWA NEAR KANDY, CEYLON.

Distance in Miles in 24 Hours.	Lightning and Thunder.
64.55	
82.19	L R to S S W in after even.
79.31	
125.98	
219.21	
64.96	
121.12	
164.14	
173.00	
177.13	L to S in after even.
203.20	
201.11	
149 41	
102.09	
37.33	
41.39	
43.24	
58.59	
60.72	
47.45	L R to S in after even.
43.58	L R to W in after even.
53.90	L to S S W at even.
43.33	
46.53	
46.31	
41.80	
48.06	
48.31	L to S W *ward* at even.
56.09	L R to S W in after night.
91.17	

GANGAROOWA NEAR KANDY, CEYLON.

February, 1864.	GENERAL REMARKS.
1	Fine, dry and pleasant day.
2	In fore and afternoon heavy nimbi from N E; a little light rain.
3	Nimbi from N E & E nearly all day; light showers throughout the day.
4	Nimbi from E all day; a little very light rain.
5	High wind at night, more mod. in the day, which fine, dry and fresh.
6	Heavy nimbi from N E & E; a few light showers in afternoon.
7	Fine, mild to warm, dry and fresh day.
8	Cool at morn, warm to hot & very dry day.
9	Mild to hot and dry; sultry & oppressive in afternoon.
10	Cool and fresh at morn, warm to very hot and dry day.
11	Squally wind at times high; mild to hot and very dry.
12	Squally wind at times high; mild to hot and very dry.
13	Cool and fresh at morn, mild to hot and dry day. [& till about 8 P. M.
14	Cool at morn & after 10 P. M., hot & dry day; close & oppressive afternoon
15	Cool at morn & after 10 P. M.; fog at morn; very hot & dry day.
16	Cold & fresh at morn; hot & dry day, sultry & oppressive after 12.
17	Cool to mild & fresh till 10 A. M.; hot & very dry fore & afternoon, sultry & oppressive after 6 A. M. [even.
18	Cool at morn; & after 10 P. M.; hot and very dry fore & afternoon & fore
19	Cool to mild to 10 A. M.; hot & very dry till 6 P. M.; close & sultry after.
20	Cool to mild to 10 A. M.; hot & very dry till 6 P. M.; close & sultry after.
21	Cool to mild to 10 A. M.; hot & very dry till 6 P. M.; pleasant after even.
22	Cool to mild to 10 A. M.; hot & very dry till 6 P. M.; cool & fresh after 8 P. M.
23	Cold & damp at morn; fog till nearly 8 A. M.; hot & very dry till 6 P. M. then
24	Cool at morn & after 10 P. M.; warm to very hot & dry till 6 P. M. [pleasant.
25	The same as 24th but sultry & oppressive at even and till 8 P. M.
26	The same as 25th; fog at morn & till 7 A. M.
27	Cool at morn; hot & very dry but fresh till 9 P. M. then close & sultry.
28	The same as 27th, but sultry in early part of after even; pleasant later.
29	The same as 28th, but sultry & oppressive all after even.
	Solar Halos on 8th, 16th & 27th. Lunar Halos on 15th and 22nd.

Meteorological Observations taken at Gangaroowa near Kandy, Ceylon, in the month of March, 1864.

Alt. 1560 ft.; E. Long. 80° 37′, N. Lat. 7° 17′.

All the Instruments have been compared with standards.

The tension of aqueous vapour, dew point and humidity, have been found from the readings of the dry and wet bulb Thermometers by Mr. Glaisher's Hygrometrical tables (Ed. 1863).

The dew is the weight in grains deposited on a square foot of ordinary woollen cloth exposed on a board from 6 P. M. to 6 A. M. or for as many hours as there is no rain.

The evaporation is given by a Babington's Atmidometer placed under cover so as to be protected from the sun, rain and dew, but freely exposed to the wind.

The rain guage is 4½ feet above the ground.

The ozone cage is hung about 25 feet above the ground.

The direction of the wind given, is that of the lowest current, by the vane; and of the currents above this, by the direction in which the Nimbi and Cumulo-Strati clouds are moving.

In this column a "calm" signifies that the clouds are apparently motionless: "variable," that the clouds apparently in the same or nearly the same stratum move in no fixed direction, but their parts move as if in vortices, or different masses of them move up from different quarters as if into a vast vortex, this being nearly always the case before thunder storms.

Entries, such as $\frac{\text{W S W}}{\text{N N W}}$, or $\frac{\text{W S W}}{\text{N N W}}\text{calm}$, signify that the clouds are evidently in strata of different altitudes, that those in the lowest stratum move from W S W; those in the next higher from N N W; those in the next are apparently becalmed, and so on.

The velocity and distance in 24 hours are given by Robinson's Anemometer.

In the column for Lightning and Thunder—

L = "Lightning," when the flash is near enough to be visible.

L R = "Lightning Reflection," when the flash is so distant that only its reflection on the clouds or in the air is visible.

"Morn," is 6 A. M., "Even," 6 P. M. and "Night," 12 P. M. and "fore" and "after" are prefixed to these, as ordinarily to "Noon," to denote the 3 previous and 3 following hours.

R. H. Barnes.

Gangaroowa near Kandy, Ceylon.

