JOURNAL

OF THE

ASIATIC SOCIETY OF BENGAL,

EDITED BY

THE SECRETARIES.

VOL. XXII.

Nos. I. to VII.—1853.

"It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science, in different parts of *Asia*, will commit their observatons 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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1854.

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Errata in No. III. *of* 1853 *of the Journal of the Asiatic Society in the Paper entitled—*

Report on the Geological Structure, &c. of the Salt Range in the Punjaub, &c. &c.

Page	line	
230	9,	*for* Kaffin *read* Kaffir.
,,	12,	*for* Kovana *read* Korana.
,,	,,	*for* rise *read* rises.
232	3,	*for* Punchah *read* Punchal.
,,	24,	*for* map *read* mass.
,,	33,	*for* Kuttba *read* Kuttha.
233	3,	*for* Chountuah *read* Chounterah.
,,	10,	*for* Kaffin *read* Kaffir.
,,	22,	*for* strata *read* straths.
234	4,	*for* Vehee *read* Vahee.
,,	28,	*for* kurrul *read* kureel.
,,	30,	*for* specigera *read* spicigera.
235	4,	*for* kurul *read* kureel.
,,	5,	*for* chenopodiacious *read* chenopodiaceous.
,,	6,	*for* java *read* lana.
,,	28,	*for* Kuringurli *read* Kuringuli.
,,	29,	*for* Katass *read* Kutass.
,,	,,	*for* Kuhun *read* Kahun.
,,	32,	*for* Kuhor *read* Kuhar.
,,	33,	*for* ditto *read* ditto.
236	11,	*for* lakes *read* lake.
,,	,,	*for* any *read* very.
,,	13,	*for* Nunva *read* Nurwa.
,,	24,	*for* Khubakkie *read* Khubukkie.
,,	,,	*for* Lone Lihesur *read* Sone Sikesur.
,,	27,	*for* ditto *read* ditto.
,,	28,	*for* inland *read* inclosed.
,,	32,	*for* Lihesur *read* Sikesur.
237	17,	*for* Europeans *read* European.
238	20,	*for* Marie *read* Maree.
,,	28,	*for* Lurdi *read* Surdi.
239	2,	from foot *for* bottoms *read* bottom.
241	11,	*for* Milawan *read* Nilawan.
242	14,	*for* trappian *read* trappean.
,,	21,	*for* Kemah *read* Keurah.
244	5,	from bottom *for* thin *read* their.
246	4,	*for* roots *read* roofs.
,,	9,	*for* salt *read* mineral and.
,,	21,	*for* strifes *read* strikes.
,,	25,	*for* Kalibay *read* Kalibag.
,,	29,	*for* Marree *read* Maree.
249	11,	*for* Sugaswalla *read* Sujeewalla.
,,	,,	*for* efforts *read* effects.
250	22,	*for* give their *read* give to their.
,,	24,	insert a point *after* through it.
,,	,,	*for* wherever *read* Wherever.
,,	26,	*for* seem to be *read* seem to lie.
252	9,	*for* Gredi *read* Grechi.
,,	18,	*for* up to the *read* up the.

Page	line	
253	2 and 3,	*for* on the scarped *read* "or the scarped."
,,	4,	*for* Vevhalee *read* Vuhalee.
,,	11,	*for* Vusual *read* Vusnal.
255	24,	*for* to be most *read* to be a most.
,,	34,	*for* calcarious *read* calcareous.
257	25,	*for* this concretion *read* these concretions.
258	8,	*for* copper, as *read* copperas.
,,	32,	*for* Bayaar *read* Bazaar.
259	13,	*for* Poonah *read* Boonáh.
,,	14,	*for* Imapore *read* Surafur.
,,	15,	*for* Gurjah *read* Gurjak.
,,	20,	*for* mount *read* mounts.
,,	,,	*for* Drengum *read* Drengun.
,,	,,	*for* where *read* whence.
260	1,	*for* Kaffee *read* Kaffir.
,,	,,	*for* Dak *read* Dok.
261	5,	*for* A lower limestone, &c. *read* "A Lower limestone, &c." in italics.
262	3,	from foot *for* on *read* of.
263	11,	*for* magnesia *read* magnesian.
,,	16,	*for* Zinnanee *read* Zamanee.
,,	,,	*for* Chederos *read* Chederoo.
,,	21,	*for* Nummaal *read* Nummul.
,,	31,	*for* Zimanee *read* Zamanee.
264	30,	*for* and intercalated *read* and are intercalated.
265	14,	*for* shales *read* slabs.
,,	23,	*for* Salira *read* Lalira.
267	11,	*for* seas *read* lias.
,,	23,	*for* M. de Verueuil *read* M. de Verneuil.
,,	24,	*for* Cara *read* Cora.
,,	32,	*for* ditto *read* ditto.
268	14,	*for* Sam Sikesur *read* Sone Sikesur.
,,	21,	*for* Mulakhail *read* Mulokhail.
,,	25,	*for* Dak *read* Dok.
,,	28,	*for* Soohinam *read* Sooliman.
271	2,	*for* Umlakhail *read* Mulokhail.
,,	8,	*for* ditto *read* ditto.
272	27,	*for* this *read* the.
,,	34,	*for* Jamieson *read* Jameson.
274	9 and 10,	*for* connected with *read* converted into.
276	1,	*for* Musakhail *read* Mulokhail.
,,	9,	*for* block hard *read* black band.
,,	13,	*for* Kuneegoornul *read* Kuneegoorum.
,,	25,	*for* Pecoptaris *read* Pecopteris.
,,	32,	*for* Pecteus *read* Pectens.
277	3,	*for* osselit *read* osselet.
,,	6,	*for* concave or convex *read* concavo-convex.
,,	7,	*for* thin *read* their.
,,	9,	*for* a disc *read* each disc.
278	7,	*for* crustacian *read* crustacean.
,,	last line	*for* throw out *read* then out.

A. Fleming.

Dera Ghazee Khan, Augt. 22nd, 1853.

Errata in Vol. XXII. for 1853, *(Nos.* 3, 4 *&* 5*) of the Journal of Asiatic Society, in the paper entitled "Report on the Geological Structure, &c. of the Salt Range in the Punjaub, &c."*

Page	line	
258	18,	*for* Soda *read* Lead.
334	30,	*for* Likesur *read* Sikesur.
335	35,	*for* thin *read* their.
,,	37,	*for* Kathee *read* Kotkee.
336	2,	*for* Chotab *read* Chotah.
,,	3,	*for* Soan *read* Loon.
,,	,,	*for* Marie *read* Maree.
,,	6,	*for* Ral *read* Rol.
,,	25,	*for* ditto *read* ditto.
337	17,	*for* Jumsan *read* Jumsau.
,,	20,	*for* apparance *read* appearance.
,,	27,	*for* devoid *read* derived.
338	8,	*for* Jumsan *read* Jumsau.
,,	27,	*for* Cents. *read* Cwts.
,,	29,	*for* Kathee *read* Kotkee.
339	3,	*for* Jumsan *read* Jumsau.
,,	16,	*for* Kathee *read* Kotkee.
,,	25,	*for* Jumsan *read* Jumsau.
340	5,	*for* ditto *read* ditto.
341	8,	*for* clay sandstone *read* claystone.
,,	16,	*for* sandstone *read* sandstones.
342	15	*for* Shob *read* Shah.
,,	33,	*for* Rhutlum *read* Ruttibun.
343	11,	*for* Kurrah *read* Keurah.
,,	14,	*for* Taber *read* Tober.
,,	34,	*for* Demdhote *read* Dimdhote.
344	13,	*for* Kurrumea Wou *read* Kurrumee Wan.
,,	28,	*for* Kathee *read* Kotkee.
,,	32,	*for* ditto *read* ditto.
345	3,	*for* ditto *read* ditto.
,,	29,	insert a point after coal.
,,	,,	*for* small *read* Small.
346	10,	*for* Kathee *read* Kotkee.
,,	23,	*for* ditto *read* ditto.
347	1,	*for* ditto *read* ditto.
,,	9,	*for* Brattenberg *read* Beattenberg.
,,	16,	*for* ditto *read* ditto.
349	2,	*for* coating *read* luting.
,,	14,	*for* Fascialites *read* Fasciolites.
,,	16,	*for* Aeritina *read* Neritina.
350	14,	*for* when *read* where.
,,	29,	*for* Gharigulla *read* Ghorigulla.
,,	34,	*for* ditto *read* ditto.
,,	,,	*for* Bulerala *read* Bukrala.
351	7,	*for* Sam *read* Sone.
,,	35,	*for* identified *read* identical.
352	3,	*for* Moochpoor *read* Mochpoora.
354	2,	*for* Buhrala *read* Bukrala.
355	13,	*for* Kuttree *read* Puttree.
,,	33,	*for* with *read* into.
357	4,	*for* Carapax *read* Carapace.
,,	13,	*for* endogenous *read* exogenous.
,,	24,	*for* eastward *read* east.
,,	36,	*for* formed *read* forced.
358	15,	*for* axis *read* axes.
,,	24,	*for* Sekesur *read* Sikesur.

Page	line	
,,	33,	*for* 2113 feet. Above *read* 2113 feet above.
,,	34,	after Maree insert a point.
,,	,,	*for* looking *read* looking, and omit ; after summit.
360	11,	*for* grove *read* zone.
,,	15,	after mountains insert would.
363	17,	*for* alluvion *read* alluvium.
,,	22,	*for* Siberian *read* Silurian.
,,	24,	*for* hard *read* hand.
366	36,	*for* oolitics *read* oolites.
367	2,	*for* 18° *read* 180°.
,,	5,	*for* Kothee *read* Kotkee.
368	15,	*for* Kurum *read* Koorum.
,,	25,	*for* fossil *read* fossils.
445	8,	*for* pelu *read* peelu.
,,	,,	*for* mud *read* mudar.
,,	13,	*for* as *read* so.
446	15 and 16,	*for* detritic *read* dentritic.
447	9,	*for* vein *read* veins.
,,	31,	*for* Gurjok *read* Gurjak.
448	2,	*for* Leyden *read* Seyden.
,,	5,	*for* Dhur *read* Dhar.
,,	8,	*for* Soue *read* Sone.
,,	9,	*for* Moosoul *read* Moosral.
,,	19,	*for* 4,493 *read* 493.
,,	40,	*for* render *read* renders.
449	9,	*for* Kothee *read* Kotkee.
,,	19,	*for* Lingasun *read* Singasun.
,,	22,	*for* Arub *read* Amb.
451	24,	*for* rock *read* rack.
452	18,	*for* Deooman Rocks *read* Devonian Rocks in italics.
,,	30,	*for* Kerah *read* Keurah.
453	11,	*for* Mukraih *read* Mukrach.
,,	20,	*for* Arub *read* Amb.
,,	25 and 26,	*for* glame *read* glance.
,,	34,	after Agate insert .....
,,	34 and 35,	Carboniferous Rocks, &c. in italics.
454	17,	Oolitic Secondary Rocks, &c. in italics.
,,	21,	*for* Shah *read* Shales.
,,	41,	*for* Intana *read* Jutana.
456	12,	after Lower Silurian or Cambrian Rocks insert ?
457	13,	*for* maps *read* mass.
,,	25,	*for* Kuhar *read* Kuhan.
,,	33,	*for* ditto *read* ditto.
458	4,	*for* Hoona *read* Hoon.

A. Fleming.

Chuprah, 26th January, 1854.

JOURNAL

OF THE

ASIATIC SOCIETY.

No. I.—1853.

Note by the Editors.

The two following papers by Mr. Hodgson were, with a third, which will appear in the next No. of the Journal, nearly prepared for issue in the early part of last year (1852), when they were recalled by the author, who desired more fully to amplify and digest his matter, with reference to his rapidly increasing information and larger access to books.

Illness, however, having now compelled Mr. Hodgson to suspend his investigations and repair to Europe for the renovation of his health, the Editors conceive that the publication of the papers should be no longer put off, and they are accordingly now printed with the author's assent. The important comparative list of Caucasian and Mongolian vocables has received considerable additions.

On the Indo-Chinese Borderers and their connexion with the Himálayans and Tibetans.—*By* B. H. Hodgson, *Esq.*

To the Secretary Asiatic Society.

Sir,—In further prosecution of my purpose of recording in the pages of our Journal a complete set of comparative vocabularies on an uniform plan, I have now the honour to transmit to you two fresh series, one for Arrakan, and the other for the Tenasserim provinces. The first comprises six tongues, viz., the Burmese, the Khyeng, the Kami, the Kúmi, the Mrú and the Sák; the second, five, viz., the Burmese, the Talien, the Túng-lhú, the Shán and the Siamese.

It is needless, I presume, to apologise for thus recording provincial dialects of well known languages such as the Burmese and Siamese,

because such deviations of a known kind afford inestimable means of testing those which are unknown, and of thus approximating to a just appreciation of the interminable varieties of speech, that characterise the enormously extended family of the Mongolidæ.

I am indebted for these vocabularies to Captain Phayre whose name is a warrant for their authenticity, and who has kindly added to their value by the subjoined explanatory note upon the Arrakan tribes. On those of the Tenasserim provinces the only elucidatory addition is the important one that the Túng-lhú are "Hillmen," that is, dislocated aborigines driven to the wilds, or, in other words, broken and dispersed tribes, like the Khyeng and Kami and Kúmi and Mrú and Sák of Arrakan, whose vocables constitute the greatest part of the first half of the vocabularies herewith forwarded.

In the course of recording in our Journal these numerous vocabularies, I have purposely avoided any remarks on the affinities they suggest or demonstrate, intending to take up that subject when they should be completed: but the high interest* excited by my Himálayan series, in connexion with the bold and skilful researches which are now demonstrating the unparalleled diffusion over the earth of that branch of the human family to which the Himálayans belong, has induced me on the present occasion to deviate partially from that rule and to at once compare Captain Phayre's Arrakanese vocables with my own Himálayan† and Tibetan ones. Having been so fortunate as lately to procure an ample Sifanese series, comprising the tongues of the several peoples bordering on China and Tibet between Kokonúr and Yúnán, and having moreover made some progress in a careful analysis of a normal and of an abnormal sample of the Himálayan tongues, with a view to determining the amounts of the Turánian and Arian elements, I shall ere long find occasion to recur to the general affinities of the Indian Mongolidæ. In the meanwhile the subjoined comparison of several Arrakanese tongues with those of Tibet and of the Eastern Himálaya will be read with surprise and pleasure by many who, accustomed to regard the Himálayans as Hindus, and the Indo-Chinese, like the Chinese, as distinct from the

* Latham's History of Man and Ethnology of British Colonies.

† My own Himálayan series will be found in the Journal, No. 185 for Dec. 1847. The Arracanese series is annexed hereto.

people of Asie Centrale, and from the Tibetans, will be astonished to find one type of language prevailing from the Káli to the Koladân, and from Ladakh to Malacca, so as to bring the Himálayans, Indo-Chinese and Tibetans into the same family.

That such, however, even in the rigid ethnological sense, is the fact will hardly be denied by him who carefully examines the subjoined table, or the documents from which it is taken, because not only are the roots of the nouns and verbs similar to identity, but the servile particles are so likewise, and that as well in themselves as in the uses made of them, and in the mutations* to which they are liable. It should be added that the resemblances cited are drawn not from "ransacked dictionaries" but from vocabularies of less than 300 words for each tongue.

To those who, not content with this abstract, shall refer to the original documents, I may offer two remarks suggested by their study to myself. 1st, The extraordinary extent to which the presently contemplated affinities holds good, has been made out by the helps afforded by the series of cognate tongues, whereby the synonyma defective in one tongue are obtained from another, whilst the varying degrees and shades of deviation are a clue to the root or basis.† 2nd, The other remark suggested by the comparison of the vocabularies is, that it is the nouns and verbs, and *not* the pronouns and numerals, which constitute the enduring part of these languages; and that consequently, whatever may be the case in regard to the Arian group of tongues, we must not always expect to find the best evidence of family connexion in regard to the Turanian languages among the pronouns and numerals. Indeed the confused character of these parts of speech seems to be a conspicuous feature of the Mongolian tongues.

* In order to appreciate this remark and to trace the elements of the vocables, see analytic observations of the following paper on Caucasian and Mongolian words, appended to the list of those words.

† Take the radical word for dog, as a sample. We have khyi, khiá, khí, kí, khwé, kwé, kwí, kú, kí-chá, ḳú-chú, khó, kyó, cho-i. For the appended particles and their mutations I must refer to the original documents, and to the future confirmations to be supplied by my Sifánese series of words.

Comparison of Tibetan and Himálayan tongues on one hand, and of the Indo-Chinese on the other.

Blood.—Thak in Bhotia, Thyak in Lhópa, Vi in Lepcha.*
Thwé in Burmese, Thé in Sák, Ka-thí in Khyeng, A-ti in Kami, Wi in Mrú.

Boat.—Thú in Sérpa.
Thé in Burmese.

Cat.—Si-mi in Bhotia, Si-mi in Sokpa.
Min in Khyeng, Min in Kami.

Crow.—O'-la in Lhópa, Á-wá in Limbu.
O'-á in Kúmi, Wá á in Kami and in Mrú.

Day.—Nyi-ma in Bhotia, Nhí in Newári, Nyim in Lhópa.
Né in Burmese, Ni in Mrú.

Dog.—Khyi in Bhotia, Khi in Lhópa, Kú-chú in Kiránti, Ki-cha in Newári, Khia in Dhimali.
Khwé in Burmese, Ta-kwi in Mrú, Kú in Sák.

Ear.—Ná in Bhotia, Na-vo in Lhópa.
Ná in Burmese, Ka-ná in Sák.

Eye.—Mig in Bhotia, A-mik in Lepcha, Mó in Múrmi and Gúrúng.
Myé-tsi in Burmese, A-mi in Kámi and Sák, Min in Mrú.

Father.—Phá in Bhotia, Amba in Limbú.
Phá é in Burmese, Ampa in Kúmi.

Fire.—Mé or Mi in Bhotia, and in all Himálayan tongues.
Mí, Má, Má i in Burmese, Kámi and Mrú.

Fish.—Nyá in Bhotia, Ngyá in Lhópa, Ngó in Lepcha, Nyau in Súnwár.
Ngá in Burmese, Ngú in Khyeng, Nghó in Kami.

Foot.—Káng in Bhotia, Káng in Lhópa, Khwe-li in Súnwár.
Khyé in Burmese, Ká-kó in Khyeng, Khou in Kúmi.

Goat.—Rá in Bhotia.
Ta-rá in Mrú.

Hair.—A-chóm in Lepcha, Chúm in Magar.
A-shám in Kami, Shám in Mrú and Kúmi.

Head.—Gó in Bhotia.
Ghóng in Burmese.

* The first line gives the northern series, the second the southern.

Hog.—Phak in Bhotia and Lhópa and Kiránti, Wak in Magar.
Ta-pak in Mrú and Vak in Sák.

Horn.—Ar-kyok in Sérpa, A-róng in Lepcha.
A kyi in Khyeng, A-rúng in Sák.

Horse.—Tá in Bhotia and Lhópa, Sa la in Newári.
Tá-phú (phú male suffix) in Kámi, Sapú in Sák (pú idem).

House.—Khyim in Bhotia and Lepcha. Yúm in Magar.
Kyim in Sák, Kim in Mrú; Um in Kúmi.

Man.—Mi in Bhotia and most Himálayan tongues, Maro in Lepcha, Múrú in Súnwár.
Ka-mi in Kámi, Mrú in Mrú dialect.
(Ka-mi in Newári means crafts-man).

Moon.—Lá-va in Bhotia, Lhópa, Lepcha, &c. &c.
Lá in Burmese and Khyeng, Pú-lá in Mrú.

Mountain.—Gún in Newári.
Ta-kún in Kami.

Name.—Ming in Bhotia and Lhópa and Limbú and Múrmi, Náng in Newári.
A-mí in Burmese, A-mín in Kamí, Na-mí in Khyeng.

Night.—Sa-náp in Lepcha.
Nyá in Burmese.

Oil.—Si-di in Magar.
Shi in Burmese and Kami and Mrú, Si-dak in Sák.

Road.—Lam in Bhotia and all the Himálayan tongues.
Lam in Burmese, Khyeng, Kami, and Sák.

Salt.—Tshá in Bhotia and Lhópa, Chhá in Himálayan tongues (most) Súng in Bodo.*
Shá in Burmese, Tsi in Khyeng, Súng in Sák.

Skin.—Pá-kó in Lhópa, Dhi in Gúrúng, Di in Múrmi.
Pé in Kúmi, Pi in Mrú.

Sky.—Mú in Múrmi, Mún in Gúrúng.
Mú in Mrú, Mó in Burmese.

* My Bodo and Dhimál vocabularies will be found in the Journal as well as the Himálayan series. I take this occasion to intimate my now conviction that the Bodo, Dhimál and Kocch tribes belong to the Tibetan and Himálayan stock rather than to the Tamilian; that is, with reference to India, to the more recent race of Tartar immigrants, not to the more ancient and more altered.

Snake.—Búl in Magar, Bú-sa in Súnwár.
Phúl in Khyeng, Pú-vi in Kúmi.

Stone.—Lóng in Lepcha, Lúng in Limbú, Lhúng in Magar.
Lún in Khyeng, Ka-lún in Kami, Ta-lún in Sák.

In the verbs, again, we have

Eat.—Sá in Lhópa, Zó, Só, in Bhotia, Ché in Limbú, Chó in Keránti.
Sá in Burmese, Tsá in Kami, Tsà in Kúmi.

Drink.—Thúng in Bhotia, Thóng in Lhópa, Thúng in Limbú and Múrmi, &c.
Thouk in Burmese.

Sleep.—Ip in Súnwár, Ip in Limbú, Im in Kiránti.
Ip in Khyeng, I in Kami, I' in Kúmi.

Laugh.—Yé in Limbu, Nyé in Múrmi, Nhyú in Newári.
Yé in Burmese, A-nwi in Khyeng, Am-nhwi in Kúmi.

Weep.—Nú, ngó, in Bhotia, ngú in Lhópa and Sérpa, Khwó in Newári.
Ngó in Burmese, and Khá in Kami.

Say, tell.—Shód in Bhotia.
Shó in Burmese.

Come.—Wá in Newári.
Vá in Kami.

Go.—Lau in Súnwár.
Lá in Kami and in Kúmi.

Sit down.—Det in Serpa, Ngú-ná in Magar.
Tat in Kúmi, Ngún-gé in Khyeng.

Move, Walk.—Dyú in Lhópa.
Kyú in Burmese.

Run.—Chóng in Sérpa, Lóyá in Kiránti.
Chó-né in Khyeng, Lei in Kúmi.

Give.—Bin in Bhotia and Lhópa, Pí in Limbú, Pai in Kiránti, Pen in Gúrúng.
Pé in Burmese, Pé gé in Khyeng, Pei in Kúmi.
(Ná pú in Kami=Náng in Bhotia asks for self.)

Take.—Yá in Bhotia, Lyo in Lepcha, Lé in Limbú.
Yú in Burmese, Lá in Kami, Ló in Kúmi.

Kill.—Thód in Gúrúng, That in Bódó.
That in Burmese.

Hear, attend.—Nyen in Bhotia and Lhópa and Lepcha, Nyo in Newári.

Né in Khyeng, Ka-ná-i, in Kami.

Remark, the materials for the above striking comparative view are derived from my own original vocabularies for the northern tongues, as published in the Journal No. 185, for December 1847, and from Capt. Phayre's for the southern tongues, hereto appended.

It is seldom that vocabularies so trustworthy can be had, and had in series, for comparison; and yet it is abundantly demonstrable that every thing in regard to the discovery of the larger ethnic affinities of dispersed races depends upon such a presentation of these materials, the distinction of roots and of servile particles, as well as the range of synonymous variation, in each of these classes of words, being thus only testable, and these points being all important as diagnostics, even more so than grammatical peculiarities which, at least in our sense, are apt to be excessively vague, or else palpably borrowed, among the Mongolidæ. Syntactic poverty and crudity and etymological refinement and abundance seem to be the characteristics of this vast group of tongues, and hence the importance of its vocables and the necessity of obtaining them in a state accurate enough for analysis, and copious enough to embrace the average range of synonymes.

A common stock of primitive roots and of serviles, similarly employed, indicates unmistakeably a common lineage and origin among the several races to which such stock belongs: preference for this or that synonyme among the radicals, as well as various degrees and modes in the employment of serviles, whether prefixed, infixed or postfixed, indicates as unmistakeably the several branches from the same family stem with the relative ages and distances of their segregation. By the above comparison of vocabularies I purpose to illustrate the common lineage of tribes now and for ages most widely dispersed, and of which the intimate relationship is ordinarily overlooked: by a subsequent and more detailed examination somewhat differently conducted, I will endeavour to illustrate the true character of the minor distinctions of race, showing that these distinctions are by no means inconsistent with the common lineage and family relationship now exhibited.

Comparative Vocabulary of Indo-Chinese borderers in Arrakan.

English.	Burmese or Myamma.	Khyeng or Shou.	Kami.	Kúmi.	Mrú or Toung Mrú or Myú.	Sák
Air	Lé	Klí	Ga-lí	A-lí	Ra-li	Mwi-ya-hé
Ant	Payuetseik	Lhing-zá-mí	Ba-lin	Pa-lin	Loung-tsa-ring-já	Phún-si-gyá
Arrow	Myá	Thwá	Lí	Li-tá-i	Sá, or qwá-i	To-lí-ma-lá
Bird	Nghet	Hau	Ka-vá or ta-vá	Ta-wú	Ta-wá	Wá-sí
Blood	*Th*wé	Ka-thí	A-thí	A-thí	Wi	Thé
Boat	Thé	Loung	M'loung	P'loung	Loung	Hau
Bone	Ayo	Ka-yok	A-hú	A-hú	A-hot	A-mrá
Buffaloe	Kyuai	Nau	Ma-ná	Pán-no	Ná	Kro
Cat	Kyoung	Mín	Mím-bo-i	Min-cho	Ta-myín	Heing
Cow	Nuá	Sharh	Kha-bo-i	Si-rá	Tsi-yá	Tha-múk
Crow	Kyí	A'ng-au	Wa-á	O'-á	Wa-á	Wúk-ká
Day	Né	Ko-nup	Ma-ni	Ka-ni twun	Ni	Yat-ta
Dog	Khwé	U'-i	U'-i	U'-í	Ta-kwí	Kú
Ear	Ná	Ka-nhau	A-ga-ná	Ka-no	Pa-rám	A-ka-ná
Earth	Myé	Det	Ka-lái-hong	Ka-loung	Kroung	Ká
Egg	U	To-i	Du	Dú-i	Dú-i	Wa-tí
Elephant	S'hen	Mwí	Ka-sái	Ka-sá-i	Nga-s'háit	U-kú
Eye	Myetsi	Mí-ú-i	A-mi	Mé	Mín	A-mí
Father	Phá-é	Pau	Pá-ei	Am-po	Pá	A-bá
Fire	Mí	Mí	Má-í	Mhá-i	Má-i	Bá-in
Fish	Ngá	Ngau	Mo-í	Ngho	Dám	Pan-ná
Flower	Pán	Pa-pá	A-pá	Ka-shyoung	Pá-ou	A-pán
Foot	Khyé	Ka-ko	A-kho	Khou	Khouk	A-tar
Goat	S'heik	Ma	Tso-bé	Mí-é	Ta-rau-a	Ki-bí
Hair	S'haben	Lu-sám	A-s'hám	S'hám	S'hám	Kú-mí
Hand	Let	Kúth	A-kú	Ka	Rút	Ta-kú
Head	Ghoung	Lú	A-lú	A-lú	Lú	A-khú

Hog	Wet	Weuk	O	A-ou	Ta-pák	Vák
Horn	Ghyo	A-kyí	At-ta-kí	Ta-ki	A-náng	A-rúng
Horse	Myin	S'hé	Ta-phú	Koung-ngú	Ko-ra-ngá	Sapú
House	Eing	I'm	I'n	U'm	Kín	Kyín
Iron	*Thán*	Thí	S'hein	Ta-mhú	Loung-há	*Th*ein
Leaf	Yuet	Shé	La-háng	Ngám	A-rám	Pwín-ták
Light	Len	...	A-ván-da-gá	...	Wa-tá-í	...
Man	Lú	Kláng	Ka-mí	Ku-mi	Mrú	Lú
Monkey	Myouk	Young	Ka-lái	Ka-la	Ta-yút	Ka-wuk
Moon	Lá	Khlau	Lá	Hlo	Pú-lá	*Th*at-tá
Mother	A-mi	Nú	Na-ú-i	Am-nú	A-ú	A-nú
Mountain	Toung	Toung	Ta-kún	Mo-i	S'hung, or túng	Ta-ko
Mouth	Nhup	Hak-kau	A-ma-ká	Li-boung	Naur	A'ng-sí
Musquito	Khyin	Young-yán	Kán-sa-ká	Chán-ráng	Ta-tsáng	Pí-chí
Name	A-mi	Na-mí	A-mín	A-min	E-mi	Tú
Night	Nyá	A-yán	Ma-khún	Wa-dúm	Wár	Ha-ná-hé
Oil	S'hi	To	S'hí	Sa-rou	S'hí	Sí-dák
Plantain	Nghet pyo	Nhám-pau	Ka-tí	Kú-ti	Deng-kú-i	Tsa-ú
River	Myit	Ha-loung	Ka-vá	Ka-wú	Au	Pi-si
Road	Lám	Lám	Láng	Lám	Ta-má	Láng
Salt	S'há	Tsí	Ma-lo-i	Pi-lo-i	Wí-s'há	Súng
Skin	Tha-yé	Wún	A-phú	Pé	Pí	Mí-lak
Sky	Mo	Han-mhí	Khau, or, Khú	Ka-ní	Mú	Koung-gounglak
Snake	Myué	Phol	Ma-khú-í	Pú-wi	Ta-ro-a	Ka-pú
Star	Kyai	A'á-shé	A-s'hí	Ka-sí	Ki-rek	*Th*a-geing-*th*i
Stone	Kyouk	Lún	Ka-lún	Lún-s'houng	Ta-whá	Ta-lón
Sun	Né	Ko-nhi	Ka-ní	Ka-ni	Ta-nin	Sa-mí
Tiger	Kyá	Kyí	Ta-ká-í	Ta-ká-i	Ta-prí	Ka-*thá*
Tooth	*Th*wá	Ka-hau	A-fhá	Ho	Yún	A-*th*a-wá
Tree	Apen	Thin	A-kún	Din-koung	Tsing-dúng	Púng-páng
Village	Yuá	Nám	Váng	A-váng	Kwá	Thing
Water	Yé	Tú-í	Tú-í	Tú-í	Tú-í	O
Yam	Myouk	Ba-há	Khá	Ho	Mau	Káng-kú

Comparative Vocabulary of Indo-Chinese borderers in Arakan.

English.	Burmese.	Khyeng.	Kami.	Kúmi.	Mrú or Toung Mrú.	Sák.
I	Ngá	Kyi	Ká-i	Ká-í	...	...
Thou	Men or nen	Náng	Nán	Nang	...	...
He	*Thú*	Ni	Ha-ná-i	Hú	...	...
She	...	...	...	...	...	...
It	...	...	...	...	...	...
We	Ngá-do	Kin-ní	Ka-chí	Ká-í-no	...	...
Ye	Mendo	Náng-ní	Nán-chí	Náng-chí-no	...	...
They	Thúdo	Ni-di or ni-li	Hún-na, or ha-ni-	...	...	...
Mine	Ngái	Ki-ko	Ká-í-un [chi	...	...	...
Thine	Meni	Náng-ko	Nán-un	...	...	...
His	*Thú*i	Ni-ko	Ha-ná-i-un	...	...	...
Our's	Ngádoi	Ki-ni-ko	Ká-chi-un	...	...	...
Your's	Mendoi	Náng-ni-ko	Nán-chi-un	...	...	...
Their's	*Thú* doi	Ní-di-ko	Ha-ni-chi-un	...	...	...
One	Tit	Nhát	Há	Há	Loung	Sú-war
Two	Nhit	Pan-nhí	Ní	Nhú	Pré	Nein
Three	*Th*on	Thúm	Ka-túm	Túm	Shún	*Th*in
Four	Lé	Lhi	Ma-lí	Pa-lú	Ta-lí	Prí
Five	Ngá	Nghau	Páng-ngá	Pán	Ta-ngá	Ngá
Six	Khyouk	Sauk	Ta-ú	Ta-rú	Ta-rú	Khyouk
Seven	Khun-nhit	S'hé	Sa rí	Sa-rú	Ra-nhít	*Th*a-ni
Eight	Shyit	Sát	Ka-yá	Ta-yá	Rí-yát	A-tseit
Nine	Ko	Ko	Ta-ko	Ta-kau	Ta-kú	Ta-fú
Ten	S'hai	Há	Ha-suh	Hau	Há	Si-sú
Twenty	Nhit s'hai	Kúr	Kú-suh	A-pum-ré	Pí-ra-mí	Hún
Thirty	Thon s'hai	Túm gíp	Kú-i-thún	M'phá-i-ré	Tsúm-gaum	*Th*on-si
Forty	Léz hai	Lhí-gíp	Kú-i-ma-lí	Wú-pa-lú-ri	...	Prí-sí
Fifty	Ngáz hai	Nghau-gíp	Kú-i-páng-ngá	Wí-pá-ri	...	Ngá-sí
A hundred	Tayá	Klá-át	Ta-rá	Chúm-wá-ri	...	Ta-yá
Of	I	...	U'n	...	...	...

To	A′	A′	A′	...
From	Gá	Lá	Ná-i	...
By	Phyen	...	Má	...
With	Nhen	Yung	Há-i	...
Without	...	...	...	...
In	Nheik	Dúka	Yá	...
On	Bomhá	Há-nang	A-koung-be	...
Now	Yakhu	Tú-a	A-vá-i	Wá-i-mé
Then	Tho akhá	Ní-kho-á	Ho-ná-i-gán	...
When	Bhe*th*o khá	I′-kho-á	Há-ni-kán	Má-na-ká
To-day	Yané	Tun-ap	Wei-ní	Wá-i-ni
To-morrow	Netphan	Nhát-ta	Cha-khon	Qui-dám
Yesterday	Yamanné	Yam-tú	Ya-dúm	...
Here	*Th*imhá	Ní-ám	Hí á, or yá	Hí-báng
There	Homhá	Tsú-á	Há-bhé	...
Where	Bhemha	I′-ní-ám	Ná-ná-bé	Má-mo
Above	Apomhá	Ada-ma-ka	A-koung-bé	I-klún
Below	Ouk mhá	Dé-kan	Ting-bé	I-klot
Between	Akyá mhá	A-lhá-ka-ku	Thinbé or u-thin-á	Si-lá
Without, out-	Pyen mhá	Kláng-á-me	A-khám-bé	A-ngám
Within [side	Atwen	Dú-gá-mé	A-thúm-bé	Thúm
Far	Wé	Tsú-a a-lhau a-me	Khán-lá	Pi-lú-pá-i
Near	Ní	A-shyo-zo-yan	Nei	Ki-sá
Little	Seikkhalé	A-lák-chá-i	Tsei-dú-to	A-htan
Much	Myá	A-pá-lúk	Pá, or, ong-jé	No-i
How much?	Bhélouk	Hyau-úm	Ha-yé-to	...
As	Gé*th*o	...	Hí-ná-í	...
So	Lo, *th*o	...	Ka	...
Thus	*Th*e-né	...	...	...
How	Bhé *th*o	I′bau	Ná-ha-bé	...
Why	Bhé pyulo	I′-na-to-ám	Ta-ú-sá-né	...
Yes	Hokhé	A-hi	Ta-ko-ká	Nán
No	Mahok	Hí-a	Na-u-ká	Na-o

Comparative Vocabulary of Indo-Chinese borderers in Arakan.

English.	Burmese.	Khyeng.	Kami.	Kúmi.	Mrú or Toung Mrú	Sák
(Do) not	Ma (pya) nhen	Né-é	Ná or nan			
And, also	Ligoung	...	...			
Or	Thomahok	...	...			
This	I′, *thí*	Ní	Hi			
That	Tho, hó	Oní	Ma-há			
Which?	Abhé	I′-ní-a-ka	Na-ná-i			
What?	Bhá	I′ní-hám	...			
Who?	Bhé*th*ú	U′-lí-am	A-pá-i-mé			
Any thing	Bhámhya	...	Ta-ú-í			
Any body	Bhéthúmhya	...	A-pá-í-mé			
Eat	Sá	E′	Tsă	Tsá		
Drink	*Th*ouk	U′-é	Nei	Nei		
Sleep	Eik	I′p	I	I′		
Wake	No	Kakák	Thá	An-thá		
Laugh	Yé	A-nwí	Ma-nwí	A′m-nhwi		
Weep	Ngo	A-káp	Khá	A-wú		
Be silent	Teiksheikné	Mhé	On-vo	...		
Speak	Pyo, s′ho	Há-we	Ta-pé	Tho-i		
Come	Lá, youk	Lo	Va	You		
Go	*Th*wá	Tsit	La	Lá		
Stand up	Thá, mát	Túm-e	Ka-do	A′ng-thou		
Sit down	Tháing	Ngúnge	Ka-nú	Tat		
Move, walk	Lé, kyuá	...	...	...		
Run	Pyé	Cho-né	A-whí	Lei		
Give	Pé	Pe-ge	Na-pú	Pei		
Take	Yú	Sí	Lá	Lo		
Strike	Yáik, pok	Mo-lé	Ma-lé	Pu khou-orathum		
Kill	*Th*át	Tú-e	Dú-rhum-ma-lé	Pu-khou		
Bring	Yú ghé	...	Ma-há-í	Lo		

Take away		Yu*th*wá	...	Lá-há-í	Lo-dé
Lift up, raise		Mhyouk	Youk-ké	Ta-khún	Ka-tán
Hear		Kyá	Ka-yauk	Thá-i	Thá-i
Understand		Lé, *th*i	Né	Ka-ná-í	...
Tell, relate		S'ho kyá	...	...	Thó
Good		Koung	Be	Hú-i	Hau-í
Bad		S'ho	Po-ya	S'hau	Hau-í-o
Cold		E'	Ka-young	Dé, or, di	Si-wá-i
Hot		Pú	Kho-leik	Bí	Bi
Raw		Seing	Tein	Ká-s'hí	Káng-hei
Ripe		Mhé	Mhín	Mín	Mhún
Sweet		Khyo	Tú-í	Tú	Tú-í
Sour		Khyin	To	Tho	A-hto
Bitter		Khá	Khau	Khá	A-kho
Handsome		Lhá	Pau-i	A-non	Ho-i
Ugly		Ayups'ho	A-si-í	A khé-sung	Ho-i-o
Straight		Phyoung	Klún	To	Tau
Crooked		Kouk	Ko-lák	Ta-ko	A-kwé
Black		Net	Kán	Ma-nún	Ka-núm
White		Phyú	Búk	A-lún	Kan-lúm
Red		Ní	Sen	E'	Kan-lein
Green		Seing	Nau	Ma-ein-sin	Kan-hein
Long		Shé	Sou	Sá	A souk
Short		To	Twé	Dó-i	Do
Tall	Man	Myin	Lhún	Ka-sá	...
Short	Man	Neing	...	Dó-í	..
Small		Ngé	Ná-ó	Spí	A-thám
Great		Kyí	Len	Leng	Lén
Round		Lun	Pú-lú	Pú-lún	...
Square		Lédhoung	Kyí-lhí	A-ti-kimli	Ta-ki
Flat		Pyá	Pé	Phá-dá	Kam-po
Fat		Wá, tok	Tho-í	Lén	Len
Thin		Shyá	Pám	Ta-pá	Thán
Weariness		Mo, pen-bán	Ka-no	Má-sá	A-kom
Thirst		Yé ngát	Tú í-lan-a-dú-í	Túí ma-kháng	Tú-an-hei
Hunger		Sá ngát	Bu-lan-a-dú-í	Búk ma-khang	Bé-on lám.

Note to accompany Vocabularies of languages spoken by Tribes in Arakan.

1.—Burmese.

This is the language of the Arakanese people, who for the most part live in the lowlands, and on the sea-coast of the country called Arakan. Provincial words occur in this language, differing from those of Burmah proper, and the pronunciation in Arakan varies considerably from that current in the valley of the "Irrawaddy;" yet the written languages of both countries are for the most part alike. Thus the word for a day written  is pronounced Rák by the Arakanese, but by the Burmese is softened to Yet: the word for water is called by the Arakanese Rí, by the Burmese Yé. It is written with the same letters by both people. The Arakanese and Burmese are of the same race, and have the common national name of *Myam-má*, which is however a comparatively modern appellation for the several tribes, into which the race was originally divided. The term Mug is applied by the people of India to the Arakanese. It is exclusively a foreign epithet, unknown to the Arakanese themselves. It probably takes its origin from the tradition of a tribe of Bráhmans, termed *Mágas*, said to have emigrated Eastward from Bengal.

2.—Khyeng.

This name is given by the Burmese and Arakanese to a numerous race of people who live in the high range of mountains called *Yo-má* (that is "great ridge," or "back-bone"), which separates Arakan from the valley of the Irrawady. These people call themselves *Shyou* or *Shyú*. The word Khyeng (pronounced Khyáng or Kyáng by the Arakanese) is probably a corruption of *Kláng** their word

* Perhaps so; but Kyáng or Khiáng is a well known ethnic designation to the Northward where, by the way, with Chinese and Tibetans many of the ethnic designations of the Indo-Chinese region are familiar terms of their own, as Mon, Lho, Lao, Sák, Kyáng, Myau. Nearer at hand we have, as terms allied to Khyeng, Rakheng (whence our Arakan for "the Mugs;") Khyi for the "Cossiahs," Kho vel Kyo and Ká for Kambojian tribes, and Ká Khyen for "the Kariens," whilst the Kambojian Kyo vel Gyo re-appears in the Kho of the Koladyne river, and in the "Moitay" of Manipúr, we have the combined appellations of the Siamese Tai,

for man; and their own present distinctive name for their tribe, is no doubt recently adopted. An Arakanese in writing down for me words from the mouth of a man of this race, wrote Khyáng for what appeared to me to have the sound of *Kláng*. The Khyeng country extends along the Yo-má range (which runs nearly N. N. W. and S. S. E.) from about the nineteenth to the twenty-first degree of North latitude. The people inhabit both the Burmese and British side of the range. The ascertained number of this race under British rule in Arakan is 13,708 souls. An equal number probably reside within the Burmese territory. There are also a large number of Khyeng tribes, which though living within the nominal British frontier, yet from the rugged inaccessible nature of their country, are really independent, and which have never yet submitted to any foreign Government, whether Arakanese, Burmese, or British. Their language is unwritten. There appears to be some difference of dialect between the Northern and Southern tribes of Khyeng. The words here given were taken from a man belonging to the Northern tribes. The Khyengs believe themselves to be of the same lineage as the Burmese and Arakanese, the stragglers from armies or moving hordes, left in the mountains.*

3.—Kami′ or Ku′mi′.

This race of people, of which there are two divisions called by themselves Kamí vel Kimi and Kúmí, and by Arakanese respectively Awa Kúmí and Aphya Kúmí, inhabits the hills bordering the river which is named by the Arakanese *Kuládán*, (that is, limit or border of the *Kula* or Western foreigner) and by the Kamís *Ye-man*, by the Kúmís *Yan pán*. It is the chief river of Arakan. It is probable that the Kamís and Kúmís have not been settled in their present

and the Kochin Chinese "Moy." In other words, the Manipurian tribe, called Cossiahs by the Bengálís, belong to the Moí section of the great tribe called Tai by themselves and Shán vel Syán by the Burmese, the sectional name being also foreign, and equivalent to the native? Khyi or Khyáng of Chinese and Khyeng of Burmese.—B. H. H.

* This native tradition and opinion accord with what follows relative to the Khyau and Mrúng in corroborating the doctrine which assigns the whole of the border mountaineers towards Ava, or inhabitants of the Yo-má range from Assam to Arakan, to the Rakheng division of the Myam-ma.—B. H. H.

seat for more than five or six generations. They gradually expelled therefrom a tribe called Mrú or Myú. The Kamí clans are now themselves being disturbed in their possessions by more powerful tribes, and are being gradually driven Westward and Southward. They state that they once dwelt on the hills now possessed by the Khyengs, and portions of the tribe have been driven out by the latter within the memory of man. The language of the Kamí portion of this interesting race has lately been reduced to writing by the Rev. Mr. Stilson of the American Baptist Mission. The Kamí words entered in this vocabulary have been chiefly furnished by an intelligent Kamí young man educated by that gentleman, and are more to be depended upon than the other portions. For it is exceedingly difficult to acquire from savages through the medium of a language foreign to them, any words but those which they use to designate some object or quality. The number of Kamís within the British territory amounts to 4,129 souls. They are divided into several clans, each having a distinctive name. The dialects of these clans differ more or less from each other. Many clans are independent.

4.—Mru′ or Toung Mru′.

This is a hill tribe now much reduced from its ancient state. They once dwelt on the river Kuládân and its feeders, but have been gradually driven out by the Kamí tribe. They have therefore emigrated to the West, and occupy hills on the border between Arakan and Chittagong. The Rádzaweng, or history of the Arakanese kings, refers to this tribe as already in the country when the Myam-ma race entered it. It states also that one of this tribe was chosen king of Arakan about the fourteenth century of the Christian era. The traditions recorded in the same work also imply that the Mrú and Myam-ma races are of the same lineage, though this connection is denied by the Arakanese of the present day, who regard the *Mrú* tribe as "wild men" living in a degraded state, and consider that it would be disgraceful to associate with them. The number of the Mrú tribe in Arakan amounts to about 2,800 souls. Their language is unwritten. They call themselves *Mrú*. *Toung Mrú** is a name

* Toung means wild, uncultured, as "hill men" with us and Pahari or Parbatia with Hindus. Mrú alias Myú=Myau of Chinese which again=Kyáng.—B. H. H.

given to some of their clans by the Arakanese. *Mrú* is also used by the Arakanese as a generic term for all the hill tribes of their country. The word Khyeng is occasionally used in the same sense.

5.—Sa'k.

This is a very small tribe mentioned by Buchanan in his paper "on the religion and literature of the Burmese." Asiatic Researches, Vol. VI. p. 229. He calls them "Thœk," (that being the Burmese pronunciation of the word,) and states that they are "the people inhabiting the Eastern" branch of the Nauf river, and are called by the Bengálís *Chatn* and "Chatnmas." *Chatn* is no doubt meant for *Sák* which is the name, these people now give themselves. Their language is unwritten.

There are other tribes in Arakan who have languages or dialects peculiar to themselves. They consist of but a few families, and some no doubt are the descendants of captives brought into the country several generations back by the Arakanese, in their warlike expeditions against the adjoining countries. Of these, the language of the tribe called *Dáing-nák* appears to be a rude corrupt dialect of Bengálí. The tribe called *Mrúng* state that their ancestors were brought as captives from the Tripúra hills. There is also a curious tribe called *Khyau** in the *Kulúdán* country, consisting of not more than from fifty to sixty families. I have not yet been able to obtain satisfactory vocabularies of the languages of these last named three tribes, but they will be procured on the first opportunity. I regret

* Kyo aforesaid? The tradition would ally them with the Kúki and Khyí, whence Kyo, Khyen, Khyi, and Kúki may be conjectured to be radically one and the same term, and to be an opprobrious epithet bestowed by the now dominant races of Indo-China upon the prior races whom they have driven to the wilds, for Khyi, Kyi, Kí, Kú has the wide spread sense of *dog*. Not one of these tribes is known abroad by its own name. Kami may be readily resolved into "men of the Ka tribe," the Ka being a proper name or merely an emphatic particle. Ka, mutable to Kí and Kú, is a prefix as widely prevalent in the Himálaya and Tibet as the word mí for man. The Kamís themselves understand the word in the latter sense—a very significant circumstance quoad affinities. Ka prefix is interchangeable with Ta, (Ka-va or Ta-va, a bird in Kamí, and so in most of these tongues;) and Ta varies its vowel like Ka; and thus, in Gyarúng, tir-mi, a man, answers Kimi, a man. Ex his disce alia.—B. H. H.

that there are so few words of the *Mrú* and *Súk* languages given, but as some time might probably elapse before they could be procured, I considered it best to forward them in their present state.

MEMO.

Scheme of vowels, &c. &c. a to be sounded as a in America.

á	..	..		..		..		..	a in Father.
i	..		..		..		..	..	í in in.
í	..	..		..		..		..	i in police.
U	..		..		..		..	..	u in push.
ú	..	..		..		..		..	oo in foot.
e	..		..		..		..	..	e in yet.
é	..	..		..		..		..	e in there.
ai	..		..		..		..	..	ai in air.
ei	..	..		..		..		..	i in mind.
ou	..		..		..		..	..	ou in ounce.
au	..	..		..		..		..	au in audience.
o	..		..		..		..	..	o in note.
th	..	..		..		..		..	th in thin,

the aspirate of t.

I have endeavoured to express the sounds of the *Khyeng* and *Kamí* languages as near as I can, but there are a few which I could not exactly convey through any combination of European letters.

N. B.—In the next or Tenasserim series of words the system of spelling followed is the common English. I have not deemed it prudent to alter it. These words were taken down by Dr. Morton, not Capt. Phayre, as above inadvertently stated. Valuable as they are, they lack the extreme accuracy of Capt. Phayre's series, and hence I have not extended my comparisons over them.—B. H. H.

Comparative Vocabulary of Indo-Chinese borderers in Tenasserim.

English.	Burmese or Myamma.	Talien or Món.	Toung-lhoo	Shán.	Siamese.
Air	Lá	Kya	Ta-lee	Lónma	Lon
Ant	Parwet	Khamol	H-tung	Mot	Mot
Arrow	Hmya	Lau	Pla	Pén	Tsán
Bird	Hnget	Khaten	A'-wa	Hnót	Hnót
Blood	Thwáy	Htsein	Thway	Leet	Leét.
Boat	Hlá	Hlo	Phray	Hó	Ró
Bone	Ayo	Htsot	Htsot	Sot	Katot
Buffaloe	Kúwai	Paren	Pay-nay	Kwihn	Khwa
Cat	Kyoung	Pakway	Nyen	Myoung	May
Cow	Nwau	Karau	Phou	Wó	Ngwau
Crow	Kyée-gan	Khatat	Zank-ay	Ka	Ka
Day	Na	Ta-ngway	Mo-yay	Kawon	Wan
Dog	Khwá	Kalá	Htwe	Ma	Ma
Ear	Nau	Khato	Nau	Hoo	Hoo
Earth	Myá-ghee	Te	Ham-tan	Sen	Teín
Egg	O'-o	Khmatsan	De	Khíht	Khu
Elephant	Tsheng	Tsing	Hsan	Tsan	Htsann
Eye	Myet-sé	Mot	May	Mat-ta	Ta
Father	A-hpa	Má	Phá	Pau	Hpau
Fire	Mée	Ka-mol	May	Hpihn	Thwa
Fish	Ngá	Ka	Lita	Pa	Para
Flower	Pán	Koung	Ken	Mau	Towkma
Foot	Khyá-hloúk	Htsihn	Khan	Ten	Ténn
Goat	Hlsiet	Khapa	Bay	Pá	Hpá
Hair	Htsa ben	Swet	Ta-lu	Khon hó	Hpóhn
Hand	Let	Tway	Su	Mee	Mó
Head	O-hkoung	Katau	Katu	Ho	Kamon

Comparative Vocabulary of Indo-Chinese borderers in Tenasserim.