March, 1864.	Barometer reduced to 32°.			Pressure of Dry Air.			Thermometer.			Dew Point.		
	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0
1	28.385	28.244	28.386	27.815	27.788	27.734	77.0	82.9	73 9	62.7	56.4	66.6
2	.390	.267	.400	.849	.780	.684	75.8	83.1	73.5	61.2	58.3	69.3
3	.395	.260	.374	.805	.706	750	76.7	83.1	69.3	63.7	61.9	65.3
4	.408	.279	.406	.962	.785	.888	75.0	81.5	73.7	55.8	58.7	60.0
5	.444	.297	.404	.901	.799	.816	75.7	81.0	73.0	61.3	58.9	63.6
6	.446	.329	.420	.816	.677	.798	74.4	73.9	71.6	65.6	66.6	65.2
7	.416	.290	.387	.824	.708	.789	77.4	78.2	73.8	63.8	63.3	64.1
8	.403	.271	.384	.802	.630	.745	78.0	80.7	73.7	64.2	66.1	66.0
9	.385	.278	.406	.944	.756	.740	78.5	82.4	72.6	55.5	60.2	67.2
10	.433	.308	.438	.930	.779	.777	77.8	83.1	73 4	59.2	60.6	67.0
11	.448	.297	.381	.882	.875	.825	76.3	81.4	71.5	62.5	54 3	62.0
12	.379	.270	.379	.857	.702	.764	77.3	82.5	74.5	60.2	62.6	64.9
13	.394	.278	.375	.802	.700	.742	78.2	80.2	73.7	63.8	63.1	65.7
14	.363	.235	.385	.795	.519	.672	78.4	77.3	71.5	62.6	69.3	69.2
15	.370	.232	.384	.737	.599	.653	76.3	82.8	72.0	65.7	65.7	69.9
16	.380	.260	.416	.784	.694	.667	76.0	82.5	75.2	64.0	62.5	70.6
17	.427	.284	.411	.803	.724	.705	77.0	83.7	74.1	65.3	62.2	68 9
18	.427	.267	.396	.790	.666	.660	78.1	83.3	74.5	65.9	64.2	70.1
19	.382	.269	.391	.802	.645	.653	77.8	80.6	75.2	63.2	65.3	70.2
20	.403	.265	.401	.781	.935	.688	76.5	86.0	76.0	65.2	47.6	69.2
21	.391	.263	.396	.922	.878	.678	77.8	85.6	73.1	57.2	51.8	69.4
22	.385	.262	.371	.839	.821	.648	79.1	85.7	74.1	61.5	55 5	69.6
23	.392	.244	.359	.830	.795	.660	77.9	85.3	74.0	62.3	56.0	68.6
24	.353	.247	.375	.941	.835	.731	79.2	85.8	73.2	53.6	53.6	66.2
25	.375	.269	.390	.838	.792	.664	78.4	86.0	73.8	61.0	57.7	69.7
26	.417	.276	.378	.843	.769	.732	80.5	86.6	76.9	62.9	59.4	66.3
27	.391	.261	.385	.845	.784	.667	80.0	86.7	75.6	61.5	57.7	69.4
28	.381	.270	.367	.785	.557	.646	79.5	76.5	72.2	64.0	69.2	69.5
29	.397	.263	.378	.769	.662	.629	77.4	83.2	74.3	65 5	64.2	70.6
30	.414	.298	.404	.832	.767	.710	77.8	84.7	75.1	63.3	60.7	68.4
31	.395	.279	.400	.805	.670	.664	78.0	84 3	76.2	63.7	64.6	70.1
	28.399	28.273	28.391	27.836	27.735	27.715	77.2	82.6	73.7	62.2	60.6	67.5

Gangaroowa near Kandy, Ceylon.

Humidity.			In Sun's Rays at 12 o'clock.	Minimum on the Grass.	Maximum in Air.	Minimum in Air.	Difference.	Mean.	Dew in Grs. per sqr. ft.	Evaporation in Grs. per sqr. ft.	Rain.		
A. M. 9.30	P. M. 3.30	P. M. 10.0									A. M. 9.30	P. M. 10.0	Total.
614	402	783	151.0	57.2	82.3	64.8	17.5	73.5	221	6168	0.000	0.006	0.006
606	424	870	150.0	57.1	82.6	63.5	18.5	72.7	202	5894	0.000	0.000	0.000
646	490	871	153.6	59.1	82.6	66.6	16.0	74.6	94	5915	0.000	0.000	0.000
514	457	625	141.0	50.6	81.7	58.0	23.7	69.9	404	8038	0.000	0.000	0.000
609	464	724	135.2	58.2	81.4	65.7	15.7	73.6	137	8239	0.000	0.000	0.000
738	783	800	134.0	66.2	78 8	69.7	9.1	74.2	34	4802	0.050	0.138	0.188
632	600	718	145.2	65.9	82.8	70.2	12.6	76.5	110	6672	0.000	0.000	0.000
626	609	775	159.0	63.5	83.4	69.8	13.6	76.6	96	6622	0.000	0.018	0.018
452	471	835	150.2	60.0	83.1	67.2	15.9	75.2	124	8391	0.000	0.000	0.000
530	466	806	155.2	59.3	83.4	66.2	17.2	74.8	103	6673	0.000	0.000	0.000
628	386	715	150.0	58.2	81.7	65.4	16.3	73.5	184	7229	0.000	0.000	0.000
557	513	720	146.3	53.4	82.8	59 9	22.9	71.4	273	7178	0.000	0.000	0.000
612	554	766	143.2	61.4	82.1	68.0	14.1	75.0	96	6925	0.000	0 008	0.008
573	762	926	159.2	60.0	83.2	66.4	16.8	74.8	173	5005	0.000	0.176	0.176
702	561	930	150.4	65.0	82.8	67.8	15.0	75.3	178	3913	0.000	0.075	0.075
670	510	855	150.5	60.3	83.0	65.5	17.5	74.2	314	5894	0.000	0.000	0.000
674	484	840	155.1	60.1	83.4	66.3	17.1	74.9	278	5561	0.000	0.000	0.000
663	525	865	150.7	66.8	83.6	70.9	12.7	77.2	127	5156	0.000	0.002	0.002
612	592	845	153.9	63.6	84.9	68.7	16.2	76.8	67	5085	0.000	0.000	0.000
686	267	790	151.9	60.1	86.0	65.2	20.8	75.6	163	7613	0.000	0.000	0.000
533	315	885	150.0	62.1	85.9	65.1	20.8	75.5	156	8563	0.000	0.000	0.000
548	354	860	148.8	59.8	86.3	66.7	19.6	76.5	225	9201	0.000	0.000	0.000
591	366	835	146.9	59.9	86.2	64.8	21.4	75.5	244	7835	0.000	0.000	0.000
414	330	792	148.6	55.2	86.4	62.2	24.2	74.3	307	1060	0.000	0.000	0.000
559	376	870	145.2	56.3	86.2	63.2	23.0	74.7	255	7987	0.000	0.000	0.000
545	391	702	146.5	58.8	86.7	65.6	21.1	76.2	288	9756	0.000	0.000	0.000
530	368	810	145.0	58.5	86.9	65.3	21.6	76.1	202	8341	0.000	0.000	0.000
587	779	920	147.8	62.8	83.5	68.2	15.3	75.9	202	3973	0.000	0.114	0.114
670	528	885	154.1	61.4	85.4	65.7	19.7	75.5	273	4691	0.000	0.000	0.000
616	442	796	151.1	61.2	86.3	66.7	19.6	76.5	242	6399	0.000	0.000	0.000
614	513	811	146.9	59.9	86.5	65.8	20.7	76.2	268	5864	0.000	0 000	0.000
598	487	814	148.9	60.1	83.9	66.0	17.9	74.9	6040	6763	0.050	0.537	0.587

Gangaroowa near Kandy, Ceylon.

March, 1864.	A. M. 9.30							P. M. 3.30						
	Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.	Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.
1	0	0	0.2	0	1.2	0	1.4	1.2	0	0	0	6.6	0	7 8
2	6.7	0	0	0	0	0	6.7	0 1	0	0	0	9.5	0	9.6
3	9.0	0	0	0	0	0	9.0	3.8	0	0	0	6.0	0	9.8
4	10.0	0	0	0	0	0	10.0	8.5	0	0	0	0.3	0	8.8
5	8.8	0	0	0	1.2	0	10.0	9.8	0	0	0	0.2	0	10.0
6	0	0	0.1	0	0	9.9	10.0	0	2.7	6.0	0	0	1.2	9.9
7	0	0	0.6	0	3.0	0	3.6	0	7.7	2.0	0	0	0.3	10.0
8	0.1	0	0	0	0.6	0	0 7	0	4.0	0	0	0	5.8	9.8
9	0.2	0	0	0	0	0	0.2	7.2	1.2	0	0	1.2	0	9.6
10	1.1	0	0	0	0.1	0	1.2	0	0	0	0	3.5	0	3.5
11	0.3	0	0	0	2 2	0	2.5	5.4	0	0	0	0.6	0	6.0
12	0.1	0	0	0	0.1	0	0.2	1.0	0	0	0.1	3.3	0	4.4
13	0	0	0	0	4.0	0	4.0	0	5.4	2.2	0.4	1.0	0	9.0
14	2.0	0	1.4	0	0.3	0	3.7	0	0.7	0.3	0	0	7.8	8.8
15	0.1	0	0	0	0.2	0	0.3	0	0	0	0,2	7.3	0	7.5
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	1.0	0	1.0	0.7	0	0	0	6.0	0	6.7
18	0	0	0	0	4.0	0	4.0	0	0	0	0	0	9.3	9.3
19	0	0	0	0	0.1	0	0.1	0	3.0	0	0	5.0	0	8.0
20	0	0	0	0	0	0	0.0	0	0	0	0	0.5	0	0.5
21	0	0	0	0	0	0	0.0	0	0	0	0	0.4	0	0.4
22	0.1	0	0	0	0	0	0.1	2.5	0	0	0	0.8	0	3.3
23	1.2	0	0	0	0	0	1,2	0	0	0	0	0.6	0	0.6
24	0.2	0	0	0	0	0	0.2	0	0	0	0	0.4	0	0.4
25	0	0	0	0	0	0	0.0	0	0	0	0	1.0	0	1.0
26	0	0	0	0	0.5	0	0.5	0	0	0	0	1.5	0	1.5
27	0	0	0	0	0.3	0	0,3	4.7	0	0	0	1.3	0	6.0
28	1.3	0	0.1	0	5.	0	6.4	0	1.3	0	0	0	8.7	10.0
29	0	0	0.5	0.1	0.3	0	0.9	0.3	0.8	0	0.1	8.0	0	9.2
30	0.5	0	0	0	0.3	0	0 8	0	0	0	0.1	7.4	0	7.5
31	1.5	0	0	0	0	0	1.5	0	0	0	0.4	0.7	5.0	6.1
	1.5	0.0	0.1	0.0	0.8	0.3	2.7	1.5	0.9	0.4	0.0	2.4	1.3	6.5

Gangaroowa near Kandy, Ceylon.

P. M. 10.0							Ozone.		9.30 A.M. Direction of wind.		Velocity in feet per Second.
Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.	6 A. M.	6 P. M.	Vane.	Lower Clouds.	
0	0	0	0	0	9.9	9.9	0	0.5	E by	E N E	3 78
0	0	0	0	0	9.7	9.7	0	0	S W	None	2.29
0	0	0	0	0	0	0.0	0	0.5	N E	None	8.89
5.0	0	0	0	0	0	5.0	0	0.5	E S E	None	14.43
9.7	0	0	0	0.3	0	10.0	2	1	E N E	E N E	18.92
0	0	0	0	0	0	0	3	3	E	E	8.89
0	0	0	0	0	9.4	9.4	2	1	E	E by S	9.86
0	0	2.0	0	6.0	0	8.0	2	1.5	E N E	E	13.64
0	0	0	0	1.3	0	1.3	3	0.5	N E	None	13.29
0	0	0	0	0	7.0	7.0	1	0.5	E N E	Calm	11.97
0	0	0	0	0	0	0.0	0	1	E by N	Calm	5.98
0	0	0	0	0.2	0	0.2	2	1	E S E	?	15.93
1.9	0	7.0	0	0.1	0	9.0	3	1	E S E	E by S	9 94
5.0	0	0	0	0	5.0	10.0	0	1	E	E by	10.65
0	0	0	0	9.0	0	9.0	0	0.5	W by	?	2.29
0	0	0	0	0	9.6	9.6	0	0	.....	.....	0
0	0	0	0	0	10.0	10.0	0	0.5	S W	Calm	0.88
0	0	0	0	0	9.6	9.6	0	1	W N W	Variable	4.14
0	3.0	0	0	2.0	0	5.0	0	0.5	S S W	Calm	2.20
0	0	0	0	9.0	0	9.0	0	0.5	N by	None	2.82
0	0	0	0	8.0	0	8.0	0	0.5	E N E	None	10.91
0	10.0	0	0	0	0	10.0	0	0	N E by E	None	10.38
0.3	0	0.6	0	7.1	0	8.0	0	0	Variablo	None	2.11
0	0	0	0	0	0	0.0	0	0.5	E S E	None	14.87
0	0	0	0	1.0	0	1.0	1	0.5	N E	None	7.13
0	0	0	0	1.0	0	1.0	1	1	E N E	E by S	14.87
6.7	0	0	0	3.3	0	10.0	3	0.5	E by	E	3.08
2.0	0	0	0	2.0	0	4.0	0	1.5	N E by	Variable	6.60
0	0	0	0	1.0	0	1.0	0	0	N E	Calm	8.80
0	0	0	0	0.1	0	0.1	0	0.5	S by W	Variable	3 61
0	0	0	0	2.5	0	2.5	0	0.5	S S W	None	1.67
1.0	0.4	0.3	0.0	1.8	2.4	5.9	0.7	0.7	.....	.....	8.16

Gangaroowa near Kandy, Ceylon.