English.	Burmese or Myamma.	Talien or Mon.	Toung-lhoo.	Shán.	Siamese.
Hog	Wet	Kalet	Htau	Moo	Moo
Horn	Gyo	Kareng	Nung	Khoung	Khóung
Horse	Myén	Chway	Thay	Ma	Ma
House	*Seng	Hnyee	Sam	Híen	Rau
Iron	Thán	Kasway	Say-thee	Leit	Leet
Leaf	Ayuet	Kana-htsoo	Lay	Moung-mán	Píhn-ma
Light	Aléng	Rá	Lita lay	Alen	Psa-won
Man	Loo-youk-ya	Karoo	Lan	Konpoo-trihn	Hpoohtso
Monkey	Myouk	Ka-nwee	Khyag	Lein	Lenn
Moon	La	Kha too	Lu	Len	Hpya hteet
Mother	Ama	Ya	Men	Amyá	Má
Mountain	Toung	Kha-lon-khyan	Koung	Pa-touk	Khan-ta
Mouth	Pazat	Khamoupan	Proung	Htsot	Pat
Moschito	Khyen	Khamcet	Takhra	You	You
Name	Amee	Yámoo	Meen	Tsoo	Htso
Night	Ngyu-ngyeen	Khatan	Mó-ha	Ka khán	Than-khen
Oil	Htsée	Kalihn	Nú-man	Na-man	Na-mau
Plantain	Hnet-pyau	Hpyat	Gná	Kwá	Kalway
River	Myeet	Pee	Nhrong	Nán-howk	May-na
Road	Lán	Khapann	Klay-tantha	Tán	Hon-tán
Salt	Htsá	Pó	Tá	Kó	Ká ló
Skin	Axá	Nan	Phro	Nann	Nann
Sky	Mó	Parwai	Mó	Hpa	A-kat
Snake	Mywa	Tha-roon	H'm	Ngoo	Ngoo
Star	Kyay	Noung	H'sa	Loung	Touk
Stone	Kyouk	Kamau	Lung	Mahein	Hee
Sun	Ná	Ta-ngway	Mu	Kawon	Kawon

* Jeng?

Tiger	Kyá	Kala	Ka	Htso	Tsó
Tooth	Thwáu	Nget	Ta-gná	Khyó	Thóhn
Tree	Apen	Ka-noung	Thing-mu	Ton	Tón
Village	Yooa	Koh	Dung	Mann	Pann
Water	Ya	Dhihk	H'tee	Nán	Nan
Yam	Myouk-khoung	Ka-wa	Nwá	Ho-mau	Mau
I	Ngá	Awai	Khwá	Koung	Kha
Thou	Nen	Bai	Na	Moung	Ren
He	Tho	Nyá	Wa	Khoung-nick	Koung-nee
She, It	,,	,,	,,	,,	,,
We	Nga tó	Pwá	Né	Koung-niht	Kha-aen
Ye	Nen to	Beén tau	Ná-the	Htsooh-niht	Aen
They	Thoo to	Nyee tau	Wá-the	Mau-niht	Loung-nee
Mine	Nga ha	Kharoo-awáy	,,	Khoung-kau	Khon-kha
Thine	Nen ha	Kharoo-hpá	,,	Khoung-moung	Khoung-aeng
His	Thoo ha	Kharoo nyúng	,,	Khoung-pen	Khoun-troung
Our's	Nga-to ha	Kharoo-away taw	,,	Khoung-houng	Khonkhá tsoung
Yours	Nen-to ha	Kharoo hpaytau	,,	Khoung moung-pen	Khrong tsoung-aen
Their's	Thoo to-ha	Kharoomyeen-tau	,,	Khoung houng-pen	Khonkha-tsooung-
One	Teet	Mway	Ta	Nein	Nein [aen
Two	Hneet	Pa	Ne	HTsoung	Tsoung
Three	Thóu	Pe	Thung	Htsan	Tsan
Four	Lá	Pón	Leet	Htse	Tsee
Five	Ngá	Pa-tson	Ngat	Ha	Hnga
Six	Khyouk	Karoung	Ther	Hoht	Hoht
Seven	Khwó-hneet	Khapau	Nwot	Tseet	Tseet
Eight	Sheet	Kha san	That	Tet	Tet
Nine	Kó	Kha-seé	Koot	Kowt	Kowt
Ten	Ta-htsay	Tsau	Tah-si	Tseit	Htseet
Twenty	Hneet-htsay	Pa-sau	He	Htsoung	Ya-tseet
Thirty	Thon-htsay	Pe-tson	Thung	Htsan-Htsiet	Tsan-tseet
Forty	Sá-htsay	Pon-tson	Leet	Hse Htsiet	Tsee-tseet
Fifty	Nga-htsay	Patsoo-tson	Ngat	Ha Htsiet	Ha-tseet

Comparative Vocabulary of Indo-Chinese borderers in Tenasserim.

English.	Burmese or Myamma.	Talien or Mon.	Toung-lhoo.	Shán.	Siamese.
A hundred	Ta-ra	Kaloon	Ta loyeu	Hpat	Yuay nén
Of	,,	Mken	A	,,	,,
To	Go	Pway	En	,,	,,
From	Ga	Noo	A	Kohn	Tway
By	,,	Nakeu	Tóme	,,	,,
With	Hnen	Ku	,,	Han	Kha
Without	Bá	Hpa	,,	Mai	,,
In	A-htámha	Atway	Pu	Kanoung	Khan-ná
On	Apau	Atoo	Long	Ka-nouk	Khan-mon
Now	Yákoo	La mod	Ngá-khayen	Mayóhnihn	Pá-too-nee
Then	Hto akha	Akha	Moung ma	Chyain-hnigh	Hpá la
When?	Bay-thaukha	A-khalarau	Teu ma	Chyain-lu	Hpalahighn
To-day	Thu khana	Tang waynau	Han-né	Ma-hniht	Wan-nee
To-morrow	Net hpangha	Lee ya	Mu-reu	Má-hpot	Hpooneí
Yesterday	Ma-na-ga	Let-ka-na	Má-ha	Ma-wa	Ma-wa-nee
Here	Thee mha	Kha-na-nau	Yo	Kaníht	Hta nee
There	Ho-mha	Kha-na-ko	Ea-h'sú	Ka-po	Hai-nan
Where?	Bay-mha	Alorau	Eu-hmay	Kalau	Kalau
Above	A-htet-mha	Atotá	En ké	Pamon	Tee-nan
Below	Ouk-mha	Kha ta ta	Enla	Palon	Khan la
Between	Alay-mha	Adho	Akha	Akhun	Khalan
Without, outside	Apyenmha	Ma-ngá	Ta-h'tanu	Ka-nouk	Khan-nouk
Within	A-hlaymha	Kha-tway	En-pu	Ka noung	Khan-noung
Far	Awá-mha	Noo-ma-way	Hyá	An-kéhn	Ka-ríhn
Near	Anee-mha	Tsouk	Lau	An-san	Kará
Little	Ta-htset kalai	Soot	Pá	Aeet	Net-ta-ró
Much	Apon	Hbau	A	Taima	Hton

How much	Bay-louk	Ma-tsee	Kheing hmay	Hta-noung	Htau riht
As	Kai-tho	Nway tseik-nau	Nay-yó	Neik-youk	Nee
So	Thu-kai-tho	Nyoung-tseik-kau	Nay-yo	Tso-neik-youk	Ram-nee
Thus	Thee atihn	Top-peun	Nay-yo	Tso-na-youk	Men-ran-nee
How?	Bay-nay	Tsou-la	Leu-may	Tso-hoo	Ran-rihn
Why	Ban-pyoolo	Moo-parau	H'twa may	Pen-htsau	Hta mihn
Yes	Hot-kai	Tot-kwai	Mwá	Htsouk-hée	Tsen
No	Mahot-bóo	Ha-tsen	Ta-mwá tew	Ma-tsouk	Mai-htsa
(Do) not	Ma-lot-boo	Hó-ka-lon	,,	Ma-het-a	Mai-htan
And, also	Yuay	Young	La	,,	,,
Or	Thó-mahot	Hó-to-tseik-ko	,,	Tso-neik-ma-tsouk	Mai-pen-yau
This	Thee-ha	Enan	Yo	Tso-niht	Née lai
That	Ho-ha	Taí-kau	Ta-hlon	Tso-nan	Nan-lai
Which?	Bay-thin	Ee-la-rau	Lisa-may-nay	An-loung-lai	Nihn-louk
What	Ba-lai	Moo-gau-rau	Lo-may nay	Ka-tsan-lay	Ayo-loung
Who?	Bay-tho	Nyay-gau-rau	Pá-may nay	Hpoung	Nihn-loung
Any thing	Tá-sontakhoo	Mway-theik-payai.	,,	Pen-htsaytsó-tsó	Hpayla
Any body	Tá-tsontáyouk	Kha-ra-tan-mwai-mwai	,,	Pen-htsaytsó-tsó	Hpayla-righn
Eat	Tsa-thee	Tsee	Am	Kyen	Kénn
Drink	Thouk-thee	Thou	Nwa	Kyen	Kenn
Sleep	Aick-thee	Tet	Píng	Nonn	Nona
Wake	Nó-thee	Ngoo	Ting	Tén	Teín
Laugh	Yay-thee	Garihn	Nga	Kho	Ho-rau
Weep	Ngó-thee	Rán	Ngen	Híhk	Raung-hihn
Be silent	Tét-Tet naithee	Mon-ka-nouk-ka-nouk	Hnging	Yoo-hlseet-hlseet	Nenróo
Speak	Pyauhtso-thee	Han-kai	Ung-dau	Sat	Hoo-tsa
Come	La-thee	Ka-lon-ra	Lóne	Mha	Ma
Go	Thwáu-thee	Aara	Lway	Kwa	Píhk
Stand up	Mat-tal-nay-thee	Monlet Kha-tau	Ung-h'hung	Tsot-roo	Roa
Sit down	Htihn-thee	Kha-gyo	Ung-lan	Nan-yoo	Nan
Move, walk	Lay-thee	Kyay	Lay	Lay-yoó	Hta-ro
Run	Pyai-thwau-thee	Gareetaa	Law	Len-kwa	Wen pihn
Give	Pai-thee	Ka	Pha	Pan	Hihn

Comparative Vocabulary of Indo-Chinese borderers in Tenasserim.

English.	Burmese or Myamma,	Talien or Mon.	Toung-lhoo	Shán.	Siamese.
Take	Yoo-thee	Keet	Khone	An	Ouk
Strike	Yeik-thee	Tat	Tway	Pau-tihn	Pau tihn
Kill	That-thee	Tsa	Ma-thay	Out-tihn	Out-tihn
Bring	Yoa-khaí-thee	Keet-nen	Htoo-tone	Oung-ma	Oung-man
Take away	You-thwau-thee	Keet-na	Htoo-lway	Oung-kwa	Oung-kot
Lift up, raise	Mhyouk-thee	Ka-toung	Hya or young	Hóh-khen	Houn-khan
Hear	Na-htoun-thee	Kalan	Heung	Htan loo	Htawlon
Understand	Nálay-thee	Tiht-ma-ra	Tha-na	Hoo-likh	Hoo-let
Tell, relate	Pyau-thee	Han-ma-rai	Thou-than	Lat	Lat
Good	Koung-thee	Khá	Heu	Lee yau	Lee-youk
Bad	Ma-koung	Hakhá	Kay	Ma-lee	Ma-lee
Cold	Chyann-thee	Bá	Khwá	Kat	Kann
Hot	Poo-thee	Kata	Kheu	Méik	Met
Raw	Tsen-thee	Tsen-tsangeet	Ta-theet	Chyo	Chyo
Ripe	Mhai-thee	Tóo	Hma	A-htsot	Wen
Sweet	Chyáthee	Tat	Neu	Tron	Wann
Sour	Khyen-thee	Hpya	H'sya	HTsol	Htso
Bitter	Cháthee	Ka-tau	Khu	Khon	Khon
Handsome	Hla thee	Gau	Tá-rá	Han-leen	Han lan
Ugly	Ayot-htso-thee	Hén	,,	Han-tichk	Hou hikh
Straight	Hpoung-thee	Touk	Tsone	Tsoo	Htsó
Crooked	Kouk thee	Ta-nouk	Ngá-ken	Kot	Kot
Black	Mai thee	Katsau	Phren	Lan	Lan
White	Hpyoothee	Hpa-tïhn	Bwá	Khoung	Khoung
Red	Nee-thee	Hpa-keet	Tá-nya	Len	Taí
Green	Tsein-thee	Hnen-ta-nyeet	Ling	Chyo	Khayo
Long	Shac thee	Kalein	H'to	Young	Young

Short	To-thee	Kalée	Deng	Tot	Tsánn
Tall } man	Myen-thee	Tha-lon	H'to	Tson	Thóhn
Short } man	Poothee	Kwa	Pú	Pauk	Tee
Small	Ngay thee	Dhot	Pá	Leikh	Let
Great	Kyoc thee	Tha-not	Tan	Youhk	Kalóhn
Round	Lón-thee	Kha-toung	Tung-lung	Món	Htsee
Square	Lai-Htouk nai thee	Pon-ka-lan	Seet-seng	Pyay	Htsee-len
Flat	Pya-thee	Kha-tai-thee	Sau-pyay	Pyee	Hpen
Fat	Wau-thee	Ka-ra	Pay	Pyee	Awen
Thin	Pen-thee	Tha rai	Hyeng	Raung	Hpóhn
Weariness	Anyoung	Ka-won	Tá-wa	Kon	Mai
Thirst	Yai-nat-khyer	Htan-tikh	H'ta-en-h'tee	Rat-nan	Rat-nan
Hunger	Ngat-mot khyen	Ka-lo hpyo	Ha-khó	Ok-pyat	Aotrat

N. B.—English system of Spelling used in the above, which I have not ventured to alter.—B. H. H.

On the Mongolian Affinities of the Caucasians.—*By* B. H. Hodgson, *Esq.*

All residents in the East who take an interest in the more general topics of Ethnology must have been exceedingly struck by Dr. Latham's recent imposing exhibition of the vast ethnic domain of the Mongolidæ. From Easter island to Archangel, from Tasmania and Madagascar to Kamskatka and the mouths of the Lena, all is Mongolian! Caucasus itself, the Arian Ararat, is Mongolian! India, the time-honoured Aryavartta, is Mongolian! Granting that this remarkable sketch* is in good part anticipatory with reference to demonstrative proofs, it is yet, I believe, one which the progress of research has already done, and is now doing much, and will do yet more, to substantiate as a whole; though I think the learned Author might have facilitated the acceptance of his splendid paradoxes, if, leaving the Oseti† and the Bráhmans in unquestioned possession of their Arian honours, he had contented himself with maintaining that the mass of Caucasian and Indian population is *nevertheless* of Turanian, not Arian, blood and breed; and if, instead of laying so much stress upon a special Turanian type (the Seriform), he had been more sensible that the technical diagnostics, which have been set upon the several subdivisions of the Mongolidæ, are hindrances, not helps, to a ready perception of the common characteristics of the whole race.

I do not propose on the present occasion to advert to what has been lately done in India demonstrative of the facts, that the great mass of the Indian population, whether now using the Tamulian or the Prakritic tongues, whether now following or not following the Hindu creed and customs, is essentially non-Arian as to origin and race, but that this mass has been acted upon and altered to an amazing extent by an Arian element, numerically small, yet of wonderful energy and of high antiquity. These are indubitable facts, the validity of which I am prepared with a large body of evidence to establish; and they are facts which, so far from being inconsistent

* Natural History of Man, London, 1850.

† It will be seen in the sequel, that in the course of those investigations which gave the "Comparative analysis" its present amplitude, I satisfied myself that the Oseti are Mongolian.

with each other, as Latham virtually assumes, are such that their joint operation during ages and up to this hour is alone capable of explaining those physical and lingual characteristics of the Indian population, which Dr. Latham's theory leaves not merely wholly unexplained, but wholly inexplicable. I must however postpone their discussion till I come to treat of the Newár and Khas tribes of Népál. In the meanwhile and with reference to Dr. Latham's crowning heresy that the most Caucasian of Caucasians (the Irôn or Oseti) are "more Chinese than Indo-European," I have a remarkable statement to submit in confirmation of his general, though not his special, position, my agreement with him being still general, not special.

His general position quoad Caucasus is, that the Caucasian races are Mongolidan; and, availing himself with unusual alertness of the results of local Indian research, he has, at pp. 123—128, given copious extracts from Brown's Indo-chinese vocabularies, as printed in our Journal; and he has then compared these vocables with others proper to the Caucasian races. My recent paper upon the close affinity of the Indo-chinese tongues with those of the Himálaya and of Tibet, will show how infinitely the so-called "Chinese" element of this comparison may be extended and confirmed; and my Sifanese series, now nearly ready, will yet further augment this element of the comparison, which in these its fuller dimensions certainly displays an extraordinary identity in many of the commonest and most needful words of the languages of Caucasus on the one hand, and of Tibet, Sifan, the Himálaya, Indo-china, and China on the other. There is no escaping, as I conceive, from the conclusion that the Caucasian region, as a whole, is decidedly Mongolian, what I have now to add in the shape of grammatical or structural correspondences affording so striking a confirmation of that heterodox belief, whilst Bopp's somewhat strained exposition of the Arian characteristics of the Irôn (as of the Malayo-Polynesian) provokes a doubt even as to them, despite the Edinburgh Review.* It is the

* No. 192, article Bopp's Comp. Grammar—a work that cannot be too highly rated, though its style of demonstration is not equally applicable beyond the Indo-Germanic pale. Its spirit may pass that pale, but not its letter, as when the Georgian sami is identified with the Sanscrit tri, Greek τρια and Latin tres. My

fashion of the age to stickle, somewhat overmuch perhaps, for structural or grammatical correspondences, as the only or best evidence of ethnic affinity. I am by no means insensible of the value of such evidence; and, though I may conceive it to be less important in reference to the extremely inartificial class of languages now in question than in reference to the Indo-European class, I proceed to submit with great pleasure a telling sample of structural identity between the Gyárúng tongue, which is spoken on the extreme East or Chinese frontier of Tibet, equidistant from Khokhonúr and Yúnán, and the Circassian language, which is spoken in the West of Caucasus.

The Gyárúng sample is the fruit of my own research into a group of tongues heretofore unknown, even by name: the Caucasian sample is derived from Rosen apud Latham, pp. 120—122.

Rosen, who was the first to penetrate the mysteries of Caucasian Glossology, states that the Circassian pronouns have two forms, a complete and separable one, and an incomplete and inseparable one. 2nd, that in their incomplete or contracted and concreted form, the pronouns blend themselves alike with the nouns and with the verbs. 3rd, that these pronouns, like the nouns, have no inflectional or other case signs, in other words, are immutable.† 4th, that the complete form of the pronouns is distinguished by the suffix Ra. Now, every one of these very arbitrary peculiarities belongs to the pronouns in the Gyárúng language, not less than in that of Circassia, as the following examples will show; and I should add that by how much the develop-

doubt respects the Oseti, not the Malayo-Polynesians, for I am satisfied that *they* are Mongolian, and would now add a striking and novel statement in support of that opinion, but that I must by so doing, go too far ahead of my yet unproduced Sifan vocabularies. The true and endless Mongolian equivalents for the Georgian numeral may be seen in the Appendix to this Essay.

† I have now ascertained that the same principles prevail, with slight variations, in the Hayn, Kuswar, Kiranti and Limbu languages of the Himálaya, in the Uraon, Ho, Sontal and Gondi tongues of Tamulian India, and in the Tagala and Malaya languages of the Pelasgian group, though passing out of use in the last named tongue as in several of the Himálayan tongues. See remarks in the Supplement. I may add that in the Hayn language (of which I have a detailed account nearly completed) the verbs are distinguished into the two classes of transitives and intransitives precisely as in Malaya.

ment of this part of speech is anomalous throughout the Tartar or Mongolian tongues, by so much is the instanced coincidence with the Circassian more significant, the anomalous or irregular character of the pronouns of both not sufficing to conceal the coincidence, and therefore doubly illustrating it.

Circassian.—Ab, father. Wara, thou, the full pronoun. Wa, the contracted form, used in composition.

Hence Wáb or Wa-ab, thy father.

Gyárúng.—Pé, father. Nanré, thou, the full pronoun. Na, the contracted form, used in composition.

Hence Napé or Na-pé, thy father.

VERBAL USE.

Circassian.—Wará, { wa / ú } —kwisloit, thou ridest.

Gyárúng.—Nanré na—syo, thou knowest.

I have changed the Gyárúng verb, because I do not possess the equivalent in that tongue for to ride. It matters not, however, as the sample shows the grammatical form to be absolutely the same in both sentences, just as well as if ride were the verb used in both.

The other rules and examples (scanty I admit) given by Latham from Rosen may be matched in each instance by Gyárúng rule and sample, as will be seen in the sequel. But there is this difference in respect to the Ra suffix, that it is applied to the first and second pronouns in Circassian, though not to the third; and to the second only in Gyárúng.*

This however is in complete conformity with the other and typical Mongolian tongues; for in Mantchú, and in Mongol also, the Ra suffix is found, but attaching only to the *third* personal; and, if we compare the Téré of those tongues† with the Chinese Tá and the Sokpo Thá, we shall perceive the perfect analogy of the suffix throughout these tongues, in spite of its varying applications.

* The first and second pronouns are so nearly alike in Gyárúng (nga, na) that the ré suffix has probably been reserved to the second, in order to difference it more plainly.

† Recherches sur les langues Tartares, pp. 173, 183. I cannot thus revert to the thoughts of my old antagonist (voce Buddhism) without a fresh tear dropt on the untimely grave of that truly amiable and learned man.

But is there no clue to the irregularities, none to the real force and signification, of this pronominal suffix? Clearly there is; for, in the Tibetan language the word rang, meaning self, and attaching to all the personal pronouns alike,* affords us that clue, though the people of Circassia and the Gyárúng, whose common and familiar use of this suffix is so perfectly analogous, seem equally unaware of the fact, and can neither explain the meaning, nor the partial application, of their suffix, any more than can the Mantchús and Mongols. This I infer from the silence of authors and should add that the explanations are wholly my own, my Gyárúng interpreter being able only to express very unsophisticated surprise when asked to analyse a word.

But I have not yet done with the analogy of Circassian and Gyárúng pronouns, having still to notice that the third personal in Circassian, which drops the Ra suffix, is not really a personal but a demonstrative, equivalent to ille, iste. Now, the Gyárúng language has a third personal, which the Circassian lacks; but it has also a demonstrative, and that demonstrative is the very same as the Circassian one; that is, ú or w; and this pronoun has, in both tongues alike a separate, full, and a concrete contracted form. Moreover, in the Gyárúng tongue the forms and uses of this demonstrative afford a perfect elucidation both of its strange metamorphosis (W. to T.) and of its anomalous suffix (i), in Circassian; for 'watú' is the complete separate form in Gyárúng; whilst 'wa,' the contracted form, alone used in composition, constantly takes í, which is really a genitive sign and recognised as such in Tibetan but is a mere "particule morte" in Gyárúng as in Circassian. Take the following samples from Gyárúng: Watú, he, iste, ille: Wapé, his father: Womo,† his

* Nga, I, Ngarang, I myself, Egomet; and so Khérang, Khórang. Remusat has sadly confused the Tibetan pronouns, and, as I suspect, those of the other "langues tartares," though his work be a marvel for the time and circumstances of its publication. Remusat ut supra, p. 365.

† The change of wa into wo, in wapé and womo, is an instance of that vocalic harmony which these languages so much affect, and which has been erroneously supposed to be peculiar to Turki. We have abundant alliteration both vocalic and consonantal out of, or beyond the Turki branch of, the Mongolian tongues.

Shaimek, from Shi and Mek, has other peculiarities precisely similar to what occur in the Altaic tongues, teste Remusat.

mother: Waimyek, wa-i-myek, his eye (myek, eye): Shaimek, shai-i-mek, leaf of tree (shi, tree, mek, leaf;) and then turn to the Circassian samples in Latham, ú-í, he; t-ab, his father;* í-kwisloit, he rides, and you will perceive that (ú being the same with w) the nominal t and the verbal í of Circassian are the secondary or suffix portions of the full Gyárúng pronoun exalted into primaries in order to difference the third person from the second, the second already having the wa or ú (wab, thy father; ú-kwisloit, thou ridest) form. And that such substitution of the secondary for the primary part of a word is no arbitrary assumption of mine, but a regular principle of the Caucasian and of the Mongolian tongues, may be seen by the numerous examples of it occurring in the subjoined list of vocables. The above elucidations of Circassian pronouns for which I am entirely answerable, are so thoroughly in the spirit of Bopp's system that I trust they may find favour in his eyes, though I have ventured to demur to his Arianising of the Tartars by too strained applications of that system.