March, 1864.	3.30 P. M. Direction of wind.		Velocity in feet per Second.	10.0 P. M. Direction of wind.		Velocity in feet per Second.
	Vane.	Lower Clouds.		Vane.	Lower Clouds.	
1	Variable	Variable	6.60	N W by	Calm	1.76
2	N E	Variable	7.74	Calm	Too dark	0.00
3	N W by	Variable	3.87	W by S	None	0.35
4	E	E	14.17	E by N	None	8.45
5	E	E by S	13.73	E	Too dark	11.88
6	E by S	E	13.38	E S E	E	8.62
7	E	E	11.35	E by N	Too dark	11.62
8	N E	E by N calm	19.89	E S E	Too dark	6.78
9	E by N	Calm	15.40	E N E by	Too dark	0.53
10	N E by N	W N W calm	686	N W by W	Calm	0.00
11	E by N	Calm	13.20	S S W	None	0.00
12	E N E	Calm	12.94	E S E by	Calm	1.94
13	E by N	Calm	23.67	E by	None	1.23
14	N W by W	Variable	8 80	N	?	2.82
15	N N W	E N E	5.37	W by	Calm	0.09
16	.....	.....	0	W	Variable	0.70
17	W N W	Variable	3.52	N W	Variable	0.09
18	W by S	Variable	8.98	N W	N W by	0.70
19	W S W	E	1.76	W	Calm	0.09
20	E by N	Calm	13.20	W by S	Variable	2.46
21	N E by	Calm	9.24	Calm	Variable	0.00
22	E	Calm	8.27	S W by	None	0.00
23	N E by E	E by calm	11.00	Variable	E S E	1.32
24	E	Calm	14.08	N N W	None	3.87
25	E by N	Calm	17.07	Calm	E by S	0.00
26	E by N	E	14.78	E	E	6.25
27	E by	Variable	8.80	W N W by	Calm	1.67
28	S S W	Variable	9.50	S	Calm	3.17
29	N N E	Variable	2.20	Calm	?	0.00
30	N W by N	Variable	1.58	W N W	None	2.64
31	W S W	Variable Calm	6.07	N W	?	2.29
	.....	.....	10.23	.....	.....	2.62

Gangaroowa near Kandy, Ceylon.

Distance in Miles in 24 Hours.	Lightning and Thunder.
48.20	
49.57	Th. in fore even & at even to S W Faint L R.
51.19	
127.95	
166.97	
169.51	
167.06	In afternoon Th. to S Wward.
128.66	In fore even Th. to N E. In after even L R to S.
140.50	Th. in fore even to S W and in after even.
75.96	In after even L R to N N N E & S W.
66.02	
107.73	
157.30	In after even L R to N W & S W.
66.79	In fore even Th. & in after even L R to N W.
41.76	Th. in afternoon & fore even.
58.81	
44.19	
42.69	In foro even Th. to S W.
42.21	In afternoon Th. to S Wward.
66.78	
77.53	
97.22	At even & some time after L & L R to S W.
80.65	In after even L R to S W & W S W.
108.82	
93.00	
157.16	
108.80	In after even L & L R to W & W N W & W S W, S S W. Th. very distant.
46.94	In afternoon Th. In after even L R to E S E, W S W, S by W.
52.34	In fore even L & Th. to N W at 10 P. M. L R to S W.
46.11	In after even L R to S.
48.67	Th. in afternoon & fore even.
88.29	

GANGAROOWA NEAR KANDY, CEYLON.

March, 1864.	GENERAL REMARKS.
1	Cool fresh morn ; hot & dry fore & afternoon ; warm & very sultry after, with heavy clouds, some light rain.
2	The same as above, clouds gather earlier : but no rain.
3	Fine, warm to very hot day. Cool & fresh after even.
4	Fog at morn : cold & fresh, dry, warm to hot day. Mild after even.
5	Cool & dry at morn : as above for the rest of the day.
6	Mild to warm & damp, light showers throughout the day.
7	Fine dry & fresh till noon, in afternoon heavy clouds & storm to S W ; in after [even some very light rain.
8	The same as above, but light rain in fore even, & fine after 8 P. M.
9	Cool & fresh at morn : fine, hot & dry till fore even, when heavy clouds gathered but only a few drops of rain.
10	Fine, warm to hot & dry day ; threatening Nim at even & after, but no rain.
11	Warm to hot & very dry day, in later after even mild to cool & fresh.
12	Cool fresh morn ; hot & very dry day ; heavy clouds fore & after even till 9 P. M. when clear, cool & fresh. [even.
13	Mild to cool morn ; hot & dry till even, heavy clouds & light shower in fore
14	Mild at morn ; fine, hot & dry till 2.45 P. M. after warm & muggy, some light rain.
15	Very damp at morn ; hot, dry oppressive day, heavy Nim. gather & break up ; rain in fore even.
16	Cool morn fine, hot dry day, afternoon heavy clouds gather & break up.
17	Cool at morn, fine, warm to hot & dry day, close & muggy at 10.0 P. M.
18	Mild to hot & oppressive day, in fore & after even, heavy Nim. [here.
19	Fine & pleasant morn ; hot & sultry day ; heavy clouds in afternoon, no rain
20	Cool morn ; clear, hot & very dry fore & afternoon, sultry after even, sky over.
21	The same as the 20th. [cast with Cum. Stratus.
22	The same as above, but in after even sky covered by Electric Cirro-stratus ; squally wind in fore & afternoon. [Cum. Str. & Cir. Cum.
23	The same as above, in after even very sultry & oppressive, sky overcast with
24	The same as above till even, but after even fine, clear & fresh. [& afternoon.
25	The same as above till even, after even fine & clear but sultry, squally wind fore
26	The same as above till even, after even fine, dry & pleasant ; squally wind from 9 A. M. till even. [out rain, very sultry fore & after even.
27	The same till 4 P. M. then heavy Nim. gathered over the sky, but cleared with-
28	Hot & oppressive, dry till 2 P. M., then damp heavy clouds gathered in forenoon and smart showers at 4 P. M.
29	Fog at morn ; hot, dry very oppressive day ; heavy Nim. gathered in afternoon & covered the sky fore & after even, but no rain.
30	Cool at morn ; warm to hot dry & sultry all day, clear till 2 P. M. when heavy Nim. gathered ; a few drops rain fell. [afternoon, but no rain.
31	Cool at morn ; hot, dry day, sultry at even & after, heavy clouds gathered in

Solar Halo 5th, 6th, 11th, 31st. Lunar Halo 22nd.