I know not if Rosen at all explains the peculiarities of the pronouns in Circassian, but Latham does not; and it will therefore be felt as a truly interesting circumstance that the explanation just given, like that of the Ra suffix, have been fetched from Lhása and Litháng! The cultivated tongue of Tibet proper continues, it will be seen, to afford the clue to the labyrinth; and that it does so, is surely a strong presumptive proof, as well of its superior antiquity as of its superior completeness. So judging, I cannot moreover doubt that the Circassian preterite sign is the same with the Tibetan preterite sign (Chen-Tshar), though this be beside the mark of pronominal expositions,—and to these I must confine myself, or I shall not know where to stop, so constantly do these Tartarian illustrations of the Caucasian tongue flow in upon me. I am unaware

* In the supplement to this paper will be found an exact and beautiful pendant for this Circassian sample, derived from the Tamulian tongues, the Sontal language having ú and í for the 3rd personal and these commutable, in composition, into the conjunct form of tá, precisely as in the Circassian tongue. From the Gondi tongue is there given another example of the commutation of ú to t, so that my exposition from the Gyárúng instance is placed beyond doubt, whilst some fresh and beautiful links are added to the chain of affinities, as to which see prior note.

whether the Circassian language is distinguished, like the Gyárúng, by a very ample employment of those prefixes which, as more or less employed, characterise so many of the Mongolian tongues, and which are dropt in composition, like the Ra suffix. Thus, tarti, a cap, in Gyárúng, is compounded of ti the root, and tar* the prefix: but, if we join a noun or pronoun to this word, the prefix disappears, and "his cap," for example, is wárti, compounded of the wá above-mentioned and the radical ti. In like manner taimek, a leaf, when compounded with shí, a tree, drops the tá prefix and becomes Shaimek, as tápé, father, becomes Ngapé, my father.† Rosen, should this paper fall under his eye, or Latham perhaps, whose quick eye will not fail to catch it, will be able to tell whether the same peculiarity distinguishes the Circassian tongue. For myself I doubt not it will so prove, because the rule for nouns is but another phase of the rule for pronouns.

In the meantime, the striking grammatical analogies‡ I have pointed out stand in no need of further elucidation, and these analo-

* Ta, the common form, becomes Tar, differentially as Timi, fire; Tirmi, man, Root Mi, used in both senses. In Tirmi, Tarti, Warti, we have the ra particle which remains in its conjunct form as a medial, whilst the usual prefix ta disappears. The rá too would disappear in a compound of roots if not needed to differentials and mark the special sense of such roots, or one of them, or if the root commenced with other than a labial consonant, its prefix being servile.

† It has been queried whether the polysynthetic words of the American tongues, quoad their principle of construction, as to which there is so much doubt, be not compiled from *radical* particles only. Judging by the method of forming ordinary compounds in Gyárúng and its allies, I should say, Yes, certainly they are to a great extent, though not exclusively, for the cumulative principle ill brooks control, revelling in reiterations and transpositions of root alike, and of its servile adjuncts though clearly, as to simple compounds, constantly observing the rules of contraction and of substitution noted in the text. In the Gyárúng sentence Tizékazé papún, he summoned them to feast, the word for to feast shows the root repeated twice, and each time with a separate servile, though we have here only one verb, not two verbs, and in Kalarlar, round, still no compound, we have the root repeated, but yet with a servile, though only one, being the prefix ka. In such cases that servile is usually omitted as kaka, sky; pyepye, bird; chacha, hot.

‡ Those analogies might now be largely extended did health and time permit. Take the following instances: Tam-bas, father; imbas, my father, in Uraon. Sampa, father; ampa, my father, in Kiranti. Ku-kos, child; ing-kos, my child, Uraon. Tam, sam, ku, serviles, replaced by the pronouns, compare Maylayan sampiyan, san-diri, kan-diri, ka-manus, k'anak, &c.

gies, together with the explanation from the Tibetan of the widely-used but heretofore unexplained Ra suffix, constitute in themselves, and as sustaining all those numerous identities of the primitive vocables which have been adverted to, something very like a demonstration of the Mongolidan affinities of the Caucasians, though I would be understood to speak with a due sense of the disqualifications inseparable from my secluded position and want of access to books. I subjoin Latham's sample of the construction of the Circassian language, with its equivalent in Gyárúng.

'I give to my father the horse.'

Circassian—Sara	s-ab	acé	istap
I	my father	horse	give
Gyárúng—Ngaré*	nga-pé	boroh	dovong
I	my father	horse	give

'In the house are two doors' is, in like manner, 'house two doors' in the Circassian and Gyárúng tongues.

The plural sign, kwé in Circassian, myé or kamyé† in Gyárúng, is in both languages alike "the beginning and end of declension."

The following list of Circassian and Gyárúng pronouns may facilitate the reader's apprehension.

	I	*Thou*	*He*
Circassian pronouns—	Sa-ra.	Wa-ra	U-í.
Gyárúng pronouns—	Ngá.	Nan-ré.	Wa-tu.

The same conjoined with a noun.

Circassian.‡—	S-ab	W-ab.	T-ab.	My, Thy, His, father.
Gyárúng.—	Nga-pé.	Na-pé.	Wa-pé.	

* Ra suffix subjoined for illustration though not in use with *this* person. See prior note.

† Ka is the prefix, appended as usual. I have already remarked that the Gyárúng tongue is distinguished among its allies by its extensive employment of this class of particles. The Burmese tongue makes less use of them, and in its myá, much many, we have the Gyárúng plural sign, myé, vel Ka-myé. The Suanic Maré and Georgian K'mari for man, afford a precise Caucasian equivalent quoad the servile ka, showing it to be dropt or retained according to circumstances or to dialects in Caucasus.

‡ Ab, father—Pé, father, less the prefix.

Comparison and Analysis of Caucasian and Mongolian words.

Man.—K'mari in Georgian. Maré in Suanic.	K, prefix, servile, as in Indo-Chinese K'lun, a man, and Malayan K'anak, a child: a sort of article and equivalent to the suffixed K.
Maro in Lepcha. Muru in Sunwar. M'ru in Mru. Mano in Newari. Mansi in Bodo. Múa-máre Nomen gentis.	Má, with the customary change of vowel (see on to Mo-i and Mi) is the root throughout, and it takes the common ra suffix, likewise with the usual vocalic diversity. But observe that in M'ru this servile absorbs the vowel of the root, as in M'se, Georgian for Mé-se, voce fire.
Man.—Lé-g in Osetic.	This is the first of numerous samples in which the name of the species is that of a tribe..
Lé-ng in Burmese.	Means husband.
Len-ja in Magar. Lú in Burmese.	Means male, especially human, lén, the root, having the sense of mankind, or both sexes.
Ló-k in Tai.	K suffix, servile articular like the g in Lé-g and Ló-g.
Ló-g-nya in Khas.	Nya, a synonyme.
K'lú-n in K'lún.	Compare K'amari and K'anak. Lú root. Nomen gentis necnon hominis.
Boy.—Lap-pu in Osetic.	Pú suffix, a diminutive. Lé, Lá, Ló, the root, as in man.
Lok-pa in Tai.	Pa, diminutive, = pu. Ló, root.
Lúk-wan in Tai.	Lú root with articular, K suffixed. Wan, doubtful. Compare Wak, in Armenian Sá-wak a child; Sa in Burmese having the root only.
Young person of either sex: Bitshi in Georgian. Bi-shi in Lazic.	Shi, euphonised sha, = sa and cha and za, in the following words: Or it may be Bi, Bo, Bu, junior, and Shi, human.
Bo-shi in Mingrelian.	Means daughter.
Bo-zo in Lazic.	Zo = Za = sa and cha, the common diminutive, euphonized to vowel of root.

Bisha, Bishi in Bodo. — Male and female respectively.

Bu-cha in Takpa. — The diminutive cha is seen in the conjunct form in Osetic Sa-ch voce Earth.

Pu-sa in Maplu.
Po-ze in Pasuko. — Zo servile, as in Lazic Bo-zo. Z = S, alike in Caucasian and Mongolian series.

Man.—Moi in Osetic. — I servile. Mó, = Má supra et Mí infra, is the root.

Moi in Kong. — Means sister.

Pú-moi in Ple. — Means woman, pú being a feminine sign. Moi therefore is man.

Moi-tai.
Mo-n. — Nomina gentium. See note at end of Supplement.

Mo-cha in Newari. — Means child, cha being a diminutive, = sa, supra.

Múi-bú in Takpa. — Mú is the root. For change of vowel therein see note voce Dog.

Mú-rú in Sunwar. — Rú, the ra suffix, with its vowel harmonised to that of root.

Man.—Tsé-s in Georgian. — Means boy, owing to the sa suffix. Tsé therefore is man.

Tsé in Chinese.

Man.—Zo-zi in Osetic.
Ka-zi in Georgian.
V-zi in Horpa.
D-zi in Chinese. — Zi, = si and Shi, is the root. The latter appears in Bit-shi, Tsé, &c. It is a very widely spread man root, signifying adults as well as juniors.

Woman.—U's in Osetic.
U's-res in Gyárúng. — The root is U meaning man. The conjunct S is the feminizing suffix. U-er-ti, U-shi, &c. have the same root. Rés is the ra suffix, with the sa particle repeated.

Woman.—Swa-n in Osetic.
Swa-s-ni in Khas.

Brother or *Sister.* — Dá in Georgian. Dá in Sontal.

Dá in Kuswár. — Means girl.
Da-s, Dá in Uraon. — Mean boy and girl.
A-da in Bodo.
Dá-ni in Dhimali. — Means virgin.
D'si in Chinese.

Ego = *Homo.*—Mi in Suanic.
Mé in Georgian.
Má in Mingrelian.
Má in Osetic.
} Mean I, the pronoun. No fact is better established in Glossology, than the frequent equivalency of the roots for man and I; and it is of much importance to note them here.

Mi in Tibetan.
Mi in Lhopa.
Mi in Murmi.
Mi in Moitai.
Mhi in Gurung.
Bhar-mi in Magar.
Bar-ma, nomen gentis.
Tir-mi in Gyarúng.
Mi-va in Garo.
Yap-mi in Limbu.
Mih-pa in Kuki.
} This, and all the following mean man. It is remarkable how far the pronominal sense of Mi prevails in Caucasus, and the nominal, in the regions east of it. But they run into each other, and the root very generally is further employed to designate tribes from Caucasus to Indo-China, as Mi-shi-mi from the Mi and Shi roots, Mú-r-mi, from the Mu and Mi roots, &c. &c.

Ka-mi in Kami.
Kú-mi in Kúmi.
Pú-mi in Plé.
} Tribe names derived from name of species—a very extensively diffused principle. The etymology of Burma, or the Burmese is thus recovered. See Supplement.

Mi-jang in Newar.
Mí-sa in Newar.
} Mi, the species: Jang and sa sexual adjuncts. Jang = mas. S a = fæ.

Mí-ya in Newar.
Miya-lau in Roinga.
} Means girl. Ya, differential servile with reference to the various senses of the Mi root.*

Mim-ma in Burmese.
} Means woman. Root Mi. Ma is a feminine and maternal sign.

Sa-mí in Burmese.
Means girl. See note in sequel.

S'mé in Horpa.
Se-mé in Kolun.
} S'mé means girl, like Sa-mi and Séme. The Sa particle in various phases, added to Mi root.

Mé-jing in Lau.
I.—Sa in Circassian.
Sa-ya in Malay.
Ya, a differential servile.

Sa in Tagalan.
} An article. See Crawford's work for proof how these so called articles blend with the pronouns.

* The basis of all these tongues from Caucasus to Oceanica is a small number of monosyllabic roots bearing necessarily many senses. Hence to distinguish between those several senses is the chief function of the servile adjuncts of the roots. In this language, for example, the root wà means, come, tooth, rice, rain, throw, and he.

Sa in Malay. — Means one. Smidt wittily remarks on the perpetual coincidence of the first personal pronoun, and the first numeral, which is also constantly equivalent to the indefinite article, where wanting.

Sú-m in Vagu. — In composition only, as Ha-sum, give to me.

I.—Má in Osetic.
Má in Mingrelian.
Má in Lazic.
Mi in Suanic.
Ma in Tinnic.

Mo-n in Sap. — Compare Mo-i, man, in Osetic and Món the Indo-Chinese tribe name.

Mi in Mongol.
Mi in Mantchu. — Deduced from the derivatives Mi-ni and Mi-ning-ge. So Mi in the sense of man is deduced from Mim-ma and Sa-mi in Burmese.

I.—Jé-s in Armenian.
Ji in Newari.
v Ja in Horpa. — See remarks, voce Dog, on the vocalic changes to which all roots nearly are subject.

I.—Á-z, A-s in Osetic.
An-ka in Kiranti.
A-ku, Á in Malay.
Á in Manyak.
Ká in Dhimali. — Á is the root throughout Za, Sa, Ka, Ku, being serviles, though some of them, as Ka, frequently take the place of the root.

Thou.—She-n in Georgian.
Si in Mingrelian.
Si in Suanic.
T'shi in Mongol.
Se-n in Turki.
Sa-n in Onigur.
Sa in Finnic.
Chhá in Newari.
Chá in Sokpa. — Sí, Shí; Sé, Shé; Sá, shá, Sú, are the several phases of the root, or cycle of customary variation, just as in the nouns. See remarks on 'Kha' voce Dog.

Sú in Tai. — The plural, Ye.

He.—Ná in Armenian.
Ná in Chinese.
Ná in Malay.
Ni in Khyeng.
No in Anam.
Ha-ná-i, h'ná-i in Kami. — Ha prefix and I' suffix, servile.

He.—U-i in Circassian.
U-i in Sontal.
O'é in Magyar.
U in Circassian.
U in Garo.
O' in Onigur and Turki.
Wo in Newari and Gondi.
Wa in Gurung, in Dhimali and in Tunglhu.

He.—I in Circassian.
I in Mantchu.
I in Burmese.
I in Dhekra.
I in Malay and Tagala. Deduced from i-ti, i-tu, &c.

He.—Ta in Circassian.
Ta in Sontal.
Ta in Gondi.
Té in Mongol.
Té in Mantchu.
Té-ún in Dhekra.
Tá in Esthonian.
Thá in Gyami.
Thi in Gurung.
Thé in Murmi.

In composition as conjunct prefix or suffix or as disjunct. E. g. T-ab, his father. Apa-t, his father. Handa-ta-r, he went. See Rosen, Phillips and Driberg. With regard to the transposed pronoun, See note voce Fire. The law of transposition is so important that I add the following samples to show that even where the actual practice has ceased, analogy supports its quondam use.

Suffix possessive.	*Prefix possessive.*
Baba-ku, Malay.	Ang-upa, Vayu.
Aba-im, Kuswar.	Im-bas, Uraon.
Apa-ing, Sontal. = my father.	Nga-pe, Gyarung.

Thú in Burmese. In i-thu, ithi.
Tá-i in Dhekra. Means she.

He.—I-s in Georgian.
I-ti-na in Mingrelian. } See remarks in supplement.

I-té in Dhekra.

I-sé, I-se-ná } in Magar. Mean this, this very one, this one here.

I-ti in Malay.
Sé-i-ti in Koch. Iste qui.
Sé-i in Dhekra.
I-ta in Khas. Means, here.
Si-ni, Si-tu in Malay. Means, here and there.*
Si-ya in Malay. Ille qui.

Sky.—Khá-k in Absné.
Ká in Lazic.
Ká-ka in Akush.
Khá Khau in Kami.
Khó-rang in Bodo.
Nam-khá in Tibetan.
Nam-khan in Magar.

Khá is the aspirate, and Ka-ka the reduplicate state of the root. K final is an articular servile, as in Talak, Bik, &c. &c.

For Nam compare Nam-sin. It is frequently omitted. Khá is *the* place, metaphorically sky or heaven. Rang is an emphatic servile, for which see supplement to this paper.

Sky.—Ta-la-k in Tshettshentsh.

La, root. Ta, the common prefix, and K, the articular suffix.

Ta-li in Georgian.
A-li in Georgian.

Doubtful, and can mean sky only metaphorically.

Ta-la-k in Ostiac.

Means sun.

Ta-li-ang in Lepcha.

Ta, as before. Ang, a form of the na suffix. Compare Pett-ang.

Ta-li in Gyarung.

Means air.

Le in Burmese.
A-li in Kumi.

The nude root whereof the phases are lá, lé, li.

K'li in Khyeng.
Ga-li in Kami.
La-k in Sak.
Li in Rukheng.

Valuable illustrations of the system of serviles, the root being palpable. Its general sense is air, sky, by metaphor. For K' prefix of Kli, see K'mari.

Fire.—Mizh in Suanic = Mi-[zhi.
Msé in Georgian = Mé-sé.
Mzá in Absne = Ma-za.

Zhí, Só, Zá, are three conjunct suffix forms of the Sá particle which is seen in Manyak in its separate unaltered form as a prefix. Here it is altered, 1st, by dropping its own harmonised vowel (see Zhi, infra), 2nd, by absorbing the vowel of the root. Din, Den, for Di-ni, day, and Smé for Sémé girl, are parallel instances of change as of transposition are Mi-sa and Sa-mi,† voce man. See note below? and that on the Ma particle, voce 'Day.'

* It is because the 3rd personal is so perpetually identical with the demonstratives, of which the direct and exclusive principle is contrast, that the same elements come to express the contrasts of place and time and manner (here there; now then; as, so.) He who would trace the remoter affinities of race, must treat languages in this thoughtful manner.

† Note. The Mi-sa, Sa-mi, sample of transposition of the Sa particle, cited above to match the Me-se, Georgian, Sa-me, Manyak, sample here compared with it, is

Zhi in Kuanchua.
Zi in Dido.
Za in Chunsag.

These are introduced to show the servile particle of Mizh, Mza, and to show it superseding the root, as in Fa for Ma, here, and in Ba for Sa, voce 'Cow,' and in Di for Bi, voce 'Skin.'

Má-fa in Circassian.

Fa servile. We shall presently see it usurping the place of the root.

Mé in Tibetan.
Mé in Limbu.
Mé in Serpa.
Mé in Murmi.
Mé in Kolun.
Mhé in Magor.
Mi in Lepcha.
Mi in Kiranti.
Mi in Newari.
Mi in Gurung.
Mi in Sunwar.
Mi in Burmese.
Mi in Khyeng.
Mi in Moitai.
Mi-ung in Maplu.
Ma-i in Kami.
Mha-i in Kumi.

These abundant instances from the Mongolian series plainly prove the root in the Caucasian series, and they show that root precisely such in every phase (mi, mé, má,) as it is seen in the Caucasian series. We thus securely proceed to the serviles or rather servile, and this the Manyak word, below, gives in the primitive state, unaltered by blending or by euphony. We are therefore certified as to its various altered forms (zhi, zá, sé), in the Caucasian series. Observe also in the Mongolian series that all the tongues which use the Mi root in the sense of man have Mé instead of Mi for fire.

Fá-i in Khamti.
Fá-i in Tai.
Fo in Kong.

Turn to Ma-fá, supra, and note again how the servile supersedes the root, as in Zi for Mi, fire. So also Tibetan Ba for Circassian bsa, voce cow, and Anamese Di for Dido Bi, voce skin; the last so decisively proved by the Murmi form of the word wherein root and servile both appear, Di-bi. Thus the Circassian word Ma-fa supplements and expounds the Tai and Khamti word Fa-i; and this the Manyak word Sa-

from my Tibeto-Himalayan vocabularies; thus in full, Mi-sa, woman, in Newari, Sa-mi, girl, in Burmese and Khyeng, and Sme, in Horpa, root Mi, Me, mankind, and Sa, a feminine and diminutive sign. In short the Sa particle, like all others, may be prefix or suffix, and separate or blended. Hence Mse, Georgian = Sa-me, Manyak. With regard to the suffixed Zhi, Zi, or Za, clearly = Sa, it would seem as if Mi were the Sun or great fire, of which Mi-sa is the diminutive, just as Sá is the earth, or terrestrial globe, and Sa-ch (cha = sa) earth, soil. See 'earth' in sequel.

	meh supplements and expounds the Georgian word Msé and its Suanic and Absne equivalents. The languages must have a deep and radical affinity which can thus be made mutually to illustrate each other.
Mé-n in Dhimali. Meh in Takpa. Meh in Thochu.	Return to the simple root again.
Sa-meh in Manyak. Sa-mi in Sak.	Here we have the Sa particle above cited in its pure unaltered state. The Georgian Msé shows it transposed and blended.
E'-mé in Abor. Ti-mi in Gyarung. U-ma in Horpa. Um-ma in Aka.	Timi recurs to the Mi form of the root, with the inseparable Gyarung prefix (ta) harmonised in its vowel, U servile, like é, in é-mé. These last words of the fire series afford excellent illustration of the wide scope of servile adjuncts.
Day.—Di-ni in Tshetshentsh.	Di is the da prefix harmonised in its vowel to that of the root Ni.
D-én, Dé-n in Ingush.	Den shows the above prefix conjunct, and the ni root altered to né, become én per metastasin. Or, if we read Dé-n, then the particle takes the harmonised vowel of the root which is absorbed, as in Din for Di-ni, below.
Ki-ni in Kasi Kamak.	Has the ka prefix harmonised in its vowel to ni root.
Ki-na in Makash.	Means to-day. Ki, as above. Na, a new phases of the root, as Ma for Mi, fire.
Di-ni in Magar. Di-ni in Gurung. Di-ni in Bodo.	Tally exactly, root and servile, with the Tshetshentsh word and similarly analysed of course.
D-in in Khas.	Tallies with the Den instance.
Ka-ni in Kumi.	Means day and sun.
Ka-nhi in Khyeng. Ko-ni in Kolun. g Na in Horpa.	Means sun. The roots for sun and day run into each other to a great extent. Nhi, vel Ni, vel Ná, is the root.

Si-ni in Singpho.	Si servile, is the sa particle with harmonised vowel.
Nam-sin in Sunwar.	Compare Nam-kha, voce sky. Sin for si-ni is like Din for Dini, ni being the root.
Sak-ni in Lepcha.	Sak, like Nam, is a servile or particule mort;* not however so utterly dead, that its radical sense of 'sun' cannot be recovered.
Nhi in Newari.	Shows the root again, free of all adjuncts, but varied by an aspirate as Khá for Ká, voce sky, Mhé for Mé, voce Fire.
Né in Burmese. Ni in Mru. Ni-n in Koreng.	
ta Ni-n in Mru.	Means 'sun.' Day, sun and sky run into each other perpetually.
Ná in Sunwar.	
Na-m in Limbu. Na-m in Kiranti.	Compare Nam-kha voce sky: mean sun or parent (ma) of day (na): Or, 'm' being servile, Na = Ni, will be sun vel day.
Ni-mo in Serpa.	Means day and sun.
Ni-bha in Newari.	Means sun.
Nhi-ga in Newari. Ka-nhé in Newari. Ba-ha-ni in Newari. Ha-ni in Newari. Tha-ni in Newari.	Mean respectively to-morrow and yesterday, evening, then, and to-day, and are most valuable exponents of the function of the particles as well as of the flexibility of the roots Nhi, Nhé, Ni being as surely phases of one root as Mhe, Mé, Ma, Mi are; voce Fire.
Má-né-k in Burmese.	Means morning, from the roots Ma, mother and Né, day with the articular K suffix, as in Kha-k, sky. The Chinese in like manner name, the day, the sun's son. Or, the prefix ma may be a servile as in the next word.

* Observe therefore that what is said of the universal vitality of all the particles of these tongues, voce dog, is only true in the comprehensive view of the languages.

Ma-ní in Kami. — The meaning here being simply day from the Ní root ma must be a servile, no more affecting the sense of the root than the ka, da, and sa prefixes in Dini, Kani and Sini.

Nyima in Tibetan. — Here the ma particle becomes a suffix, and, as before, without touching the sense of the root.

Nyi-m in Lepcha. — Ma suffix conjunct = ma in the preceding word. Seems conjunct in Tsari chim, voce water.

Na-ni in Dhimali. — Means then. Na, servile.

Nyi-ti-ma* in Dhimali. — Ti, and Ma, both servile differential. For ma suffix, see Chi-m, voce water, Si-ma, voce tree, &c. For ti suffix, see Purti, voce bird, Bi-t, voce cow, &c.

Snyi in Gyarung. — Sa prefix, conjunct.

Pish-nyi in Gyarung.
Sos-nyi in Gyarung. — Mean respectively to-day and yesterday.

Night.—Ak-sá in Osetic. — Ak servile as in Akra, voce horn. Sa root = Sha, Tibetan.

K'shé-r in Armenian. — K prefix = Ak, and the final r, the common ra particle, conjunct.

Séri in Mingrelian. — Ri suffix, servile, = r in Ksher. See supplement.

T'shá-n in Tibetan. — Initial t' and final n serviles.

Ché-n spoken Tibetan. — Final n servile.

Kú-sén
Sén-dik } in Lepcha. — Kú prefix and Dik suffix serviles. Sé root.

Sén-li in Takpa. — Li servile, as in Ché-li, Georgian, voce hand, and Kué-li, Surawar, voce hand.

* Mani compared with Nyima and Nyitima afford further illustrations of the rule of transposition already illustrated from the Msé and Sameh instance, voce fire, as well as from the Misa and Sami sample, voce man. In fact no law of these languages can be more certain than this of transposition, passing frequently into substitution (of servile for root), of which also we have seen various instances. The rationale is that every element is, in general, equally available in a primary or secondary sense, though there will of course be exceptions if the view be narrowed to one or two of the tongues, and more especially if these be regarded merely in statu quo.

Chá-i in Chinese. Cha-i in Buret.	Tally exactly with the spoken Tibetan.
Summer.—Ach-ké in Mizjeji.	Ach = cha, per metastasin. Ké servile.
Chá-ko in Tushi.	Kó servile, like ké and ká. For vocalic changes, see "dog."
Cha-r-ka Chi-d-ka } in Tibetan.	Means spring. Medial r and d serviles, for which see the supplement of this paper.
Chi-a in Chinese.	Final a, servile.
Chá-ko in Dhimali. Sá-ko in Dhimali.	Cha is hot and Sá, summer.* Yet the adjective and substantive are really, but one word.
Chá-n-gu-la in Newari.	"The hot months." Lá means month and gu is a servile = ka, ko, supra.
Sun.—b Shá in Mingrelian. Shá in Tushi.	
Ta-chán in Tushi.	Means day. Final n, servile as in the following words.
Sha-n in Bodo. Sa-n in Garo.	N. servile, as in the prior word and subsequent one.
Sá-ne in Dhimali.	Means sunshine.
Sá-cha-k in Lepcha.	Sá-chá, sing, song, repetition of the root. K, articular servile.
Moon.—Twai in Suanic = Tá-va-i.	Compare Tagalan, Ta-vo and Bugis, Tau, meaning man, for proof of the wide prevalence of disjunct and conjunct styles. Final i, servile.
Twé in Georgian. m Twá-ré in Georgian.	Ré servile, the common ra suffix.
Twó in Newari. Dá-va in Tibetan. Dá-u in Lhopa. Tá in Tai.	Epithet from colour, white.
Tá-li in Dhimali.	Li servile, as in Cheli, Sen-li supra.
Earth.—T'shé-do in Dido.	Initial t', servile, and do suffix. For the suffix see remarks in supplement.