Meteorological Observations taken at Gangarooiva near Kandy, Ceylon, in the month of April, 1864.

Alt. 1560 ft.; E. Long. 80° 37′, N. Lat. 7° 17′.

All the Instruments have been compared with standards.

The tension of aqueous vapour, dew point and humidity, have been found from the readings of the dry and wet bulb Thermometers by Mr. Glaisher's Hygrometrical tables (Ed. 1863).

The dew is the weight in grains deposited on a square foot of ordinary woollen cloth exposed on a board from 6 P. M. to 6 A. M. or for as many hours as there is no rain.

The evaporation is given by a Babington's Atmidometer placed under cover, so as to be protected from the sun, rain and dew, but freely exposed to the wind.

The ozone cage is hung about 25 feet above the ground.

The direction of the wind given, is that of the lowest current, by the vane; and of the currents above this, by the direction in which the Nimbi and Cumulo-Strati clouds are moving.

In this column a "calm" signifies that the clouds are apparently motionless: "variable," that the clouds apparently in the same or nearly the same stratum move in no fixed direction, but their parts move as if in vortices, or different masses of them move up from different quarters as if into a vast vortex, this being nearly always the case before thunder storms.

Entries, such as $\frac{\text{W S W}}{\text{N N W}}$, or $\frac{\text{W S W}}{\text{N N W calm,}}$ signify that the clouds are evidently in strata of different altitudes, that those in the lowest stratum move from W S W; those in the next higher from N N W; those in the next are apparently becalmed, and so on.

The velocity and distance in 24 hours are given by Robinson's Anemometer.

In the column for Lightning and Thunder—

L = "Lightning," when the flash is near enough to be visible.

L R = "Lightning Reflection," when the flash is so distant that only its reflection on the clouds or in the air is visible.

"Morn," is 6 A. M., "Even," 6 P. M. and "Night," 12 P. M. and "fore" and "after" are prefixed to these, as ordinarily to "Noon," to denote the 3 previous and 3 following hours.

R. H. Barnes.

Gangaroowa near Kandy, Ceylon.

April, 1864.	Barometer reduced to 32°.			Pressure of Dry Air.			Thermometer.			Dew Point.		
	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0
1	28.422	28.256	28.396	27.805	27.666	27.704	78.9	84.6	74.9	65.0	63.7	68.3
2	.410	.272	.395	.790	.884	.694	78.5	85.9	73.0	65.1	52 0	68.7
3	.429	.284	.385	.881	.890	701	78.5	85.4	73.5	61.6	52.4	68.0
4	.396	.276	.384	.770	.675	.769	77.3	83.2	75.2	65.4	64.2	64.9
5	.379	.244	.348	.766	.662	.612	78.2	85.9	73.5	64.8	63.3	70.1
6	.353	.251	.336	.673	.564	.616	79.3	71.9	72.0	67.8	68.1	69.4
7	.338	.207	.322	.637	.520	.596	76.7	80.7	72.0	68.7	68.1	69.7
8	.305	.171	.287	.664	.532	.527	77.5	83.7	73.2	66.1	66.0	71.0
9	.301	.158	.280	.628	.553	.481	77.4	86.4	76.1	67.5	64.4	72.5
10	.307	.221	.320	.615	.562	.616	80.1	81.3	72.3	68.3	66.9	68.8
11	.329	.206	.360	.651	.514	.596	79.0	82 2	73.1	67.7	68.3	71.2
12	.336	.189	.344	.642	.445	.590	77.4	82.4	72.5	68 4	70.4	70.8
13	.343	.205	.321	.610	.544	.603	78.3	82.3	72.0	70.0	67.0	69.4
14	.254	.153	.280	.604	.548	.534	77.2	84.3	73.6	66.5	64.4	70.5
15	.280	.153	.274	.593	.489	.530	77.4	84.7	77.0	68.1	67.1	70.4
16	.299	.171	.271	.543	.378	.517	78.8	79.2	72.5	70.9	72.3	70.8
17	.292	.152	.286	.533	.403	.575	78.3	73.7	72.6	71.0	70.6	69.1
18	0	.155	.312	0	.475	.579	0	79.4	71.8	0	67.8	70.0
19	.307	.202	.289	.541	.505	.583	73.0	74.7	71.4	71.3	68.5	68.9
20	.281	.193	.271	.58(	.419	.494	73.6	74.0	72.2	68.7	71.6	71.7
21	.289	.153	.260	.566	.374	.522	75.3	73.0	71.3	69.6	71.8	70.2
22	.284	.134	.262	.530	.390	.501	75.6	74.1	72.0	70.8	70.4	71.1
23	.291	.211	.339	.558	.462	.621	74.3	72.2	70.1	70.0	70.6	69.4
24	.341	.285	.374	.668	.567	.651	75.6	71.0	70.7	67.5	69.4	69.6
25	.402	.327	.421	.791	.621	.739	74.6	79.2	69.7	64 7	68.9	67.9
26	.420	.314	.409	.832	.653	.731	74.0	80.1	71.2	63.6	67.0	67.7
27	.392	.280	.381	.770	.572	.680	.6	80.1	71.0	65.2	69.0	68.7
28	.365	.260	.385	.708	.494	.592	77.0	82.0	75.7	66.8	71.3	72.3
29	.365	.288	.401	.586	.509	.629	78.5	82.4	74.6	71.8	71.8	71.5
30	.408	.307	.380	.690	.589	.691	78.5	80.0	71.0	69.4	69.4	68.2
31	0	0	0	0	0	0	0	0	0	0	0	0
	28.342	28.223	28.336	27.663	27.549	27 609	77.1	80.0	72.6	67.7	67.2	69.7

Gangaroowa near Kandy, Ceylon.