* Compare Malay Cha-bi and Ende Sa, meaning pepper. Sense, sound and system seem to tally with ours, the added or omitted servile and the change of root!!

T'shi in Georgian.
T'shí-git in Osetic.
T'shi-git in Dugoian.
T'sé in Georgian.
: Initial t', the common ta particle: git, doubtful.

Sá-ch in Osetic.
Sé-ch in Osetic.
: Ch suffix, a phase of the diminutive particle cha, sa. Sa, the root, is *the* earth. Sach, earth, soil a little of.

Mit-za in Georgian.
: Mi-t, double servile, modified like git.

Mi-sá in Andi.
Mu-sá in Akush.
: Mi and Mu are indubitable serviles, Sá being the root. They serve excellently to show how these particles attach to the roots. The Mi prefix is very common in the Magar tongue, as Mi-rong, Misya-ros, &c.

Di-chá in Mingrelian.
: Chá, the root, tallies exactly with Newari. Di, is the common, da prefix.

K'shá in Horpa.
: K' is the ka particle conjunct, as in K'mari, K'li, K'anak, &c. &c.

Ha-sá in Sontal.
: Ha, servile, or a synonymous root.

Séh in Gyarung.
Sá in Tibetan.
Sá in Lhopa.
Sáh in Takpa.
Chá in Newari.
: These numerous samples from the Mongolian tongues plainly demonstrate the root of the Caucasian words as before remarked in reference to the fire series.

Kat-ché in Karien.
: Compare Kat-shú, voce hand, and observe that the form is identical in the Caucasian and Mongolian sample (Andi and Plé). We have here the very same compound servile (ka-ta), similarly employed (prefix). Such perfect coincidence of all the elements of speech could result only from identity of origin and family unity.

Salt.—T'shé-a in Kubitsh.
: The word is radically the same as that for earth, as proved by the Osetic and Wogal terms. The prefix also is the same, and hence a suffix is required to difference the senses. It is thus we learn the real function of the serviles. See note, voce Ego = homo.

Za-ch in Osetic.
Se-ch in Wogal.
D'zé in Akush.
Zi-o in Dido.
} See earth.

Dé-sé in Dhimali.
Dé in Kolun.
{ Comparing this word with the Akush D'sé we see the equivalency of the conjunct and disjunct serviles.

T'si in Khyeng.
T'sá in Takpa.
T'sha in Tibetan.
Shá in Burmese

Wi-shá in Mru.
{ Wi = water? sha = salt. The salt procured from water. Else wi = bi, the common servile.

Chá-chá in Gyarung.
Root repeated as in Ká-ká, voce sky.

Chhá in Lhopa.
Chhá in Serpa.
Chi in Newari.
Chhé in Manyak.
Chhá in Horpa.
Chhé in Gyarung.
{ This aspirate Ch is equivalent to the Tibetan and Kábitsh Tsh.

Sú-ng in Sak.
Syú-ng in Bodo.
{ Final nasal servile. Intercalate y, very common as Ni, Nyi, voce day. Khi Khyi voce dog.

Dab-sú-n in Mantchu.
Da-ba-sú in Mongol.
{ We cannot doubt that Sú is here the root. Da-ba therefore are servile prefixes, though the existence of such has been denied to these tongues.

River.—O'r in Osetic.
O', U', the root: r, servile.

Hor in Avar.
The same aspirated.

Or-(kyuré) in Akush.
For Kyúré, see on to 'Rain.'

Wá-ran in Osetic.
{ Means rain. Wá root. Ran servile. See supplement.

sg-Wá in Georgian.
Means a lake. Wá, the root.

O' in Sak.
O'ng in Lepcha.
{ O' is the nude root. O'ng, the same with the common nasal addition.

U'-(sú) in Sokpa.
{ U', another phase of the water root. For sú see on.

Wá in Newari.
Same as U'. Means water.

Ha-wá, K'wá } in Kami.
Prefixes H and K, servile.

A'ú in Mru.
Unites the O' and U' roots.

Wá-i in Dhimali.
Means rain.

Hra in Horpa. — Hra = Ho-ra, Ho-r, with the vowel of the root absorpt as in Msé, voce fire, &c.

Hyúng in Serpa. — Compound of Yú and Ong, synonymous roots.

O'ng-kyong. — Compound of Kyú (see rain) and O'ng, supra.

Wó-hóng in Limbu.
Khyóng in Lau.
Khwóng in Gurung.
Khyong in Burmese.
— Obvious compounds from the precedent elements. River, rain, water, so run into each other that no justice could be done to the real synonymies by technical separation.

Rain.—Ḳú-a, Kwá in Abassian.

(Or) Kyú-ré in Akush. — For ré suffix, see the supplement. 'Or' disposed of above. Kyu is ku with the intercalate y as in Nyi for Ni and Khyi for Khi.

Kú-i, Kwi, in Murmi.
Kyú in Gurung.

Li-kú in Sunwar. — Li may be a root = sky and then Liku is sky water, or it may be the Li servile.

Khu-(si) in Newari. — Compound of two synonymes Abassian Kú and Kubitsh Si! For si, apart, see on.

Lake.—D'zo in Armenian.
T'so in Tibetan.
Water.—Dú in Ingush.
Dó-ú in Armenian.
Dú-n, Dó-n in Osetic.
Dú-í in Singpho.
Dó-í in Bodo.
Do-í in Garo.
Dá in Sontal.
Dá in Moasi.
Dí in Magar.
Tú-í in Khyeng.
Tú-í in Kami.
Tú-í in Mru.
Water.—Chi in Mizjiji.

Voce 'dog' we have summarised the changes to which the elements of words are liable, when taken singly or when a single element constitutes a word: we may here take occasion of the great water root (or of available space, rather) to summarise the changes those elements are liable to in conjunction, or when more than one goes to the composition of a word. They are

1st. By reiteration, as Ká-ká voce sky, Chá-chá voce salt.

2nd. By cumulation, as na-ma, si-ni, voce day; i-sé-na voce he.

3rd. By contraction as nt-sin voce water; bb-sé voce tongue; Msé voce fire.

4th. By permutation (euphonic of vowels and consonants) as Kach-chur for Katas Kyur, voce sour.

5th. By transposition, as mim-ma and mi-sa, versus sa-mi, and s-mé, voce man.
6th. By substitution as fa for ma, voce fire; di for bi, voce skin.

Shi-n in Kubitsh.
Shi-n in Kasikumak.
Shé-n in Akush.
p Shi in Tsherkesik.
d Zék in Absne.
T'cha-ri in Mingrelian.
— Final n servile. This is easily said by way of disposing of an inconvenient particle. But I appeal to the uniform tenour of the whole of my paper for my proofs.

Chi-m in Tshari. — M, conjunct ma suffix, as in Lepcha, nyim voce day, and in Mru sham voce hair.

Sé in Altekesek. — Often cited with the dú suffix as is d zé in Absne. See remarks on Tshe-do voce earth.

Chi in Garo.
Chi in Dhimali.
Ti-chi in Gyarung. — Has the inseparable ta prefix, harmonised in its vowel.

T'ché in Mopla. — The same prefix conjunct.
m Chi-n in Jili. — Initial m and final n, serviles.

Cho-du-k in Mongol.
I'-si-ng in Khyi. — Means 'spring.' Observe that the dú suffix, is frequently attached to Absne Zé and Altekesek Sé, though omitted here.

Wé-si in Ugorian. — Compound of two synonymous roots.

n t Sin in Singpho. — n-t, prefix, and n, suffix, serviles, Sí being the root.

Chá-wa in Kiranti.
Chá in Thochu.

Water.—T'zú-n in Kubitsh. — Zú = sú = chú, the root.

Shú-r in Armenian. — R, final, the common ra suffix, conjunct.

T-sú-en in Samoiede. — Cited to illustrate Tzú just remarked on. Final en is metastatic ne, a servile.

Chhú in Tibetan.
Chhú in Lhopa.
Chhú-a in Limbu.
Chhú-wá in Kiranti.
Shú-i in Gyami.
Sú in Anam.
Sú in Turki.
— Aspirate chh = Ts and Tsh by numerous examples, though the Tibetan alphabet has both letters.

U'-sú in Sokpa. — U' and Sú, are synonymes. U' is, in fact, the basis of a whole series of words for water.

Chú-rá in Kalmak.
Chó-dú-k in Mongol.

Means rain. The ra suffix = dú, to which is added the articular k. Dú however may here be a root and synonyme.

Cow.—b Sá in Circassian.

Turn to the Tibetan word and mark how root and servile are commutable.

Sá in Newari.
Sá-lo in Sokpa.
Sha-r in Mongol.
Sha-r in Khyeng.

Lo, servile. La, Li, Ló, its phases; r, the common ra suffix.

Bá-shá in

Note how the surplus silent b of Circassian here becomes a regular prefix.

Bá in Tibetan.

Takes up the servile b of the Circassian and makes root of it as already noted in various other instances.

Bi in Sunwar.
Bi-t in Limbu.
Bi-k in Lepcha.

Cow.—K-chú-g in Osetic.
Má-shú in Bodo.
Má-chú, spoken Tibetan.

K and g, serviles. Chu, root.
Má, feminine sign.
Má, as before.

Dog.—Chó-í in Avar.
Chó-í in Andi.
Chó-í in Chansag.
Chú-á in Akush.

K-chú-d in Osetic.

Initial k and final d, serviles. The latter is the conjunct form of the da, du, do, suffix remarked on in the supplement.

Shu-n in Armenian.
Chó-í in Bodo.
Chú in Magar.

Chí-ta in Moasi.
Sé-ta in Sontal.

Ta, the common servile, which, like all others, may be prefixed or suffixed.

Dog.—Khá in Circassian.
Kó-a in Kubitsh.
Gwai in Dido.
Gwi in Dugoric.
Khí-á in Dhimali.
Khí-á in Limbu.
Khí in Lhopa.

We may take occasion of the cycle of changes seen in this word to make a general remark. That homogeneousness and vitality belong to all the elements (roots and serviles) of words in these tongues is a very important truth, as well for the illustration of general philology as for the ex-

Dog.—Khi in Gurung.
Khwá in Thochu.
Khwé in Burmese.
Khyi in Tibetan.
Geu, Gyú, in Chinese.
Na Gyú in Gurung.
Ká in Horpa.
Ká-í in Garo.
Kou in Gyami.
Kú in Sák.

planation of the extraordinary extent to which transposition and substitution among those radical and servile elements are carried. It is likewise true that these elements and the words resulting from them are less flexible and mutable than among the Arian tongues. But it is by no means generally or strictly true that "all the words are invariable." On the contrary, the words, whether consisting of monosyllable roots, or of such roots and their servile adjuncts, are constantly subjected to changes, which are clearly systematic, which belong alike to the radical and servile particles, and which may be summarised as follows:—

1st by aspiration, as Khi for Ki.
2nd by change of vowel, Ko, Ku, Ke, Ka for Ki.
3rd by intercalation of y, Khyi for Khi.
4th by metastasis, ain for nai, voce ear, &c.

Ta-kwi in Mru. — Kwi root = Ku-i.

Dog.—Kút-chik in Kurd.
Khí-cha in Newari.
Ko-chu in Kiranti.
Kú-chúng in Sunwar.

These are compounds of the two preceding words—a sort of terms very common in all countries wherein many tongues prevail.

Dog.—Húé in Chunsay.
Hwé in Tunglhu.
U-i in Kumi.
U-yo in spoken Tibetan.

Tree.—K-Cha-d in Osetic.
Ché in Mizjeji.
d Sé-g in Circassian
d Sá in Lazic.
Sé-k in Suanic.
Shi in Gyarung.
Si-ng in Moasi.
Shi-ng in Bodo.
Shi-ng in Dhimali.
Shi-ng in Lhopa.
Si-ng in Magar.

The root varies from Chá to Ché, and Sa to Sé to Si, to Shi. The suffixes have occurred too often to call for further remark in this place.

Si-n-du in Gurung. — Here is a Mongolian sample of the dú suffix, so frequent in the Caucasian series. Ka-n-du, Ka-do-t, &c., voce foot, are further samples.

Sá-ng in Anam.
Sí-ma in Newari.
T-sing in Mru. — Sá, Si, the root, ut supra. Of ma suffix we have had samples in Nhi-ti-ma, voce day, Chi-m, voce water, Cha-m, voce Hair, &c.

Forest.—Dish-chá in Mingrelian.
Din-chá in Dhimali. — The Osetic Chá = tree is clearly the basis of these two words for forest.

Bird.—Pú-r-ti in Andi. — Compare Ta-r-ti, a cap, Ti-r-mi a man, Nyi-ti day, of the Mongolian series, and the Pú root will be easily apprehended.

Pét-tang in Avar. — Tang, servile, is the ta particle with the common nasal addition. How common it is may be seen by consulting my Himalayan Vocab. Pé is the root, borrowing the t from the servile suffix.

Pyé in Gyarung. — Pyé = Pé. The frequent intercalation of y, has been already noted in Ni, Nyi, Khi Khyi, &c.

Pyá in Takpa.

Byú in Tibetan. — Abstract the intercalate y, and the root re-produces that of the Andi Pú-r-ti.

Bú in Limbu.
Pho in Lepcha. = Andi Pú.

Fish.—b Zhéh in Circassian. — Turn to the word for flesh, and you will see the differential function of the prefix b.

g Zháh in Thochu. — Initial g = b supra. These are merely the conjunct forms of the ba, ga prefixes. The conjunct and disjunct system of prefixed, as of infixed and postfixed serviles, prevail alike in the Caucasian and Mongolian tongues, as evidenced by this paper throughout; and the prevalence of both systems is another striking feature of that perfect analogy which pervades these tongues.

Di-shé in Magar. — Di, servile.

Flesh.—Zhéh in Abassian.
Jé-chu in Suanic.
Li-chá in Finnic. — Li, servile. Chá root.
Shá in Tibetan.
Shá in Takpa.

Ta-Shá in Gyarung.
A-sá in Burmese. — The prefix ta is as common in Gyarung as is A in Lepcha and Burmese.

Egg.—Dú-khi in Akush. — Du, Water? Khi, fowl?
To-khá in Garo. — To, blood and kha, fowl.
Tou-chi in Garo. — Tou, fowl and chi blood.
Tou-dŏï in Bodo. — Tou, fowl and Dŏí water.

Tó-i in Khyeng.
Dú-i in Mru.
Dú in Kami.
Tú-í in Dhimali.
U in Burmese. — U Burmese, meaning originally 'water,' is the root of all the other words, for which see 'Water.' The metaphorical and now only current sense of the word is even more singular than that of the preceding terms, amongst which the first is determined analogically. The literal sense of U is lost in Burmese, like Mi for man.

Ear.—Ná in Armenian.
Ain in Tshari.
Ain in Avar. — Ain = ná-i, per metastasin.

Ná in Burmese.
r Ná in Tibetan.
Ná in Singpho.
Ná-vo in Lhopa.
Né-ko in Limbu.
Ná-ku in Karien.
Ná-pé in Murmi.
Ná-bé in Gurung. — Ná, the root, speaks for itself. Vo = bo = be = pe are phases of one and the same servile which = ko, ku. De Coros calls these "articles;" and like all the serviles, they often perform the articular function of specification or emphasization.

A-ga-ná in Kami.
Ká-né in Sak.
A-kha-ná in Tankul.
Ná-i-pong in Newari.
Nhá-tong in Dhimali. — A rich fund of illustration of the serviles, the Ná root being unquestionable. My Himalayan Vocabulary afford numerous samples of the pong and tong suffixes which are but pa and ta with the frequent nasal addition.

Hair.—T-shá-r in Kasikumak. — Shá the root t' prefix and r suffix as before in endless examples.

Sá-b in Avar.
Sáb in Anzukh.
Sá-b in Tshari. — b final the conjunct form of the ba, bo suffix, so common in Tibetan.

Shá-ben in Burmese. Shá-m in Mru. Chá-m in Magar.	M servile = b, and constantly commutable with it.
A-shó-m in Lepcha. A-shá-m in Kami. Lú-sá-m in Khyeng.	A prefix and M suffix, so common in Lepcha that almost every adjective in particular is thus formed.
Lú-sá-m in Khyeng.	Lú = man. Hence lusam is human hair.
Head.—Tá-wi in Georgian.	wi, servile = bi, vi, infra compare wi-shá, voce salt.
Tá-u in Khas.	
Thá-bo in Murmi.	Aspirate form of root, with bo suffix.
Tá-ng in Kiranti.	Ng servile the customary nasal appendage often superceded to other serviles.
Thá-gek in Limbu.	Gek servile. Compare git in Tshigit, voce earth.
Thau in Gyami.	Aspirate root as in Murmi.
Ka-taú in Mou.	Ka, the common prefix. Note that, in general, a, servile may be known by the absence of accent, or of broad vowel where writing is used.
Head.—Káh. A-káh in Absné.	A, servile, as in A-shom A-sa, &c.
Za-ká in Altekesek.	Za servile, the sa prefix in its usual Caucasian phase.
A-ká in Tangkul.	
Ká-ng in Burmese.	Ng servile.
Da ká-m in Garo.	Prefix da and suffix m, serviles.
K-ra in Gurung.	Compare Hra for Hora Mse for Me-se. So Kra for Ká-ra, the ra suffix absorbing the vowel of the root.
Kho-ro in Bodo.	ro servile with harmonised vowel.
Horn or Bone.—Ra-k-ka in Tsari.	Ra, root; ka servile adds k to it.
R-ka in Georgian.	Servile ka absorbs the vowel of the root rá.
Rá-g-s in Lettic.	g, and s, servile.
Rú-g in Slavie,	g, servile.
Ak-rá in Lazic.	Ak servile as in Ak-sa. It is the ka suffix changed per metastasin.

Rá, and Rú in Tibetan. — Pure root, of which rá, rú, ró ré are the phases.

Rá-jo, Rú-ko } spoken Ditto. — jo servile and ka also, differential addenda.

Rá-k in Thochu.
A-ro in Rukheng. — K final, conjunct form of ka suffix, = prefixed K' in Ak, which itself is merely metastatic ka.

Rou in Lhopa.

Ré-ra in Horpa.
De-réng, in Sontal. — rá servile, or sing song repetition of root. Dé, servile, the da particle harmonised to vowel of root.

Am-rá in Sak. — 'am,' servile, metastatic ma.
A-ro-ng in Lepcha. — 'a,' prefix, and ng suffix, serviles.
Rú in Gurung. — Pure root.

Ró-s, Rá-ng, in Magar. — The roots for horn and bone are constantly the same, both in the Caucasian and Mongolian tongues. The senses are sometimes distinguished by an additional particle, as in Magar, which uses the pre-prefix mi, = human to demark bone. Just such is the form in lusan, voce hair.

Bone.—t Lú-sa in Dido.
Lo-t in shan. — The root is Lú, which is really only a varied pronunciation of Tibetan Rú. But note how the servile t stands equally as prefix and suffix, just as does the servile r, voce stone.

Bone.—Tsi-zyú in Suanic. — Tsi = Magar Mi, just remarked on: zyá, root, compare lusan, voce hair.

Gyó in Burmese.
Guro in Sunwar. — ró, servile.

Mouth.—Mó-lé in Kubitsh. — Mó, the root. Lé, servile.
Mú-ra in Limbu. — Mú, the root. Rú servile.
Mú-r in Khoibu. — The same with ra conjunct.

Mhú-tu in Newari. — Mhú, aspirate form of root as Mhé for Mé, fire Nhi for Ni, day, &c. &c.

Tooth.—d Zéh in Circassian. — d servile.

Zá-vi in Avar.
Sí-bi in Lesgian. — Z = s. Observe that in the Mongolian samples the conjunct form is used, swi, swá.

T-shi in Chinese. — t' servile, = d Circassian.

Só in Lhopa.
Wá in Newari.
S-wá in Murmi.
S-wé in Thochu.

Ti-swi in Gyarung. — Ti, the usual Gyarung prefix harmonised to the root.

Th-wá in Burmese.
Só in Tibetan.
Só in Serpa. — Th, servile.

A-tha-wá in Sak. — Repeats the Burmese prefix with an additional one.

Sá-k in Gurung.
Sya-k in Magar. — K, servile, the quasi article so often noticed.

Si-tong in Dhimali. — Tong is the ta suffix with the nasal addition before noted.

Syó in Horpa. — Intercalate y, as in Khyi for Khi, voce dog, Nha for Na, voce ear.

Horse.—t' Shé in Circassian.
A-sé in Tuwash.
z-Ché-ni in Georgian.
Shé, Sé in Tibetan.
Shé in Khyeng.
Sá in Sak.
Sá-la in Newari. — Sá, changing to Sé is the root, the aspiration being neutral as to sense. Thus we have Mhe or Me, Nhé or Né, Khi or Ki, &c.

Sá-dom in Sontal. — Dom suffix, is the sexual sign.

Foot.—Pé-ché, Pé-chi } in Georgian.
Pé-t-ché in Mantchu. — Note the marvellous correspondence of this word with its Mantchu equivalent, roots and serviles tallying, as in Katshu, voce hand.

Foot.—Po-g in Lesgian.
Pa-g in Chunsag.
Pa-g in Anzukh.
Pa-g in Khas.
Pá-li in Newari.
Bhá-lé in Gurung.
Bá-lé in Murmi.
Foot.—T'shé-ka in Andi.
Chhé in Horpa.
Ché-n in Anam.
Lip-ché in Manyak.
Lap-ché in Manyak = hand.
Chap-lap in Garo.
Chhá in Gyami. — The manner in which the words for hand and foot run into each other, *alike in the Mongolian and in the Circassian* series, is truly remarkable, so much so that it is difficult to distinguish the terms. The Georgian Pé-ché, like the Mantchu Pét-ché, in fact blends the more special names for the lower and upper members, and so do the Manyak Lipché and Lapché, the latter word meaning hand, whilst Chéli, hand in Georgian, has the Ché root of foot with li servile.

Foot.—Ká-ch in Osetic.
Ko-ch in Tshetshentsh.
Ko-g in Ingush.
Ko-g, Ko-ek, Kwek in y, Mizjeji.
} Ká, Kó, is the root in all these words and in the next one. Yet the two latter mean hand—a sufficient confirmation of what just said!

Kó-da in Kabitsh. } For dá suffix, see remarks on Tshedá, voce earth, and compare Kado and Ka-do-t, infra.

Kó-ng in Khyi.
Ká-ng in Tibetan.
} Final ng, servile, as in many prior instances.

Ká-ng-lep in Lhopa. } Lep may be servile, or it may be the radical lip, lap of Lipché, Lapché, &c.

Ká-n-du in Ple. Dú servile, also the annectant n.

Ká-do-t in Mon.
Ká-do in Pasuko.
} Mean leg, yet have indubitably the same root as the foregone, the Do being servile, as in Tshedo, voce earth.

Kó in Horpa. } The nude root, vast numbers of such words occur in all the tongues alike.

A-kho in Kami. } A, servile: Kho, the mere aspirate phase of Ko.

Khó-khó-i in Dhimali. } Root repeated, as in Ká-ká, sky; Cho-cho, hot, &c.

Khyé in Burmese.
Khau in Tunglhu.
Khú-t in Khoibu.
Khú-t in Khas.
Khá-ng in Newari. Means leg.

Foot.—Tá-i in Kubitsh.
Tá-ra in Moasi. Ra, the common suffix.

A-tá-r in Sak. } A, the servile, so frequent in Lepcha and Burmese: r = ra.

Tá-mi in Gyarung. Mi servile, means human.
Ka-tá in Sontal. Ta root. Ka, the common prefix.

Hand.—Ká-r in Tshari. } r servile, conjunct ra, as in the following words.

Kú-ch in Osetic. Ch servile, compare Sé-ch, &c.

Kwé-r in Anzug.
Ká-r in Sokpa.
Gá-r in Mongol.
} r final servile. Kú-er, observe here that Kú, Ká, Gá, is the root throughout the whole series and note the identity of the word in Sunwar and Anzak with reference to the alleged Greek etymon of Kwér.

Ká in Kumi. — The pure root.

A-ká in Kami.
Ta-kú in Sak. — Á and ta prefixes, serviles.

Kwé-li in Sunwar. — Li servile, as in Ché-li, Georgian for hand. The word therefore is identically Anzug, li being = r.

Hand.—Kat-shú in Andi.
Kat-shú in Plé. — Shú, the root. Kat, a double servile; ka-ta a marvellous accord!

Hand.—Ché-li in Georgian.
Ché in Mingrelian. — Such samples leave no doubt as to li being a servile.

Shi in Suanic.
Shú in Gyami.
Pat-shu in Pusako. — Pat, double servile, pa-ta.

Chú-a-sé in Ple. — Compound of Andi Shú and Mingrelian ché!!

Blood.—t'Shá, Shá in Absné.
Shá in Manyak.
Sáh in Thochu.
Séh in Horpa.
Syé in Gyami.

Ta-shi in Gyarung. — Compare the conjunct servile in the Absné word, and observe that the so-called monosyllabic and polysyllabic character of languages has been made to rest on this frail foundation!

Blood.—Thú in Osetic.
Thwé in Burmese.
Thé in Sak. — Observe that the change of root from Thú to Thwé is exactly similar to that of Kú to Kwé, voce hand. This identity of plan prevailing throughout speaks trumpet-tongued for the truth of the affinity of races contended for.