Humidity.		Max. in Sun's Rays at 12 o'clock.	Minimum on Grass.	Maximum in Air.	Minimum in Air.	Difference.	Mean.	Dew in Grs. per sqr. ft.	Evaporation in Grs. per sqr. ft.	Rain. At 4½ feet.			Rain. At 39 feet.		
A. M. 3.30	P. M. 10.0									A. M. 9.30	P. M. 10.0	Total.	A. M. 9.30	P. M. 10.0	Total.
492	800	150.9	62.5	85.8	68.2	17.6	77.0	273	5995	0.000	0.000	0.000	0.000	0.000	0.000
314	865	151.1	59.9	86.1	66.3	19.8	76.2	271	7935	0.000	0.000	0.000	0.000	0.000	0.000
322	830	153.6	59 9	85 8	65.9	19.9	75.8	144	7200	0.000	0.000	0.000	0.000	0.000	0.000
528	716	149.9	67.5	84.2	71 5	12.7	77.9	70	4975	0.000	0.000	0.000	0.000	0.000	0.000
469	890	153.2	60.1	86.8	65.6	21.2	76.2	240	5965	0.000	0.046	0.046	0.000	0.044	0.044
883	915	155.8	64.9	84.7	68.3	16.4	76.5	187	3385	0.000	0.583	0.583	0.000	0.561	0.561
650	925	155.0	64.2	82.8	67.7	15.1	75.2	0	3590	0.003	0.000	0.003	0.001	0.000	0.001
552	925	151.2	63.2	83.6	66.3	17.3	75.0	234	4650	0.000	0.001	0.001	0.000	0.001	0.001
482	885	150.8	65.0	85 7	67.7	18.0	76.7	206	5430	0.000	0.000	0.000	0.000	0.000	0.000
619	890	155.3	67.8	86.6	70.9	15.7	78.7	202	4450	0.000	0.001	0.001	0.000	0.000	0.000
630	935	147.2	64.9	82.4	68.3	14.1	75.4	156	3135	0.000	0.479	0.479	0.000	0.490	0.490
672	942	154.3	68.3	83.9	69.7	14.2	76.8	173	4135	0.003	0.221	0.224	0.003	0.221	0.224
595	915	145.1	67.6	82.3	69.3	13.0	75.8	173	4195	0.000	0.000	0.000	0.000	0.000	0.000
510	900	148.8	64.5	85.0	68.2	16.8	76.6	180	5670	0.000	0.000	0.000	0.000	0.000	0.000
552	946	152.0	63.1	84.6	67.8	16.8	76.2	252	5140	0.000	1.982	1.982	0.000	2.019	2.019
797	942	153.0	67.0	82.8	69.8	13.0	76.3	173	2820	0.000	0.235	0.235	0.000	0.218	0.218
900	890	147.7	68.3	82.1	70.3	11.8	76.2	165	3030	0.000	0.654	0.654	0.000	0.618	0.618
674	942	140.8	69.4	80.6	71.3	9.3	76.0	90	4450	0.000	0.109	0.109	0.000	0.093	0.093
810	920	98.4	70.2	75.3	70.2	5.1	72.7	0	1830	0.132	0.021	0.153	0.121	0.015	0.136
920	983	133.0	68.2	77.0	70.4	6.6	73.7	110	2990	0.002	0.146	0.148	0.001	0.134	0.135
958	965	155.3	70.0	80.4	70.7	9.7	75.6	43	2180	0.002	4.777	4.779	0.001	4.755	4.756
885	970	144 3	67.3	0	0	0	0	0	2275	0.011	0.039	0.050	0.001	0.033	0.034
947	976	127.8	66.8	78.0	69.5	8.5	73.7	210	1565	0.000	0.887	0.887	0.000	0.880	0.880
946	964	146.0	64.9	79.2	67.9	11.3	73.6	273	2625	0.000	1.127	1.427	0.000	1.423	1.423
706	940	137,5	62.0	79.8	66 2	13.6	73.0	340	5410	0.000	0.000	0.000	0.000	0.000	0.009
639	882	132.2	58.0	79.8	62.4	17.4	71.1	460	8390	0.000	0.000	0.000	0.000	0.000	0.000
686	922	140.0	61.0	80.5	65.2	15.3	72 8	415	6980	0.000	0.000	0.000	0.000	0.000	0.000
704	890	139.0	62.8	82.0	67.3	14.7	74.7	370	5810	0.000	0.000	0.000	0.000	0.000	0.000
704	900	141.7	66 8	83.2	71.2	12.0	77.2	170	5260	0.000	0.000	0.000	0.000	0.000	0.000
698	904	139.2	66.9	82.6	70.3	12.3	76.4	240	5060	0.000	0.006	0.006	0.000	0.007	0.007
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
675	909	145.0	65.1	82.5	68.4	14.1	75.5	5820	4560	0.153	11.614	11.767	0.128	11.512	11.640

Gangaroowa near Kandy, Ceylon.

April, 1864.	A. M. 9.30							P. M. 3.30						
	Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.	Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.
1	0.5	0	0	0	1.7	0	2.2	0	0	0	0.1	7.5	0	7.6
2	0	0	0	0	0.4	0	0.4	0	0	0	0.1	0.8	0	0.9
3	0.4	0	0	0	1.0	0	1.4	0	0	0	0	5.0	0	5.0
4	0	0	6.5	0	3.3	0	9.8	1.0	0	0.2	0	8.8	0	10.0
5	0	0	0	0	1.0	0	1.0	0	0.6	0	0	0	8.6	9.2
6	2.5	0	0	0	2.5	0	5.0	0	0	0	0.1	0	9.9	10.0
7	3.0	0	0	0	2.0	0	5.0	0.4	0	0.7	6.0	0	2.0	9.1
8	0.5	0	0	0	0.3	0	0.8	3.5	0	0	0	0	3.8	7.3
9	7.3	0	0	0	1.2	0	8.5	0	0	0	0	0	9.0	9.0
10	0.1	0	0	0	2.4	0	2.5	0	0.4	0	0	0	9.0	9.4
11	0.5	0	0.3	0	2.0	0	2.8	0.7	0	0 3	0	0	9 0	10.0
12	6.8	0	0.1	0	0.1	0	7.0	0	0	0.1	0.4	0	8.8	9.3
13	4.0	0	1.5	0	3.3	0	8.8	0	6.7	0	0	0	3.3	10.0
14	10.0	0	0	0	0	0	10.0	8.3	0	0	0.2	1.5	0	10.0
15	9.2	0	0	0	0.4	0	9.6	1.2	1.3	0	0	2.5	0	5.0
16	3.7	0	2.0	0	3.3	0	9.0	0	0.2	0.1	0	9.7	0	10.0
17	8.4	0	0	0	1.2	0	9.6	0	8.5	0.2	0	1.3	0	10.0
18	0	0	0	0	0	0	0	0	3.5	1.5	0	0	4.5	9.5
19	0	7.8	1.2	0	0	1.0	10.0	0	0.6	0	0	0	9.4	10.0
20	0.2	0	0	0	0	9.8	10.0	0	0	2.0	0	0	8.0	10.0
21	0	0	8.0	0	0	2.0	10.0	0	0	0	0	0	10.0	10 0
22	0.2	0	9.3	0	0	0.4	9.9	0	0.2	0	0	0	9.8	10.8
23	0	9.0	0	0	0	1.0	10.0	0	0.2	0	0	0	9.8	10.0
24	0.4	0	0.1	0.2	0.7	0	1.4	0	2.0	0	0	0	8.0	10.0
25	4.0	0	0	0	0	0	4.0	4.5	0	0	0	1.2	0	5.7
26	0	0	0	0	0	0	0	0 8	0	0	0	0.8	0	1.6
27	0.1	0	0	0	1.2	0	1.3	1.8	0	0	0	1.5	0	3.3
28	0	0	0	0	2.5	0	2.5	0	0	0	0	5.0	0	5.0
29	0	0	0	0	0	0	0	0	0.2	0	0	8.0	0	8.2
30	5.0	0	0	0.1	1.7	0	6.8	0	1.5	0	0	0	8.5	10.0
	2.5	0.6	1.1	0.0	1.2	0.5	5.9	0.8	0.9	0.2	0.2	1.8	4.3	8.2