Thé in Kasswi.
Thó-i in Garo.
Ka-thi in Khyeng. — Ka servile.
A-thi in Kami. — Á servile.
Thá-k spoken Tibetan. — K, the articular suffix.

Blood.—I, E in Dido.
Hí-n in Andi. — N servile.
I in Khyi.
Hí in Newari.
Hí-t in Kong. — t' servile.

Hi-ki in Dhimali. — Ki servile, the ka suffix harmonised.

Hí in Khoibu.
Hí in Marung.
Hyú in Magar.

Blood.—Zí in Tshetshentsh.
Zí in Ingush.
Zí in Mezjiji.

Blood.—U'-sí in Sanwar. — U' servile as in ú-má, voce fire.
Chí in Garo.
A-zí in Champhang.
A-zyé in Maram.

Blood.—Bí, Pí in Avar.
Ví in Lepcha.
Wí in Mrú.

Skin.—f Fé in Circassian.
t'Ché-bi in Mingrelian.
Ga-shi in Armenian.
Pé in Kami.
Pí in Chinese.
Fí in Gyami.
Pí in Mrú.
Ché-gú in Newari. — gú servile, as in Chan-gu hot.
Pá-ko in Lhopa.
Pa-g in Tibetan.

Skin.—Ká-ni in Georgian.
Ka-n in Suanic.
Kám-pa in Lhopa.
— Ka is the root passim. Ni and n, two phases of the same servile. The 'm' in Kampa, a euphonic copula with reference to the labial of the root. Pa, servile, the common ba, pa suffix of Tibetan.

Skin.—Bi-k in Dido.
Di-bi in Murmi.
Di in Anam.
— Here is another sample of the substitution of servile for root, as Fá for Má, voce fire, &c.

Bi-gur in Bodo. — gu-ra, double servile. See remarks voce Ego = homo.

Tongue.—bb Sé in Circassian.
rd Zhé in Tibetan.
Shé in Chinese.
— These repeated serviles bear direct reference to the very numerous senses of the Sé root, and thus we learn the differential function of the serviles. See remarks voce man.

Stone.—Dó-r in Osetic.
r Dó in Tibetan.

Note again how the suffixed and prefixed serviles tally, the root (Dó) being here indubitable. So Tsari chi-m and Jili m-chi, voce water.

Dóh in Lhopa.
Dóh in Serpa.

Dún-ga in Khas.

ga, suffix, and annectant n, both servile.

Stone.—Ló-di in Georgian.
Lú-n in Khyeng.
Lú-ng in Limbu.
Ta-lú-n in Sak.
Ló-ng in Lepcha.
Ka-lú-n in Kami.

Root is Ló, Lú. The serviles have been too frequently remarked on, to need repetition. But note well how congruous they are ab initio usque ad finem!

Great.—Di-di in Georgian.
Di-di in Mingrelian.

Root repeated, as in Cho-cho, Pyé-pyé, &c. &c.

Di in Tai.

Gé-dé-t in Bodo.

Gé, the gá prefix euphonised: t, conjunct ta.

Dá in Kuanchua.
Dá-i in Anam.
Dá in Plé.

i final, servile.

ta-Dhí in Newari.

ta, the common prefix and dhi, the aspirate form of the root, as Mhé for Mé, &c.

Three.—Sami in Georgian.
Sami in Mingrelian.
Jum in Lazic.
Sum, Shum, Sam, Song, San, Tham, Tum, in all the Tibeto-Himálayan and Indo-Chinese tongues.

Four.—p Sí in Circassian.
p Shi in Abassian.
b Zhi in Tibetan.
Zhi in Lhopa.
Zhyi in Serpa.

Both root and servile are identical in all five words; another marvellous instance of concord, capable, like the rest, of only one explanation.
Intercalate y, as in the nouns.

Si, Si-kú in Gyami.

Kú, a servile.

t' si in Siamese.
t' sé in Shan.

t', servile: the common ta particle, conjunct.

Sí in Tai.

The nude root.

Five.—Chú-ba in Circassian.
Pat-chú in Talien.

Chú, the root. Pat, a double servile as in the Pasuko word for hand.

Eight.—Yat-sh in Tshe-tshentsh.
Yat-sh in Limbu. } Final sh', servile. Another beautiful sample of affinity.

g-Yet in Takpa. — g, servile, = v, d, p, below.

Ka-yá in Kami.
Ba-yá in Tangus.
Ri-yá-t in Mrú.
Re-yá in Kiranti.
Yó in Sunwar.
Or-yét in Gyarúng. } Yá the root throughout the whole series, with the common vocalic changes. 'Or' servile, in Gyarung.

Eight.—Rwa in Georgian.
Rú-a in Mingrelian.
Ré-ya in Kiranti.
p-Ré in Murmi.
Ryië in Horpa.
Rá-nit in Mru. } Rá, Rú, Ré, is the root beyond doubt, though the Kiranti sample under both this and the preceding head shows how readily roots become serviles and vice versâ.

Nine.—b gú in Circassian.
d gú in Tibetan. } Note again the wonderful accord of root and servile.

r gú-ré in Thochu. } The ra particle here appears both as prefix and suffix.

Gú-bi in Manyak. — Bi servile, as in Circassian.
Gúh in Sunwar. — The pure root.
Gú-n in Newari. — N, final, servile.
Gó in Horpa. — Nude root again.

Kan-gú in Gyarung, } Kan, double servile, Ka-na = Kam in Kampa, voce skin.

Ten.—p Shé-n in Circassian.
Zhé-ba in Abassian.
Swá-ba in Circassian = Sú-a.
b Chú in Tibetan.
t Sha-i in Burmese.
h Sú in Kami.
Chi in Garo.
ta-Chi in Gyarung.
Shi in Chinese.
Sha-i in Tangus.
ta-Shi in Tunghlhu.
Sí-sú in Sak.
t-Sa-u in Talien.
p-Chi in Takpa.
Chú in Serpa.
Chá in Gurung.
Chá in Lhopa.
Sá-n-ho in Newari. } Sá, Chá, is the root with the usual cycle of changes by aspiration and by alteration of the vowel; and to the root, moreover, are added the usual variety of servile appendages in some cases, whilst in others we have the nude root. All this is perfectly conformable to what has been seen in the nouns, and it follows therefore that the peculiarities commonly ascribed to the numbers do not really exist. The nature of the error, as derived from the examination of a few only of these tongues, may be appreciated by adverting to the remarks in the next paper on the differences presented to all *such* observations.

Chi-chi-bi in Manyak.	Root repeated with ba suffix harmonised and *serial* as in Circassian. This feature of the numeral serviles is of frequent occurrence. See Essay on Bodo and Dhimali for two good samples.

P. S. The above paper has been considerably augmented in number of vocables, and in the analysis of them, since it was first presented to the Society, though not to the extent I had hoped and purposed if health had not failed me. If however the principles of the analysis (sufficiently revealed in their application and in the observations of this and the following paper) be sound, they may be easily carried as much further as is desired.

With regard to the soundness of those principles I am fully prepared for censure of the presumption of attempting to analyse unknown tongues;—prepared also to see many errors of detail detected, to afford apparent justification of such censure.

I can but solicit the particular attention of the candid to the perfect uniformity of the phenomena presented by the vocables, whether nouns, pronouns or numerals, from the very beginning to the very end of my paper, and ask, How this is to be explained, except upon those principles which a comparison of the numerous Himálayan tongues with each other and with that of Tibet led me first to detect, and which my opportunities of novel exploration beyond the Himálaya afforded me great advantages for testing the more extended application of? I have to regret that my investigations have been interrupted just when they were beginning to produce their ripest fruit, and to solicit the Society's favourable construction of what is now submitted, as it is, rather than trust to an uncertain future for its improvement.

Supplement to the paper on the Mongolian Affinities of the Caucasians.

Since the above paper was hastily written I have obtained through the courteous aid of our Secretary the loan of the Mithridates and Asia Polyglotta. The ampler stock of Caucasian and Mongolian vocables thus placed within my reach (and illustrated too by occasional analytical notices) has needed only to be compared with my

own large stores from the Himálaya, Tibet, Sifan, Indo-china and Tamulian India, to satisfy me that the widest assumed scope of Allophylian affinities might be placed on an unassailable basis. Again, a renewed reference to well known works* has equally satisfied me that nothing short of a careful analytical demonstration would be accepted after the frequent insufficiently supported assertions, and more or less superficial investigations that have been given to the world, even Dr. Latham's splendid panoramic view of the subject, though in fact well grounded on the opinions at least of numerous scholars,† and fortified, moreover, by the adduction of some special evidence‡ either priorly overlooked or only recently accessible, having met with a cold, not to say a scoffing, reception.§

I therefore beg permission to withhold for the present the comparative list of Caucasian and Mongolian vocables which I had prepared to accompany the above paper on the resemblance of Circassian and Gyárúng pronouns, pledging myself that that list shall ere long be submitted to the Society, so amplified, and analysed, as to enable the scholar both to test and to extend the analogies sampled by the list.‖

In the meanwhile and with reference to the above paper I subjoin some farther explanations which will not only serve to illustrate more fully its special topic (pronouns), but to show how continued attention to the general topic teems with fresh proofs of the soundness of the opinion that Caucasus is essentially Tartaric, and that the widest sense of the word Tartaric is the truest.

Klaproth, who was too well informed on the subject to insist on the Arian origin of the Caucasians generally, yet contended that the Osi were Indo-germanic.

I shall soon be able, I think, to show that the elements and the mechanism of words in the Osetic tongue are purely Tartar, and that

* Prichard III. 13 et seq; IV. 384 et seq. Report of the British Association for 1850, p. 174 et seq. Madras Journal for July 1837, and January, June 1850.

† Klaproth, Dobrosky, Rask, Rolt, Norris, &c. &c.

‡ Brown's Indo-Chinese vocabularies, and Rosen's Caucasian Researches.

§ Edinburgh Review. Article Bopp's Grammar.

‖ This has been done, I hope tolerably effectually, in the list as it now stands.

the very name of the race (O-si*), like that of the Georgians (Swan), proves their Tartaric progeniture, these names being significant, and significant in the special mode in use among the Tartar races. How Bopp could contend for the Arian origin of a race styling themselves Swan, and go to Sanscrit for Georgian etymologies, I am the more surprised, as Swan in Sanscrit means Dog, and we can hardly suppose that the Georgians or any other people would call *themselves* Dogs, though their neighbours might so compliment them. Not to travel however beyond pronouns, I may mention that I have a long list of Mongolian equivalents for the Caucasian pronouns, and that, for instance, the Má root in all its phases (Má, Mí, Mó, Mú,) and in both its senses (nominal and pronominal) will be exactly matched by a long series of Tartaric equivalents. Nor are the so called inflections or declensional signs, less Tartaric than the roots; for instance í or ní for the genitive; an, ang, náng for the dative case; the í being Tibetan, Takpa, Horpa, &c.; the ni, Mongol, Mantchú, Turki, Bodo; the an or ang, nan or nang, Dhimáli, Turki, Ouigúr, &c. Here is a sample.

Pronoun I.

	Ouigúr.	*Osetic.*
N.	Ma, Ma-n,	Ma, Ma-n
G.	Ma-ni-ng,	Ma-ni.
D.	Ma-nang Máng-gé	Ma-nan.

In Ouigúr the first na suffix is often dropt in the dative, and the second, reiterated; and thus we have Manggé for Ma nang. Both changes are thoroughly consonant to the genius of these tongues, and are in perfect harmony with the alternative nominative form Ma, or Ma-n. The n final is here simply emphatic, and is the conjunct form of the na suffix. All these particles, in either their servile or radical character and function, may be used conjunctly and disjunctly, that is with or without their vowel;† and all may be also

* See the note in the sequel on words with the O′ and Sí roots, O-as, O-su-ri, O-zu-r-ka, &c.

† Here are some examples, k′ ma-ri man in Georgian, ka-mi, man in kami: Mú-rú, man in Sunwar, M-rú man in Mrú (root, ma, mi, mu): M-za, fire in Absné, Mi-za, fire in Avar (root mi): S-mé girl in Horpa, Sá-mé girl in

augmented by various new elements or by reiteration, without affecting the sense in either case. Here are some samples of the disjunct and reiterated, or added ná, with one of these singular equivalents.

	Pronouns I.	Thou.	He.
Tibetan	Na, Nani.	Khé, Khéna.	Khó, Khóna.
Esthonian	Ma, Minna.	Si, Sinna.	Tá, Temma.

We see here that the suffix má is equal to the suffix ná. So also is the suffix rá, which has been noticed as common, in form and function, to the Circassian and Gyárúng tongues, but which in fact has a wide and almost universal prevalence among these tongues, being attached like all the other serviles alike to pronouns, nouns, numerals, adverbs and changing or dropping its vowel as well as taking the sursuffix n, ng, without more alteration in its meaning than in the other cases of reïteration and elision and vocalic changes above illustrated in the pronominal roots and serviles, and in the nominal ones also, by the subjoined note.

In fact such, and much greater, reiteration, cumulation, substitution and vocalic change, with concomitant contractions medial and final, affecting roots as well as serviles, are chief almost among the fundamental laws of these languages and constitute the veil that has so long concealed their complete affinity. Who, for instance, would suppose Namasini or contractedly Namsin, day, to be the same with Ni, Nyi, or Nin? Show him, however, the intermediate forms Nani, Mani and Sini, and show him also this intercalate y and final n of the root, as well as this cumulation and these changes of the serviles, holding good in a great number of *other* instances, and you will carry him with you in this one and the rest, as I hope to do my readers by and by.

Here are some further pronominal illustrations of the Ra suffix.

It attaches, as rá, to the 1st and 2nd singular in Circassian, exclu-

Tunglhu, Sa-mi girl in Burmese (root mé, mi). Note also the vocalic changes of roots and of the servile ra, in ma-ri and mú-rú and m-rú ka servile of Georgian kmari, is dropt in Suanic Maré, where again the servile ri becomes ré. In the Indo-chinese tongues we have the ka prefix present and absent in this very word, man, just as in the Caucasian, witness k' lun in kolun being lun in Burmese. I may add L-ó-k in Tai and Lé-g in Osetic with the k vel g suffix (root, lú, ló, lé).

sively; to the 2nd singular only in Gyárúng, as ré; to the 3rd singular only in Mongol and Mantchú, and Sokpo, as ré; to the 3rd singular only in Gondi as r; to the 3rd plural only in Turki, as ré; to all three plurals, and to no singular in Rukheng, as ró; to the same in Burmese as dó, (local difference and of pronunciation merely); to the 1st and 3rd plural in Mongol as dá and dé respectively; to all three plurals in Takpa, and to them only, as rá; to all the persons singular and plural in Tibetan, as ráng, usually rendered by self; to the 1st and 3rd plural in Ouigúr, as ár vel lár. The usual reading of Olar, they, is O-lar, making lar a so-called plural sign. But if Ol be 'he,' in Ouigúr and Turki, ol-ar must be 'they.' However, O is undoubtedly the root; as proveable by numberless instances in the cognate tongues; and lá is an infix, and O-la-ra, the true etymological analysis, as of the Turkish anlar and anlaré, the analysis is, a-na-la-ra, á being here* the root (anggé, to him a-ning, his), and na-la-ra, serviles, whereof the first is the emphatic ná above illustrated; and ár, vel rá, vel lá-rá, the so-called plural sign or signs, though in my judgment it is to mistake the true genius and character of these tongues to give to any of their particles, except with extreme reserve, the attributes of strict grammar (declensional marks), or a precise independant signification such as self for ráng in Tibetan. Ráng is a compound of the rá, and ang particles. The phases of the latter are á, an, ang, and the reflective or egoistic sense, such as it is, (it is most like that of the Sanscrit swa) attaches, not to the compound ráng, but to the simple áng. In Bódo and Gáro and Hayu áng stands for the first personal pronoun; in Limbu and many other allied tongues it is the first possessive, in the form of á. In Tágala and Malaya á and áku represent the first personal, and ang is an articular prefix of the same drift. The first personal is an-ka in Kiranti and a-za in Osetic, prefix in all these instances, in others even of the same tongues it is a suffix;† but still whether

* The change of the root from ó to á in Turki and Ouigúr is continued in Mantchu, wherein it becomes í. Precisely in like manner we have Mi, vel Má vel Mé, for five, and Ni, vel Na, vel Né for day, in Caucasus.

† As ang is prefix or suffix, so is any other servile, for instance the ká of anka, here cited; thus, k' mari, man, in Georgian (mari in Suanic) and Osurka, maid, in Mingrelian (Osuri in Lazic). See on to further note.

attached to pronouns, verbs, or nouns and whether prefixed or post-fixed or standing alone, as root or servile, it is apt to indicate a reflective character. This is the reason why it so constantly marks the possessive case, with or without a preposed particle; but if with one, usually the ná conjunct, which is only one phase, as ang-gé is another phase, of the repetition of itself; and this is also the reason why in so many of these tongues the áng suffix when appended to verbs and their participles, designates the first person. Thus Kazáng I eat, Kazángti I who eat, I the eater, I eating, from the root zá, zó, in Gyárúng. Piré, give; Pi-ráng or Piráng-gé or Piráng-né, give to me, in Limbú, from the root Pi Davo, give, Davóng give to me, in Gyárung, from the root va, vo. These forms are imperative. The indicative ones are similar, thus Piré and Dovo mean, you or he (quivis præter meipsum) gives; and Piráng, Dovong, I myself give, Ang-né and Ang-gé are equal and are reiterations of the a, an, or ang particle.* Compare ang-gé to me, in Turki and Ouigúr; and máng-gé to me in Ouigúr with their equivalent má-nán in Osetic. Piré and Piráng show very pointedly that the reflective virtue resides not in the rá particle but in the áng particle. This case also examplifies their conjunction. Má-náng is the disjunct form; máng, the conjunct; and máng-gé, is the same, only more emphatic; máng, to me, máng-gé to myself; and máng-né and máng-ré, are both equivalents and emphasizers merely. So mini is mine; and mining-gé, my own, in Mongol and Mantchú; the náng becoming níng euphonically to harmonise with the mi root. And, by the way, we may here, as in all the other derivatives, note the forthcomingness of the widely prevalent Mi root, though obsolete as a nominative in these two tongues, just as it is in the analogous sense of man (Ego = homo plur. exem.) in Burmese, wherein however we similarly gather it from its derivatives, woman and child, Mimma† and Sa mi.

* In Sontal Uraon, Ho and Hayu, the ang becomes ing, and eng with the very same emphatic reiteration, viz. eng gna and ing ga.

† Compare Esthonian Temma, supra, where suffix ma = emphatic na. All these tongues affect alliteration and consonantal as well as vocalic harmony to an extent quite perplexing, since each tongue has its fancies in this respect. Here má is a root.

I have illustrated the pronominal and verbal uses of the rá particle, as well as explained its relation to rang. Here are some exemplifications of its nominal and other uses. I fear I shall weary the reader: but he must remember that what is true of this particle is true of all the particles; and that, whereas a confined view of the character and functions of this grand element of these tongues has led to very erroneous notions as to their general affinity, so a complete conception of the nature of the particles is the best guide to a just perception of that affinity. For instance, Rosen has dwelt on the unique character of the Circassian pronouns arising in good part out of the operation of the rá particle, and I, following him, have announced with reasonable surprise the fact that the same peculiarities are attached to the Gyárúng pronouns, whereas in very truth whatever he or I noticed in this respect as to the pronouns is equally true as to the nouns, adverbs, &c., and that not merely in the languages of the Circassia and Gyárúng, but in every tongue from Caucasus to the Pacific. Here is the enumeration.

Ma-re, man, Suanic, Ma-ri, man,* Georgian, Ma-ro man, Lepcha,

* I here omit the ka prefix, with full warrant from usage:

See prior note on kmari and klúu; ka suffix in Ozurka is the same thing and similarly omissible, witness osuri. Here ó is the root, = ú, meaning man, and it also takes the k prefix. Sú is the sa particle harmonised in its vowel to the root. It is a diminutive, so that O-sa, U-sa or U-a-sa is child and Kusa is equally child. We have Kusa and A-sa in Limbu, and U-a-sa in Avor, U-s in Osetic, U-as in Wogul, U-er in Armenian, Sa in its capacity of diminutive means woman as well as child when added to any root for man as U or Mi; and hence Ossetic U-sá woman = Mi-sa, Newari. Such and so concordant are *all* the elements. In Armenian Uerti, child, erti vel rati being servile, it follows that the ú root for man may express juniors as well as adults, whilst the Gyárúng Us, man, and Ossetic Us woman prove that the U root expresses both sexes meaning man-kind or the species man, and also that Sa is not uniformly a diminutive but a synonyme. This will be amply proved by and by, when the O-U-W, and the Sa, Si, Shi, roots for mankind are arrayed, and then it will be also seen that the name of the Osetic people is derived from two synonymes for man, and that, like Tá-tá, or Tshe-tshe-nsh, it is = Allemanni. The Caucasian puzzle as to Us, Ush, Ushi, U-as, U-as-sa, U-er, O-su, O-zu, is solved by this explanation, and if we add the Murmi Bú root for man (supra) we have the clue to the Caucasian Bo-zo, Bo-shi, Bit-shi, Bi-shi, for all which I have numerous Mongolian equivalents, thus Po-zo in Pasuko, Pu-sa in Karien, Bu-cha in Tekpa, Bi-sha and Bi-shi in Bodo.

Mú-rú, man, Sunwár, M-rú, man, Mrú, Ilé-ru, before, Turki, uz-ré upon, Turki, Herel-ri man, Sontál.

Lan-ré, once, Tibetan. Kyú-ré, river, Akúsh. Thó-ré, to-morrow, Tibetan. Wá-ran, rain, Ossetic. Mu-ran, river, Turki. Mai-ran, arm, Mantchú. Koöl-ron, child, Mongol. Kho-rang, sky, Bodo. Chák-reng, hand, Garo. Dí-rang, this, Serpa. Dé-ring, to-day, Tibetan. Ré-m-bú, man, Limbu. Res-ga, where, Tibetan (samples of prefix). Us-rés man, Gyárúng (sa, added). Rgu-re, nine, Manyak. Ma-r, horse, spoken Chinese. Ma-rhi horse, Sokpa. Gá-r, where, Tibetan. Gá-rú, where, Tibetan. Dé-r, and Dé-rú, there, Tibetan. Ta-r-ti, cap, Gyárúng. Ti-r-mi, man, Gyárung. Ok-ur, ox, Magyar. O-zu-r-ka, maid, Mingrelian (ka added see note). O-sú-ri, maid, Lazic. U-er-ti, boy, Armenian. Pu-r-ti, bird, Andi (ti, added, the rati suffix). Do-r, stone, Osetic. Teng-er, sea, Magyar, Sha-r, ox, Mongol. Khor, river, Avar. Kú-er, hand, Anzúg. Ka-r, hand, Tshari. Ka-r. hand, Sokpo.

We thus see that the ra particle changes its vowel to the utmost (rá, ré, rí, ró, rú); takes the ang or other additional particle, (ti, ka, sa); occupies the initial (res-ga), medial (pú-r-ti), or final (ka-r) position, or even both (r gú-re), with reference to the root, and lastly, blends itself with that root dropping its vowel (gár), or stands apart retaining its vowel (gá-rú); and all this without change or even modification of the meaning of the word as derived from the root further than a certain emphasizing can be so termed, as Kho-rang, *the* sky; ka-r, *the* hand.

Such elements of speech, and all the serviles are essentially alike, can with little propriety be designated by our grammar terms or alleged to be conjugational or declensional marks except with extreme caution. The essence of a grammatical rule or part of speech is generalization: the essence of the function of these particles is the very opposite or specialization; and thus it is that unlimited change of place and change of form belong to the latter, whilst nothing of the sort does or can belong to the former.

Of the habit of applying our grammatical terms to the elements of these tongues in central Asia, without any apparent perception of their true character* as noted in the South Eastern islands, I will give a sample from the Altaic group of languages.

* To prove this it suffices to advert to Vater's derivation of the Caucasian kar

The plurals of the Mantchu personal pronouns are thus stated and commented upon.

We.	*Ye.*	*They.*
Bé. Mousé.	Souwé.	Tését.

To this statement of the pronouns it is added that Bé, Sou wé, and Tését, constitute the ordinary series; that Mousé is a sample of the Dualistic form; and that it is regularly derived from Mou, I, by the addition of the plural sign sé. Now it is quite true that the existence of a Dual or rather, of an inclusive plural* is one of the characteristics of these tongues and one that prevails very generally from the Pacific to Caucasus. But how it can be said that in the Mantchu tongue this inclusive plural is formed regularly from the singular Mou by means of the plural sign sé, I cannot conceive, since a regular pluralizing particle would be uniformly applied and wear one shape, whereas there is here in the three persons of the pronouns no vestige of such attributes in the sé particle. The ordinary "we" (bé) has no trace of this or other pluralizing suffix: the ordinary "ye" (sou wé) has quite a different augment (wé); and, lastly, the 3rd person shows the sé particle indeed, but with a foreign element or suffixed t (sét). Now surely a grammatical rule must have some identity of character; what it includes must be similar in form and application. But that in the Mantchú pronouns the plurals cannot be said to be regularly formed by the addition of sé is self-apparent; and if we turn to any collated list of the pronouns of the Altaic tongues generally we shall immediately perceive the same anomalies prevailing throughout this group of languages, and affecting both the form and the application of all the particles; the áng suffix, for instance, being at once a genitive and a dative sign in

and kwer, hand, from χειρ, and Klaproth's of Waran rain from باران and Máré from مرد. I shall give numerous Tartar equivalents for all three and thus prove their roots to be respectively Ka, Wa and Ma, the ra, ré and ran being serviles, or rather phases of one servile.