Gangaroowa near Kandy, Ceylon.

P. M. 10.0							Ozone.		9.30 A.M. Direction of wind.		Velocity in feet per Second.
Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.	6 A. M.	6 P. M.	Vane.	Lower Clouds.	
0	0	0	0	8.0	0	8.0	0	1	Variable	Variable	1.67
0	0	0	0	0.7	0	0.7	0	0	Variable	E	2.73
0	0	0	0	0	0	0	0	0	N E	E N E	6.16
0	0	0	0	3.3	0	3 3	1	1	W	N E	3.34
9.0	0	0	0	1.0	0	10.0	0.5	1.5	Variable	Calm	2.16
0.3	0	0	0	0	8.5	8.8	0	3	Variable	Variable	2.02
0	0	0	0	1.0	0	1.0	0	1	W by N	Variable	5.11
0.5	0	0	0	1.5	0	2.0	0	0	W by	Variable	0.00
0	0	0	0	0	9.0	9.0	0	0.5	Variable	Variable	0.35
0	0	0	0	9.0	0	9.0	0	1	Variable	Calm	2.29
3.0	0	0	0	0	7.0	10.6	0	1	W by	Variable	2 55
1.5	5.0	0.2	0	0	0 3	7.0	0	1	Variable	None	2.20
8.4	0	0	0	1.0	0	9.4	0	1	S by W	E S E	7.57
0	0	0	0	2.0	0	2.0	0	1.5	N E by	None	1.58
0	0	0	0	9.6	0	9.6	0	1	N N W by	E by S	2.64
0	0	10.0	0	0	0	10.0	0.5	1	W by	E	2.11
0	0	9.8	0	0.2	0	10.0	0	2	N by	E N E	0.79
0	0	0	0	0	10 0	10 0	2	2	.. ..	... ..	0
0	0	10.0	0	0	0	10.0	0	1.5	E N E by	?	0.18
0	0	1.7	0	0	8.0	9.7	3	1	N N E	?	1 06
0	0	0	0	0	10.0	10.0	0	0.5	Variable	E	0.18
8.5	0	0.3	0.2	0	0	9.0	0	1	S W	Calm	2.82
0	9.8	0	0	0.2	0	10.0	0	1	S W by W	W by	1.76
0	10.0	0	0	0	0	10.0	0	0	W	S by (?)	5.28
0	0	0	0	0	0	0.0	0	0.5	W N W	None	3.96
0	0	0	0	0	0	0.0	0.5	0	.....	.....	0
0	0	0	0	0.7	0	0.7	1	1	W	S W by S	10.91
0	0	0	0	8.5	0	8.5	0.5	1	S S W	S by W	7.57
1.0	0	0	0	1.0	0	2.0	1	1	....	.....	0
0	0	0	0	2.0	0	2.0	1	2	S W by N	S W by W	11.97
1.1	0.9	1.1	0.0	1.7	1.8	6.6	0.4	1.0	.....	.....	3.38

Gangaroowa near Kandy, Ceylon.

April, 1864.	3.30 P. M. Direction of wind.		Velocity in feet per Second.	10.0 P. M. Direction of wind.		Velocity in feet per Second.
	Vane.	Lower Clouds.		Vane.	Lower Clouds.	
1	W S W	Variable	6.25	Calm	Too dark	0.00
2	E by N	Variable	14.08	N W by N	Too dark	3.17
3	N E	Variable	7.39	W S W	W by	1.94
4	N W	Variable	6.25	S W	Calm	3.08
5	W N W	Variable	7.83	N N W	Calm	2.73
6	N E	E N E by Calm	2.38	N W by	Too dark	1.67
7	W S W by	N N E by	3.78	N N W by	?	0.02
8	W N W	Variable	7.83	Calm	Too dark	0.00
9	W by N	Variable	6.86	N W	Too dark	0.62
10	S	Variable	12.41	N W by W	Too dark	0.09
11	N E by E	E	7.48	N by	Calm	0.10
12	W	Calm	10.38	Variable	Too dark	0.18
13	S W by W	Variable	9.06	N W	E N E	2.46
14	W S W	E S E (?)	7.83	N W	N E (?)	1.94
15	N W	E by S by	7.83	N N W	N by E	0.00
16	S by (?)	Variable	7.48	N W	None	2.29
17	E N E by	Calm	1.50	E N E by	Too dark	4.93
18	N N E by	E	6.42	W S W	Too dark	3.17
19	E	Calm ?	6.07	Calm	None	0.00
20	E N E	E N E	0.26	N W	E S E	0.26
21	Variable	Calm	2.29	N E	?	6.51
22	S S E	W by	1.14	W N W	None	0.88
23	E S E	Calm	0.26	Variable	Calm	0.00
24	W by	S by	0.88	N by	None	0.70
25	W by S	W	14.87	N W by W	None	1.50
26	W by N	W S W by	9.68	W by	None	0.35
27	W	W	16.72	W N W	Too dark	1.85
28	W by S	Calm	12.67	W	Too dark	8.10
29	W	S W by	19.18	S W by	?	0.26
30	S by	Calm.	6.34	W N W	Too dark	3.87
	.....	.....	7.45	.....	.....	1.75

Gangaroowa near Kandy, Ceylon.

Distance in Miles in 24 Hours.	Lightning and Thunder.
49.94	Between 7 & 8 P. M. brilliant L R to N N W—N.
74.52	[L R to W by S—W N W.
64.85	Between 9 & 10 P. M. L & Th. barely heard to W N W—N W & brilliant
45.31	At 4 P. M. one clap of Th. heard. [fore even L & Th. not far.
61.38	In fore & afternoon & fore even Th. at even L & Th. dist. to S W & in early
49.87	At 2 P. M. L & Th. not far at 3.30 P. M. L & Th. to N W & in fore even L & Th. dist. a few miles at 8 P. M. vivid L R to W—W S W.
50 63	At 2 P. M. Th. in fore even L & Th. in N W quarter between 7 & 8 P. M. L R to N—N N W & S S W.
31.36	[even L R to S by W, S S W & N N E.
39.55	At 3.30 P. M. Th. & shortly one flash L to S E by E dist. 4 miles.. In after
38.57	From 2.30 to 3.30 P. M L & Th. to E N E dist. 1 or 2 miles. At even frequent L in a mass of Cumulus to N W.
31.10	At noon, after 2 P. M. & in fore even Th. At even two flashes L with Th. to W, W N W dist. 7 & 12 miles, between 7 & 8 P. M. L R to W N W, N N W & S W & S after 9 P. M. L R to W—S W, S—S E & dist. Th.
46.21	After 2.45 P. M. Th. & after 4.30 till even L & Th to S W—N dist. several miles. In after even frequent L & Th. more or less dist. & at 10 P. M. L R to W N W & E N E.
55.02	At 3.30 P. M. & in all fore even Th.—at 8 P. M. L R to W N W.
49.02	
49.57	Between 7 & 8 P. M. L & Th. dist. several miles. [L R to N N W.
29.56	Between 1 & 2 P. M. Th. in fore even L & Th. dist. several miles & at even
37.71	At 2 P. M. Th. & shortly L with Th. not far dist. At 10 P. M. L R to E.
88.93	Between 2 & 3.30 P. M. Th.
40.26	
58.82	
32.04	From 2.30 P. M. to 6 P. M. L with Th. not far dist. some flashes very near.
33.82	In afternoon Th. L R at even in Cumulus to N W by W, at 8.30 to E & at 10 P. M. L & L R in Cumulus to S W by S, S W by W & N W.
22.45	At 1.30 P. M. Th. from 2 to 3 P. M. frequent L & Th. dist. 1 or 2 miles & more.
30.67	From 1.30 to 2 P. M. L & Th. some flashes quite close, at 3.30 P. M. dist. Th.
70.51	
122.93	
112.39	
104.38	[8 P. M. bright L R to W S W.
102.54	Between 7 & 8 P. M. L R to N E & brilliant L in Cumulus to E by S after
93.16	At 1 P. M. & after Th. at 3.30 P. M. L & Th. dist. several miles, & in fore even L & Th. in all, N half of sky dist. a few miles.
57 24	

Gangaroowa near Kandy, Ceylon.

April, 1864.	GENERAL REMARKS.
1	Fog & very damp at morn; hot & dry day, sultry in after even, heavy Cum. Str. & cover. large part of sky for rest of the day. [squally in forenoon.
2	Cool & fresh at morn, warm to very hot & dry, not much cloud, wind rather
3	The same as above, but at even heavy threaten. clouds in N W quarter.
4	Warm to very hot & dry but sultry & oppressive all day; more or less Cum. Str. all day, very threaten. in fore even.
5	Cool at morn, warm to very hot, dry & oppressive till 4 P. M. when some rain & after pleasant. Heavy Nim. gatherd. in afternoon.
6	Cool damp morn, warm to hot & oppressive till the rain, then raw & damp heavy rain in afternoon & afterwards light rain. [but broke up without rain.
7	Cool damp morn, fine & clear till Noon, Nim. gathered in afternoon & fore even,
8	Cool fresh morn, warm to hot pleasant day, Nim. gather. in afternoon covered the sky in fore even but broke up with only a few drops rain.
9	As on previous day. [but broke up with a little rain.
10	Mild to very hot & oppressive day, heavy Nim. in afternoon & fore even,
11	Fine & pleasant till 10 A. M. heavy rain for an hour in forenoon, Nim. covering the sky afternoon, fore & afternoon & some rain.
12	Raw & damp with fog till 7 A M. warm to hot, at times muggy, at times pleasant, after Noon Nim. & rain in fore & after even.
13	Very damp morn, warm to hot & pleasant day. In fore even Nim. covered the sky but only a few drops rain.
14	Very damp with fog at morn, cloudy but fine, warm to hot, dry & pleasant day.
15	Damp morn, fine, dry & pleasant till even, very heavy rain fr. 6.45 till 8 P. M. & then again fine. [3.0 P. M. & 4.30 to 9.0 P. M.
16	Mild to very hot, damp & oppressive day, Nim. at Noon & after, rain 2.30 to
17	Fog at morn, mild to hot, damp & oppressive day, heavy Nim. gathered at noon, rain 2.30 to 3 & 4.30 to 9 P. M. [from E rain fr. 4.15 till after 8 P. M.
18	Mild to hot & pleasant till fore even, then damp Nim. more or less passing over
19	Mild to raw, damp cloudy day, light rain fr. 2 A. M. till 9 A. M. showers in fore & after Noon. [light showers.
20	Mild to warm, damp day, Nim. more or less all day, generally fr. E N E or E
21	Mild & very damp day, heavy Nim. gatherd. in afternoon, fr. 2.30 to 3.30 P. M. 3 inches rain fell, rain all fore & after even. [& in afternoon & fore even.
22	Mild to warm, damp, muggy & cloudy day, light rain between 10 P. M. & 6 A. M.
23	Very damp, at times raw, oppressive day, Nim. gathered in forenoon, heavy rain 1.30 to 3.30 P. M. & light rain in fore even. [light rain all fore & after even.
24	Oppressive at noon, raw and damp after the rain. heavy rain fr. 1.30 till 3 P. M.
25	Very damp with fog at morn, mild to warm, dry & fresh day.
26	Cool, fresh morn, mild to hot, dry, pleasant day, sky nearly cloudless.
27	As on previous day. [less clouded.
28	As on previous day till afternoon, then sultry & oppressive, & sky more or
29	Muggy morn, fine, hot, pleasant, more or less cloudy day, sultry after even.
30	Mild to hot plessant day, heavy Nim. in afternoon & fore even, but they broke up with only a little rain here.
31	

Solar Halo seen on 6th, 7th, 12th, 14th, 15th, 22d, 23d, Lunar Halo seen on 13th.