* This remarkable and arbitrary feature of a dual and two plurals I have already detected in the Kuswar, Hayu and Kiranti tongues of the Himálaya and in the Ho, Sontal and Uraon tongues of Tamulian India, I need hardly add that the same peculiarity belongs to the Tagalan and Alforian languages, as well as the Altaic.

a single tongue (sanggé, of thee; manggé, to me, in Ouigúr), and also changing its form entirely in the same case (maning, of me; sanggé, of thee) in that single tongue. Look again beyond the Altaic group and you will see the same anomalies. Every body had noticed them in this or that instance, and I have on this account myself demurred to the use of the pronouns at all as a test of ethnic affinity. I am now aware that I was misled by the authority of great names looking at these particles from a too grammatical point of view. We first make the particles grammatical and then we declare them to be utterly anomalous; the facts being, that they are not strictly or uniformly grammatical, generally speaking, nor perhaps any where so except as the result of Arian influences (Tibetan, Newarese, cultivated Tamulian, and so in Caucasus); and that they obey their own law with perfect uniformity, and equally so when they attach to pronouns as to nouns and to verbs. That they are not strictly grammatical may be shown as well by their inconsistency with any intelligible conception of grammar,* as by the harmonious and simple elucidation they admit of according to their own normą loquendi or mechanism of speech.

Look, for instance, at the following explication of the Mantchu plurals above cited, or Mouse, Souwé and Tését. Mou-sé, we, = I and Thou, thus, Mou is the Ma, Mi, Mo, root for I, obsolete as an ordinary nominative in this tongue, but found as such in most of the cognate series of tongues and forthcoming even in Mantchu in all the oblique cases (Mi-ni; Mi-ninggé; Mi-ndé), Sé, again, is the sá, sé, sí, só, root for Thou; still extant as si in this tongue, as sé in Turki, as sá in Ouigur, Finnic and Esthonian, not to cite more instances from my ample store. Therefore Mousé is beyond dispute a compound of two roots meaning I and Thou. In like manner pre-

* There should be, though there is not, a higher sort of grammar capable of reconciling Tartaric forms of speech with our own, that is, of showing the equivalency of each to the other. In the meanwhile the use of our technical terms in discussing the Tartar tongues is natural, almost inevitable; and at all events I beg earnestly to disclaim all purpose of censure whilst attempting to elucidate. There is much grammar in these tongues, but as I think borrowed and shown to be so, as well by reference to the much larger and unchanged portion of the languages as by the unharmonising character which the grammatical element wears when it exists.

cisely is Sou-wé, ye, a compound of the root above cited for Thou, and of the O, U', root for He; which latter, though obsolete in Mantchu, is extant in Turkí and in Ouigur as O; in Magyar as O'é or wé; in Circassian as úí or wí; in Gáro as ú; in Dhimali, in Gyárúng and in Tunglhu, as wá; in Newari, as wó, &c. &c. Sou-wé ye, is therefore palpably a compound of the roots expressing Thou and He; Só changing to Sou, as Mó to Mou, and O'é to wé; the é moreover being a synonyme of ó, and a phase of the í root, found alike in this very Mantchu tongue and in Circassian; so that the Magyar óé, Circassian úí and Mantchu í, with other instances just cited, lead irresistably to wé = He in Mantchu. Therefore Souwé, ye, is literally Thou and He; as Mousé, wé is literally I and Thou. In like manner the 3rd plural or they, Tését, is undoubtedly a compound of Té = he, and Sé = Thou. The sé root has the tá particle added as a conjunct servile (sé-t,) according to a rule of universal operation in these tongues. Té is extant in Mantchu in the sense of He. It has the rá particle suffixed and harmonised in its vowel to the vowel of the root (téré,) also according to an universal rule governing these particles; and Sé, in the sense of Thou, is likewise extant, as Sí in Mantchu, as Sé in Turki; as Sá in some one of its phases, in short, (Sá, Sé, Sí, Só, Sú) in 20 of these tongues. Therefore Té-sé-t, or They, is, literally, He and Thou; and the whole of the three plurals are constructed upon precisely the same principle thus:

Mou-sé, = we, = I and Thou.
Sou-wé, = ye, = Thou and He.
Té-sé-t, = They, = He and Thou.

In like manner the Mongolian plurals Bi-dá, Tá, and Té-dé-t, might be analysed by means of the Tibetan demonstratives Dí and Dé with their analogues in allied tongues; and shown to be nothing more than reiterate pronouns of the singular number, and also that the Dá Dé, is no more a plural sign than the third phase of this particle or Dou (Dá, Dé, Dí, Dó) is a dative sign though widely as erroneously so regarded (just as De Coros regards the equivalent ra,* particle), wit-

* De Coros, pursuant to his view of the rá particle, as a dative case sign, translates Namgar in one instance and another, to Heaven. Now, Nam is the Sun, and Kha vel gá is place; and that the ra suffix only emphasises the sense of Khá vel Gá may be shown by a familiar pair of Examples. Gár vel Gáro and Takla-khár

ness T sé-do, to the earth, Ko-dá, to the foot, &c., in the Caucasian group, according to Vater. In truth, the Dá particle is in these latter instances a servile, not a radical, as is the sé before given; but apparently neither radical nor servile can be regarded in strictness as a declensional sign, of case or of number. Nor in the great majority of these tongues from Caucasus to Oceanica do these or the other particles* ordinarily fulfil the necessary conditions of such a sign, with the scant and obvious exceptions before noted. The Sá radical and the dá servile are both alike particles and as such subject to the laws regulating particles according to which all their alleged anomalies in either character can be explained, including not only every vocalic change, incident to them in both capacities alike, but also that substitution whereby they interchange functions and the root becomes a servile, or the servile, a root. Thus, for example, the sé particle is undoubtedly a root in the instances cited above; and it is as undoubtedly a servile in the Magar tongue wherein I-sé means this, and O´-sé, that; í and ó being the near and remote demonstratives, with sé as a servile affix, answering exactly to the Georgian S, in í-s, he. Compare Circassian í with Georgian í-s, and the servile and equivalent character of the Sa suffix in these instances drawn from the Magyar and Georgian tongues will be at once apparent, and it will be also perceived how the alleged plural sense is here neither admissible nor possible, though the particle be assuredly the identical one to which in the Mantchu tongue the plural quality is attributed.

In explaining the Mantchu pronouns I have included almost all that need be said of the Circassian 3rd personal singular, or ú í, with its change to t' conjunct, as in t-ab, his father.

If we consider the ú, the I, and the T, as all radicals, we may yet find numerous equivalents for each in that sense; and if, again, we regard the t' as a servile superseding the radical úí, or wí, we may

are the names of two well known places in Nari, Gár meaning *the place* or fort, or head-quarters of its district; and Takla-khár, *the* place, or fort, or Sadr, of Takla. Again the 13th divisions of the spire of a Chaitya are called Chuksum-khár in Tibetan, = triyodas bhuvan in Sanscrit, i. e., *the* 13th mansion.

* The chá suffix in Ma-ch, we, Osetic, is called a plural sign. What is it in Sa-ch, earth? Probably what it is in A-ch, one, Circassian, viz., a servile with the usual differential function.

find abundant instances of such supersession alike among the Caucasian and the Mongolian tongues, as Má, Ma-fa, Fá, fire; Bí, Dí-bi, Dí, skin; Sá, Bá-sá, Bá, Cow; and many more for which I must refer to the forthcoming analysed list of vocables.

With regard to Mongolian equivalents for the radicals U′, I′ and Ta, in the sense of He, the 3rd personal, the subjoined enumeration must suffice at present.

U′, Circassian, = ú in Garo; ú in Sontal; O′ (óé) in Magyar; O′ in Ouigur and Turki; Wó in Newari; Wá in Gyárúng, in Dhimali* and in Tunglhu. I′, Circassian, = I′, in Mantchu; I′ in Sontal; I′, in Burmese, (this); E′, in Magyar (O′é); E′, in Kalmak; E′, in Lazig; I′-s, in Georgian; I′-sé in Magar; I′-tu in Tagalan. Tá Circassian, = Té, in Mongol; Té, in Mantchu; Tá, in Esthonian; Tá, in Chinese; Thá, in Gyami; Thí, in Gurung; Thé, in Murmi; Thú, in Burmese.

If, again, we take the Circassian ú í as one root and word, we have parallels for it in the Magyar óé, similarly taken, and in all the wá roots should we read wí, (w for ú).

With regard to the Gyárúng wa tú, which I have compared with the Circassian ú í changing in composition to tá, it is very important to observe that if wa tú and ú í be considered as compounds of two synonymous roots, according to the above detailed exposition of

* The perfect agreement of the Circassian and Dhimali in regard to the singular of the 3rd personal, ú being he, in both tongues, renders the proximate agreement of the perplexing plural, ú-bert and ú-bal, very interesting. I have tried the analysis in several ways but have not succeeded to my own satisfaction: but I submit the following.

U′-ba-rt = they = he and he; one he being the ú above elucidated, and the other, a synonymous bá, bé, bí, root such as Bí actually is in Bodo: rt, servile; the ra and ta suffixes conjunct.

U′-ba-l = they = he and he, as before. The juxtaposition of the Bodo and Dhimal tribes renders the adoption of the Bí root from Bodo likely in this instance.

It is however a word and root widely diffused and used as a noun and pronoun also. Final l′, servile. ——— The Suanic Al, he; and the Ouigúr and Turki Ol, he and Ol-ar, they, are very suggestive, as also the Turkish and Ouigur Bí, and the Sokpo Bú in Abú, with all the numerous words for man having the Bí root, as Bi-shi, juvenis, alike in Turki and in Bodo. Nominal and pronominal roots are so apt to coincide that I have a long list of coincident roots for Ego = Homo: for instance the Mi root, and Ta root and Sa root, and Ba root.

roots, then that such reiterated pronouns are completely conformable to the genius of these tongues, and as such harmonise perfectly with the preceding exposition of the plurals. These tongues in fact revel in cumulation pronominal and nominal, varying as to the exact applications of the emphasized or reïterated pronouns,* but preserving a general overruling similitude, of which the following instance from a Himálayan and a Caucasian tongue is too singular to be omitted. In Georgian the í root for the 3rd personal singular, or he, becomes by such accretion, gradually augmenting, first í-s, and then, í-ti-ná; and in Magar the same root with the same sense (ille iste) becomes í-sé and í-sé-ná, according as more or less of emphasis and discrimination is needed. Again, the Georgian ti, in iti na, is the Burmese thí, in I'-thi, a word compounded of two synonymes, both meaning this (ille), and conjointly equivalent precisely to iséná as well as itina in Magar and Georgian respectively. Thú, again, means he, the 3rd personal, in Burmese, and this word, which is merely another phase of the thá particle (thá, thí, thú, thó—which last signifies that, and is Tibetan)—brings us back to the Tagalan í-tú and the Gyárúng wa-tú every particle, whether used in a primary or secondary sense, taking the aspirate indifferently (Mé, Mhé, fire; Ni, Nhi, day; ká, khá, sky; et cæt., ad libitum).

Now, if we look again at the Gyárúng wa tú through the medium of the Malayan and Tagalan í tú and the Circassian rí í and tá,—all but the last equally involving a double pronominal root and single sense—we shall see in this identical composition and identical idiomatic use of the 3rd personal pronoun, illustrated on all sides as they are by Altaic, Himálayan and Indo-Chinese equivalents reproducing every form and phase of the roots, a marvellous proof of the affinity of all the tongues. But this is not all, for the Circassian ú and I' commutable to T derives the highest and complete illustration from another and most interesting quarter, to wit the uncultivated Tamulian tongues of India amongst which the Sontal exhibits both ú and I' for the third personal pronoun as well as their com-

* See Mith. voce Turki, I. 467 et seq. and Essay on Koch, Bodo and Dhimal, p. 120, and De Coros' Grammar, p. 65, Crawfurd's Malayan Grammar, Phillips's Sontal Grammar, and Brown's Asam Grammar.

mutation into T* whilst the Gondi has ú (w) similarly commutable. For the proof of these most remarkable co-incidences I refer the student to the works of Phillips and Driberg, merely observing in conclusion that it is but a sample of those analogies derivable from the same interesting quarter which I have already made good progress in the development of, and which when fully exhibited will go far to confirm the conviction that the Tartaric family is one and indivisible from the Caucasus to the Pacific.

The prospect of a reünion of all the Tartars suggests the consideration of a fitting designation for the whole; and, whatever my leaning towards the term Scythian† from veneration for the father of history who first introduced this mighty herd to our view, I prefer upon the whole the more familiar appellation Tartar, 1st, because it has a sense as ample as our present requirement, in which respect it has no advantage over Scythian—2nd, because it has an etymological significance thoroughly indigenous and in the highest degree appropriate, as well with reference to the structure of those tongues by the dissection of which we have come at a knowledge of the whole scope of Tartar affinities, as with regard to that characteristic idiom according to which the name of a tribe is the name of our species. Tá means man in a score of extant tongues; and Tá designates numerous extant tribes stretching from the Altai to the gulf of Siam, whilst the same or equivalent names prevail throughout the Mongolian countries and in Caucasus ;‡ and, lastly, the reiteration whereby

* The transposableness of the particles in these tongues has been already stated, and abundantly proved. With this hint look at the following wonderful sample of analogous structure, t-ab, his father, in Circassian ; apa-t, his father, in Sontal. It is needless almost to add that the word for father is ab in the former tongue ; apa in the latter. Not one of Bopp's celebrated Arian affinities surpasses the above in beauty and interest.

† Essay on Koch, Bodo and Dhimal, Preface, pages 8—9, where the reader may see that seven years ago I had a strong presentiment of what I now hope to demonstrate.

‡ Tshá-ri, Tshé-tshé-nsh, &c. come from the tá and sá roots for man, and are seen in similar combination, being synonymes, in the Chinese and Georgian Tsé meaning man, whereof Tsé-s, is a diminutive. The Chinese call the Tartars indifferently Thá-thá and Thá-tsé, and so do the Newars of Nepal, whilst Ta-i, Ta-i-mó, Ta i-lúng, Ta-i-né, Ta-i-yé, names of tribes from Assam to the Ocean, are

the Tá, or Zenghis' clansmen, came to be called Tá-tá, vel Thá-thá, (men pre-eminently, quasi Allemanni) is a normal sample of one of the chief constructive principles of these tongues. Wherefore I would abide by that medieval designation by which all the races beyond the confines of Europe have been known to Europe in modern times, and which from and after the middle ages superseded the classical term Scythian—a term of as wide import as the other and so far equally fitting, but now laid aside, and never so etymologically just as Tartar, the very r of which word, though carped at by half-informed critics, is in fact thoroughly in accordance with the jus et norma of Tartaric speech, everywhere from Oceanic to the Caucasian region.

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all not only Tá but Tá-tá, since the second syllable is in all a synonyme, and therefore as equivalent as Tshé-tshé and Tá-tá which are reiterations. As instances, familiar to us in India, of a tribe-name signifying also man in the language of that tribe, I may mention, A-nam, Mru, K lun, Ka mi, Ku-mi, Kong, Lau, Mó-n, Mo-i, Bar-ma. These are simple. Mi-shi-mi, Mú-r-mi, &c. are compound. Occasionally, as in Burmese, the root may be obsolete in the human sense; but it will always be found in its derivatives or in the proximate tongues, leaving the principle of gentile nomenclature indisputable. In Misshimi we have the Mi and Shi roots for man, the former, reïterated. In Múrmi we have the Mi root reïterated in different phases (Mú and Mí). In Burma, we have a third phase of the same root (má) with the Bá root and synonyme preceding it; and lest this etymology should startle my readers, I will add that this very word Barma means man in the Magar tongue, that is, in one of those Himálayan tongues whose close affinity to the Burmese language I have lately shown.

On a Geometrical Measurement of the distances from Crest to Crest of the Barometric Waves in a Cyclone.—By HENRY PIDDINGTON, *President of Marine Courts.*

The measurement of the pressure of the Barometric Column, whether arising from changes in its density or from actual variations in its height; such as the fish at the bottom of the sea must experience by the effect of every wave which rolls over them; we have possessed since the days of Torricelli and Pascal, and though, from our ignorance of the definite extent of the atmosphere and other causes, we can only express that pressure or vertical height by a conventional scale, which expression again though depending always on one fact, is different with different nations, we may still be said to have *a* measure, though an imperfect one, of the height of the atmospheric waves: assuming as we always do in using a Barometric measurement that we know and allow for all the causes which influence their density.

That these variations in the Barometric pressure also succeeded each other in the form of waves, at greater or less intervals of time, so as to be traced over large areas, has of late years been well known, and the attention of Meteorologists has been much directed to this research, of which an illustrious professor of science has justly said—"the great extent of country over which the accidental variations of the Barometer take place is one of their most striking features, and in a future and more advanced state of Meteorology, we may be able to draw the most interesting and important conclusions from the great atmospheric tidal waves which are thus perpetually traversing oceans and continents."*

We also knew generally, and from undoubted authority, that the Barometer both on the approach of, and during, Cyclones was subject to very remarkable oscillations, but hitherto we have had no Barometric measurements of their height, and though from their succession in time we of course inferred that their crests were at a certain dis-

* Professor Forbes' Report on Meteorology to British Association in 1832.

tance from each other in space, we had no sort of index as to what that distance might be. In the present paper I have, as will be seen from its title, the pleasure to announce an instance in which, by the aid of Cyclonology, the Barometric waves of a Cyclone during its passage have been, I think, accurately measured, both vertically by the Barometer scale, and horizontally in geographical miles, giving us thus, as in the beautiful instance of the *Charles Heddle's* Cyclone, a new insight into the internal economy of these wonderful and fearful phenomena, and, I hope for Meteorologists in general, a stepping stone of which we can only at present anticipate the advantage from its position and the authenticity of its data.

After a Cyclone from the 2nd to the 5th of May 1851, which raged principally between Trincomalee and Madras, extending to about 85° East Longitude—and which I have named "The *Fox's* Cyclone" from H. M. S. *Fox* having made very bad weather by getting too close in towards the centre before she bore up—I received from my friend Capt. Chas. Biden, Master Attendant at Madras, amongst a large collection of logs and other data some ten-minute readings of the Barometer at the Madras Observatory. This was what I had been long looking and hoping for from some quarter, knowing, as I did, to what it might lead us if a complete short series of Barometric observations in the track or neighbourhood of a Cyclone could be obtained, together with the necessary data for an accurate track of the Cyclone itself; and having written to Captain Biden on the subject, the Hon. Co.'s Astronomer, W. S. Jacobs, Esq. was good enough to furnish me with a complete table of his ten-minute readings extending from 8h. 41′ A. M. on the 2nd May, to 11h. 41′ on the 5th; and from these, combined with the track of the Cyclone which I was fortunately enable to trace very accurately, having no less than twenty-six logs and reports. (See Journal Vol. XXI. p. 283,) the accompanying Diagram which, it will be seen, shows both the vertical height on the Barometric scale, *and the horizontal distance in miles and tenths from Crest to Crest of the Barometric waves in the Cyclone,* has been constructed.

To understand the plate it will be necessary to observe—

1. That, as shewn in the Diagram A. which is from the Chart to the Memoir on this Cyclone, above quoted, omitting

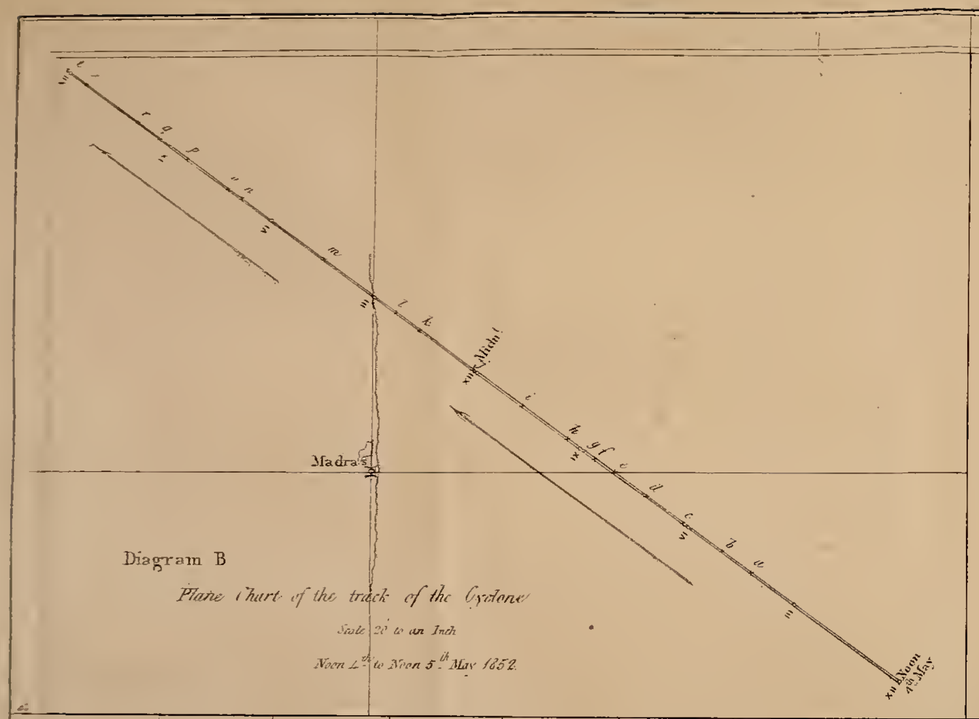


Diagram B

Plane Chart of the track of the Cyclone

Scale 20′ to an Inch

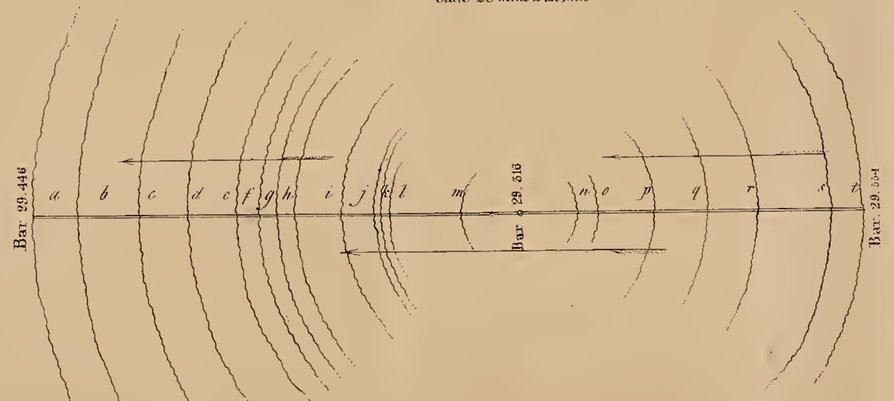
Noon 4th to Noon 5th May 1852.

Diagram D

Birds eye View

of the Barometric Undulations in Diagram C

Scale 25 miles to an Inch



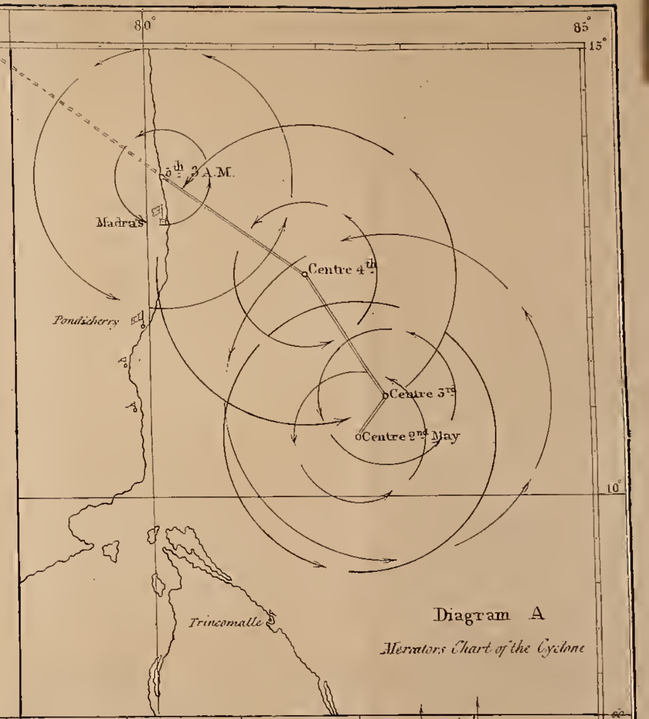
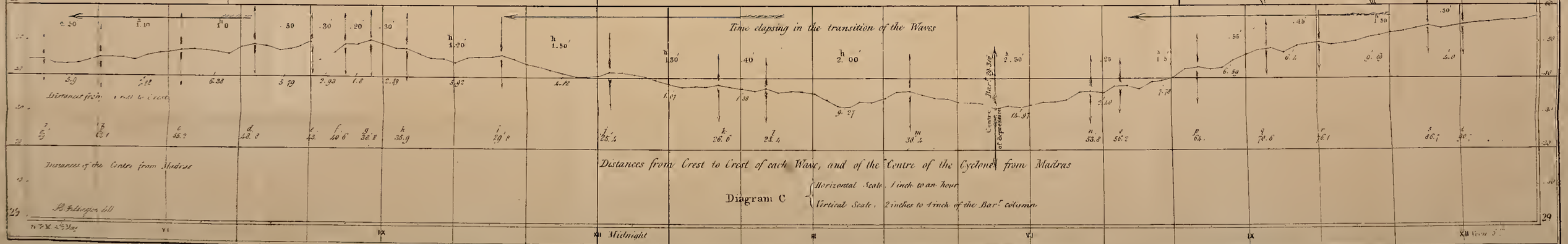


Diagram A

Mercators Chart of the Cyclone



Distances from Crest to Crest of each Wave, and of the Centre of the Cyclone from Madras

Diagram C

Horizontal Scale, 1 inch to an hour

Vertical Scale, 2 inches to 1 inch of the Barr. column

only the ship's tracks, the Cyclone has been accurately tracked for the day between Noon of the 3rd and Noon of the 4th May, and to 3 A. M. of the 5th May, when its centre must have reached the shore about 30 miles to the Northward of Madras. We have unfortunately no inland reports beyond that point, so as to enable us to trace accurately the exact passage of the centre, and we have thus to *assume* that its course and rate of travelling were the same inland as they had been at sea, which I have done in this case —though there is usually some diminution of the rate of travelling on shore—from comparing the veering of the wind, and the rise of the Barometer with its previous fall.

2. That from the known extent of the Cyclone, as well as by the indications of the Barometer and Anemometer, the true wind-circles of the Cyclone do not appear to have reached Madras before 4h. 11′ P. M. of the 4th, from which time the readings are projected on the Diagram C. The greatest depression of the Barometer was 29.316 occurring at 5h. 36′ A. M. of the 5th May, when the centre of the Cyclone bore about No. 21° 30′ West, distant 47 miles from the Madras Observatory.

3. The course of the Cyclone at sea being accurately known, and consequently the distances of its centre from Madras at any given time, those distances are noted in Diagram C. at the different hours at which the various waves passed the Observatory. These distances are also marked on Diagram B. which is a Plane Chart enlarged from A. A is a copy of the Mercator's Chart to the Memoir on this Cyclone in which the ships tracks are omitted.

4. As the Cyclone did not advance directly towards Madras but passed to the N. East of it, each of the successive undulations shewn by the projection must have passed the Zenith of the Observatory at a different angle; so that the simple distance from Crest to Crest as shown by the advancing centre of the Cyclone would not be a direct transverse measurement at right angles to their course, but one more or less diagonal. The correction for this, which varies, as the sines of the angles, has been duly calculated, and the distances in the column of corrected distances are the true transverse ones.

5. A very steep wave will be remarked at *e—f* (or 8 P. M. of the 4th May). This seems exactly analogous to the steep, and sudden

roller-like sea waves which I have noticed at p. 360 of my Horn Book as the *resultant* wave of an advancing or passing Cyclone.*

6. The centre of the Cyclone at Noon on the 4th May bore S. 70° East, 102 miles from Madras, and its course and distance to 3 A. M. of the 5th, or for 15 hours when it bore North of Madras was No. 55° West 114 miles, and the various distances given in the Table No. II. are those measured on the Plane Chart on which the positions of the centre at the times of the passage of the Crests of the waves are laid down. The distances from crest to crest of the undulations, and those from the flag-staff of Madras are the actual ones as measured at each successive interval on the Plane Chart, and for each of these again the correction above indicated has been calculated and applied.

7. The Cyclone was coming up from the S. E. b. E. or from the right to the left of the page, but the hours are naturally read from left to right. It will not then be forgotten that, according to the direction of the arrows, *a* is the advancing front of the Cyclone, and that the whole passage here shown is that of 19 hours 50 minutes or from 4.11 P. M. of the 4th to 24h. 1′ of the 4th—5th May.

8. But of this it should be borne in mind that we have really but 10h. 10′ of actual measurement of the Cyclone's track at sea, and that we have *assumed* its inland course and rate to have been the same, as above stated.

9. The Diagram D represents a Bird's-eye view of the whole of the undulations of the Cyclone, as we may conceive them, or waves analogous to them, to have existed at the time when the first of them *a* reached Madras, or when the centre passed the Meridian of that place. The regularity on the van or advancing portion of the Cyclone with the exception of *g* and *h*, and the grouping of the waves by twos and threes, as they felt the effect of the land (the Pulicat hills) are very remarkable.

10. The mean result of *the whole* of the measurements is as follows, i. e. that—

The mean Time of Transition of each wave is 1h. 7′.

* Our analogies must necessarily be drawn from what we know of the motions of waves in fluids, since we have assumed that the Barometric variations are waves of some kind. Of what medium we know not.

The mean distance in geographical miles from crest to crest of each wave is 5.91 miles.

But if we take only the means of the ten hours and ten minutes for which we have the actual track measured at sea, the means will then stand as follows:

Mean time of Transition of each wave 1h. 1′.

Mean distance from crest to crest of each wave 4.62 miles.

We may thus for the present say that—

1. In a Cyclone of average violence (for this was by no means an excessively violent one) travelling at the rate of 182.4 miles in 24h., or 7.6 miles per hour, there is a succession of aerial undulations affecting the Barometer to the average extent of 0.020 per hour of pressure, these being + or — according to the position of the centre, and the curve of the undulation as shewn in the Diagram.

2. That these variations of pressure occur at average intervals of 1h. 4′, and that their crests are at a horizontal distance of about 5 miles from each other; the greatest horizontal distance being at 14.97 miles, and at the centre of the Cyclone, and the least at 1′.07 miles.

As an Appendix to this paper, and because, however carefully the original drawings are made, we cannot in India have them accurately lithographed, and the unequal stretching and drying of the paper again always deranges the most exact work in the printing. I give here

Table I. The Madras observations complete, as sent to me, for the time included in the Diagram C, i. e. from 4 P. M. on the 4th May to 1 A. M. on the 5th May, 1851, as being those from which the projection is made.

Table II. (2) The separate times at which the various undulations passed over Madras, with (3) the intervals of these times. (4) The heights the Barometer, and (5) their variations. (6) The distances of the centre from Madras at these times; (7) its bearing (8) the angles of variation of bearings. (9) Distance, and (10) the corrected distance in geographical miles from crest to crest of each aerial wave of the Cyclone.

TABLE I.—*The Madras Observations for the time included in Diagram C.*

Sunday 4th May, 1851.					Sunday 4th May, 1851.					Monday 5th May, 1851.				
Time.	Barometer.		Wind.		Time.	Barometer.		Wind.		Time.	Barometer.		Wind.	
	Height	Ther.	Azimuth.	For.		Height.	Ther.	Azimuth.	Force.		Height.	Ther.	Azimuth.	Force.
P. M.					P. M.					A. M.				
4. 11	29.446	80.0	0		9. 31	29.464	80.0	326		2. 41	29.362	79.5	W. N. W. 292	
21	.432		0		41	.454	79.5	326		51	.362		W. N. W. 292	
31	.432		0	2.6	51	.458		326		3. 1	.358		W. by N. 281	2.8
41	.434	80.5	0		10. 1	.454		N. N. W. 337	1.2	11	.340		W. 270	
51	.442		0		11	.458		337		21	.320		W. 270	
5. 1	.452		0	0.8	21	.458		337		31	.323		270	
11	.452		0		31	.460		N. W. by N. 326		41	.336	79.5	270	
21	.452		0	2.5	41	.464	79.0	326		51	.330		270	
31	.446		0		51	.454		326		4. 1	.346		270	6.5
41	.458	80.0	0		11. 1	.440		326	3.0	11	.364		270	
51	.464		0		11	.432		N. W. 315		21	.367		270	
6. 1	.462		0	1.0	21	.424		315		31	.358		270	7.8
11	.470		0		31	414		315		41	.347	80.0	W. by S. 259	
21	.470		0		41	.406	79.5	315		51	.347		0	
31	.470		N. by W. 349		51	.402		315		5. 1	.332		0	8.0
41	.466	80.5	349		A. M.	Monday 5th May, 1851.				6	.328		0	
51	.462		N. N. W. 337		0. 1	.402		315	3.0	11	.332		0	
7. 1	.480		N. W. by W. 326	1.3	11	.420		315		16	.339		0	
11	.484		326		21	.417		N. W. by W. 304		21	.330		0	
21	.480		N. N. W 337		31	.412		304		26	.324		0	
31	.478		337		41	.400	79.5	304		31	.318		0	16.0
41	.476	80.5	337		51	.395		304		36	.316		0	15.6
51	.481		337		1. 1	.388		N. W. 315	2.7	41	.322	79.5	0	
8. 1	.492		N. by W. 349	2.3	11	.378		315		46	.324		0	
11	.440		N. N. W. 337		21	.379		315		51	.320		0	
21	.468		337		31	.377		315		56	.323		0	
31	.492		N. W. by N. 326		41	.380	79.5	315		6. 1	.328		0	11.0
41	.490	80.0	326		51	.377		315		6	.328		0	
51	.499		326		2. 1	.370		N. W. by W. 304	2.5	11	.332		0	
9. 1	.492		326	2.2	11	.366		304		21	.338		0	12.8
11	.480		326		21	.370		304		31	.342		W. S. W. 247	
21	.480		326		31	.365		304		41	.362	79.0	247	

Monday 5th May, 1851.

Time.		Barometer.		Wind.	
		Height.	Thermometer.	Azimuth.	Force.
A.	M.				
6.	51	29.365		247	
7.	1	.360		247	15.4
	11	.380		247	
	21	.380		S. W. by W. 236	
	31	.372		236	
	41	.392	78.0	236	
	51	.394		S. W. 225	
8.	1	.398		225	9.8
	11	.426		225	
	21	.430		225	
	31	.424		S. W. by S. 214	
	41	.432	77.2	214	
	51	.452		214	
9.	1	.466		S. W. by S. 214	6.6
	11	.481		214	
	21	.482		214	
	31	.476		214	
	41	.493	76.5	214	
	51	.498		214	
10.	1	.502		214	5.8
	11	.498		214	
	21	.502		214	
	31	.508		214	
	41	.518	77.5	214	
	51	.520		214	
11.	1	.526		214	4.4
	11	.532		214	
	21	.542		214	
	31	.547		214	
	41	.540	78.6	214	
	51	.540		214	
P.	M.				
0.	1	.554		214	3.2
	11	.554		214	
	21	.556		214	
	31	.558		S. S. W. 202	
	41	.560	78.5	202	
	51	.558		202	
1.	1	.552		202	2.4
	11	.550		202	
	21	.554		202	
	31	.554		202	

Table II.

Table of Times, Barometrical Variations, Distances of the Centre from Madras, Angles of Bearing, and Distances and corrected Distances from Crest to Crest of each Wave of the Cyclone.

1	2	3	4	5	6	7	8	9	10
References.	Time of passage over Madras.	Intervals of Time.	Height of Barometer 4th May.	Variation of Barometer.	Distance from Madras Miles.	Bearing from Madras.	Angles of Variation.	Distance from Crest to Crest of Waves Miles.	Corrected Distance Miles.
a	h. 4.11 P. M.		29.446		69.0	S. 75.45 E.	°	5.9	5.9
		h. 0.50		+ .006			2.25		
b	5.1		.452		63.1	78.10		7.88	7.88
		1.10		+ .018			3.50		
c	6.11		.470		55.2	82.00		6.4	6.38
		1.00		+ .014			4.00		
d	7.11		.484		48.8	S. 86.00 E.		5.8	5 79
		0.50		+ .008			3.30		
e	8.1		.492		43.0	N. 89.30 E.		2.94	2.93
		0.30		.000			3.15		
f	8.31		.492		40.6	86.15		1.80	1.80
		0.20		+ .007			1.45		
g	8.51		.499		38.8	84.30		2.9	2.80
		0.30		— .019			4.00		
h	9.21		.480		35.9	80.30		6.1	5.92
		1.20		— .016			14.00		
i	10.41		.464		29.8	66.30		4.40	4.12
		1.30		— .044			21.00		
j	12.11		.420		25.4	45.30		1.20	1.07
		1.30		— .040			26 30		
k	1.41A M		.380		26 6	19.00		1.40	1.38
		0.40		— .010			9.00		
l	2.21		.370		28.4	N. 10.00 E.		10.00	9.27
		2.00		— .003			23.00		
m	4.21		.367		38.4	N. 13.00 W.		15.40	14.97
		2.30		— .002			13.45		
n	6.51		.365		53.8	26.45		2.4	2.40
		0.25		+ .015			1.15		
o	7.16		.380		56.2	28.00		7.8	7.78
		1,5		+ .050			3.45		
p	8.21		.430		64.0	31.45		6.6	6.59
		0.55		+ .051			2.15		
q	9.15		.481		70.6	34.00		6.4	6.4
		0.45		+ .021			1.00		
r	10.1		.502		76.1	35.00		9.7	9.69
		1.30		+ .045			3.00		
s	11.31		.547		86.7	38.00		4.0	4.00
		0.30		+ .007			1.00		
t	12.1		.554		90.7	N. 39.00 W.			

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL,

For January, 1853.

The Annual General Meeting of the Society adjourned under Bye-Law 59 was held on the 19th January 1853, in the Society's Museum at half-past 8 P. M.

Sir James Colvile, Kt. President, in the chair.

The proceedings of the December meeting having been read and confirmed, the Secretary read the following Report.

REPORT.

In laying on the table the accounts for the past year, the Council have the pleasure to call attention to the generally improving character of the state of the Society's affairs.

The Annual Report for 1851 held out the prospect of the Society's finances being re-established on a healthy footing in the course of the year just elapsed, and this prospect has been quite realized, as the accounts now on the table will show.

The Society has lost 2 members by death and 4 by withdrawal during the year. Mr. W. Mackintosh died in England, and the loss of Mr. H. W. Torrens in August last was the occasion of a resolution which will be fresh in the recollection of all present.

The list moreover of Honorary Members has lost the name of a distinguished scholar, that of Eugène Burnouf.

The accessions during the year have however been more numerous than the losses, 10 new members have been elected, so that the Society now numbers 139 members, of whom 17 only are absent from India.

The gross Receipts and Disbursements of the Society in the course of the year were as follows :—

Receipts.					Disbursements.		
Contributions, ...	6,764	12	0				
Library including Society's Oriental and other publications, ...	1,652	11	0		2,892	14	4
Journal, ...	1,074	4	0		4,052	1	6
Museum including Government Grants, ...	7,369	1	0		7,905	3	3
Building,.....	0	0	0		296	12	0
Secretary's Office, ...	2	1	0		1,778	4	9
Deposits,.....	130	0	0		72	8	0
Miscellaneous, ...	34	5	6		762	9	0
Total,...	17,027	2	6		17,760	4	10
Balance of 1851,.....	3,481	9	1	Cash in hand including bal. in London Agent's hand.			
	20,508	11	7		3,538	14	7
In hands of London Agent £101-8 or at 2*s*.	1,017	13	4	Ineff. Bal.	227	5	6
	21,526	8	11		21,526	8	11

This Statement is intended to show the whole income and expenditure including the Government Grants, but the heads are so arranged as to distinguish the Society's own resources and the charges which they were required to meet.

The outstandings continue large, amounting to Rs. 14,092-6-9, and the Finance Committee have not yet succeeded in determining the character of all the items with sufficient precision to enable them to remove from the accounts what is irrecoverable. It is believed, however, that not more than Rs. 4,500 of this sum will have to be given up; a very large proportion consists of current contributions which are certain of realization during the next quarter.

The liabilities amount only to Rs. 3,384-1-10. This estimate provides for the payment of Book-sellers and Printer's Bills, and every contingent charge for the year which may yet be due. The amount, it will be seen, falls short of the Cash balance now in hand.

The Council think therefore there is room to congratulate the Society on its having recovered altogether from the remaining embarrassments which were noticed in the Annual Report for 1851.

The average monthly expenditure of the past year has exceeded the average monthly income by 62 Rs. being 868 Rs. against 806 Rs., but the detailed accounts will show that the whole cost of printing the 7 Nos. of the Journal for 1851, (A.) the balance of the printer's bill for Mr. Blyth's Bird Catalogue, (B.) and the removal from the list of the Society's liabilities of heavy items (C.) due to the late Mr. Torrens and other members, are among the charges; deducting the aggregate of these as by marginal Memo. the legitimate charges of the year will not exhibit a higher monthly average than 578 Rs.

A. say 1400 out of the 1961 Rs.		
B.	971	1
C.	774	0
	222	8
	45	12
	64	0
	3,477	5

The Council think that the following may be taken as a fair estimate of the probable income and expenditure of the ensuing year.

INCOME.

Contributions from 118 resident Members, ...	7,552	0	0
Government Grants,.....	7,368	0	0
Journal, 80 Subscribers and Miscellaneous sale, ...	1,100	0	0
Library and Sale of Society's publications,.....	1,600	0	0
	16,620	0	0

EXPENDITURE.

General Establishment including Secretary's Office,...	1,470	0	0
Museum Establishment and Contingencies, ...	7,920	0	0
Journal, say 8 Nos.,.....	1,700	0	0
Library, ...	2,236	0	0
Miscellaneous, including Building, &c.	1,200	0	0
	14,526	0	0

The income from the Sale of Oriental publications is here perhaps under-rated. The gradual improvement of this branch of the Society's resources will be best seen from the following memo.

Sales in	1843	696	8	0
„	1844	224	4	9
„	1845	1,047	7	3
„	1846	777	7	3
„	1847	917	8	0

„	1848	.....	1,077	10	6
„	1849	.....	1,042	3	3
„	1850	.....	1,097	14	5
„	1851	.....	1,339	6	6
„	1852	.....	1,791	8	0

It should be remembered that the Stock on hand from which these supplies are derived is considerable, being valued at Rs. 17,242, exclusive of the Stock of Bibliotheca Indica, which may at its present selling price be estimated at Rs. 14,469.

Library.

The number of books added to the Library during the year 1852, amounts to 219 volumes. Of these 43 volumes, including Johnston's Physical Atlas, Layard's Remains of Nineveh, Fergusson's Illustrations of Indian Architecture, Ghasaley's Ohia ul Alum (MS.) and several other valuable works have been purchased at a cost of nearly 800 Rs., the remaining 176 volumes are donations from authors and learned Societies, and include works also of considerable value.

A new Catalogue of the Library is nearly ready, and will, it is believed, be sent to the press by the middle of February next.

The estimate of the current year's expenditure above given provides for additional purchases of books to the amount of Rs. 1000.

Museum.

Several valuable additions have been made to this Department during the year now closing.

The coin cabinet has been re-arranged, many of the silver and gold coins having been accurately labelled during the short stay in Calcutta of Mr. E. Thomas, who kindly offered his assistance. A classified catalogue of the coins is in progress and will be, it is hoped, soon completed.

The Council have again to record their satisfaction with the two Curators and with the Librarian, whose best attention has throughout been given to their respective Departments.

Secretary's Office.

The arrears of accounts and other business in this Department have been brought up by means of extra assistance.

Oriental Fund.

The Bibliotheca Indica has received an accession of eight new numbers. Six of these contain Sanscrit texts and Translations (1), and of the remaining two Numbers, one is in Arabic (2) and the other Persian (3). It was proposed also to print the History of Animals by Damyry, but though six copies of the work had been obtained from various quarters, it was found on comparing them and correcting the text that none was sufficiently correct to enable the editor to proceed with the labour.

The prospect of the Bibliotheca for this year are encouraging. Two new contributors, Dr. Ballantyne and Mr. Hall of Benares, are engaged in editing, for this work, the Sáñkhya Pravachana Bháshya, and their recent proposal to edit the Sutras of all the six Darsanas is now under consideration.

In addition to the books of which parts have been printed, a new work of great importance would have been commenced two months ago, had not the Printer's hands been already fully occupied; this work is an Arabic Dictionary of the technical terms used in various sciences. It is as large as the Kámus, and it is intended to print it in the same form.

Two works, moreover, the Chaitanya-chandrodaya Nátaka and an English translation of the Chhándogya Upanishad of the Sáma Veda, are being edited by the Society's Librarian, Bábu Rájendralál Mittra, and others are in progress under the auspices of Drs. Roer and Ballantyne. In short, the coming year's income added to the amount, viz. Rs. 9,513-10-10, now at credit of the Oriental Fund, will be insufficient to meet the charges for the undertakings already on foot.

(1) Dr. Röer has edited Naishada Charita text, Fas. 2, 3 and 4, Brihad Aranyaka Upanishad, English Translation, Fas. 2; Several Upanishads, English Translations, Fas. 1; and Sahitya Darpana, text Fas. 2. Dr. Ballantyne has edited an English Translation of the last mentioned Number.

(2) Soyúty Itqánfy, fy 'olúm al-Qoran, edited by Mowlawies Basheerooddeen and Noorool Haqq, Fas. 1.

(3) Sikandar-namah, edited by Dr. A. Sprenger and Agha Mohammad Shooshtaree, Fas. 1.

The liabilities of the Fund may be classified as follows :—

Due for works published altogether or in part, ...Rs.	8,890	0	0
Probable cost of work now in the Press,.....	3,600	0	0
Ditto ditto in progress of editing for publication,.....	5,880	0	0
Total Rs.	18,370	0	0

The Report having been read, it was proposed by Mr. Woodrow and seconded by Babu Gyanendro Mohun Tagore, that it be received and adopted, and the proposal being put to the vote was carried unanimously.

The meeting then proceeded to the election of office-bearers for the current year, and appointed Mr. Woodrow and Babu Gyanendro Mohun Tagore scrutineers, who after examining the lists declared the following to be the result of the Ballot.

PRESIDENT.

Sir James W. Colvile, Kt.

VICE PRESIDENTS.

W. B. Jackson, Esq.
J. R. Colvin, Esq.
Babu Ramgopal Ghose.

COUNCIL.

C. Allen, Esq.
Dr. H. Falconer.
C. Beadon, Esq.
Major W. E. Baker.
Captain H. E. L. Thuillier.
Rev. W. Kay.
Major J. S. Banks.
H. Woodrow, Esq.
H. Walker, Esq.

SECRETARIES.

Dr. A. Sprenger.
A. Grote, Esq.

Read and confirmed,
2nd February, 1853. (Signed) J. W. COLVILE.

ABSTRACT STATEMENT

OF

RECEIPTS AND DISBURSEMENTS

OF THE

ASIATIC SOCIETY,

FOR

THE YEAR, 1852.

Dr. *Abstract Statement of Receipts and Disbursements of the*

1852.	RECEIPTS.						
	To Museum.						
	Received from the General Treasury, amount of Government allowance authorized by the Court of Directors for the services of a Curator, from December, 1851, to November, 1852, at 250 Rs. per mensem, ...	3,000	0	0			
	Ditto for the preparation of Specimens of Natural History, from ditto ditto, at 50 Rs. per mensem, ...	600	0	0			
					3,600	0	0
	To Museum of Economic Geology.						
	Received from the General Treasury, amount of allowance authorized by the Court of Directors for the services of a Joint Curator, from December, 1851, to November, 1852, being 12 months, at 250 Rs. per mensem,..	3,000	0	0			
	Ditto ditto for Establishment and Contingencies, from ditto to ditto, at 64 Rs. per mensem,	768	0	0			
	Ditto from Issurchunder Mistry's salary for 4 days, his services not having been entertained for that period in the month of September,..	1	1	0			
					3,769	1	0
	To Contribution and Admission Fees.						
	Received from the Members, amount of quarterly Contributions, ...	6,373	1	3			
	Ditto ditto admission Fees, ...	384	0	0			
	Ditto ditto in advance, ...	7	10	9			
					6,764	12	0
	To Library, including Sales of Oriental Publications.						
	Received from Babu Rajendralal Mittra, Librarian and Assistant Secretary, by sale of Miscellaneous Books from January to December, 1852, ...	1,310	11	0			
	Ditto from Major M. Kittoe, per sale of Books, at Benares, ...	308	0	0			
	Ditto by sale of Bibliotheca Indica, sold at the Library, including Subscription to ditto, ..	34	0	0			
					1,652	11	0
	To Journal.						
	Received by sale of the Society's Journal, and Subscription to ditto from January to December, 1852, ...				1,074	4	0
				Carried over,..	16,860	12	0

Asiatic Society, from the 1st of Jan. to 31st of Dec. 1852. Cr.

1852. DISBURSEMENTS.						
By Museum.						
Paid Mr. Blyth's Salary as Curator, from December, 1851, to November, 1852, being 12 months, at 250 Rs. per mensem, ...	3,000	0	0			
Ditto for house-rent from ditto to ditto at 40 Rs. a month,..	480	0	0			
Ditto Establishment at 45 Rs. per mensem, ..	540	0	0			
Ditto Freight, ...	17	0	0			
Ditto Charges for repairing a thatched roof of the Taxidermist's Room,..	4	8	6			
Ditto Contingencies for preparing specimens of Natural History up to September, including extra allowance for fixing in position the jaw-bones of a whale, ...	219	0	3			
				4,260	8	9
By Museum of Economic Geology.						
Paid Mr. H. Piddington's Salary as Joint Curator, from December, 1851, to November, 1852, being 12 months, at 250 Rs. per mensem, ..	3,000	0	0			
Ditto Establishment from ditto to ditto at 35 Rs. per mensem, ...	420	0	0			
Ditto Rev. J. Thomas for printing 50 copies of "Papers, being Geological, Mineralogical and Analysis,"	1	8	0			
Ditto Contingencies, ...	220	13	9			
				3,642	5	9
By Museum of Mineralogy and Geology.						
Paid Mr. H. Piddington, Curator, for Sundry Contingencies, ...				2	4	9
By Library.						
Paid Babu Rajendralal Mittra's Salary from December, 1851, to November, 1852, at 70 Rs. per month, ...	840	0	0			
Ditto Establishment, at 8 per ditto, ..	96	0	0			
Ditto Contingencies and Stationery, &c. ..	71	4	9			
Ditto for binding Books and Varnishing Maps,	289	14	0			
Ditto for Purchase of Books, ...	536	1	0			
Ditto Freight for books received from Europe and for despatch of ditto to ditto, ..	42	0	0			
Ditto for Extra Writer for copying the Catalogue, ...	31	2	1			
Ditto for Book-shelves, ...	6	0	0			
Ditto for printing 200 copies, Catalogue of Birds, including binding-charges, ..	971	1	0			
Ditto to the Registrar of the Government Boat-Office, Freight for sundry cases of books despatched to Benares, .. .	12	7	6			
				2,895	14	4
Carried over,..				10,801	1	7

	Brought forward, Co.'s Rs.			16,860	12	0
To Miscellaneous.						
Received from Capt. Thuillier, amount proceeds of old furniture sold to him from the Library, ...	16	0	0			
Ditto from the Government of India, the amount of charges incurred in packing and shipping sundry sculptures, ...	16	4	6			
Ditto from Babu Rajendralal Mittra, Librarian, freight and postage on account of him,	2	1	0			
				34	5	6
To Deposit.						
Received from B. H. Hodgson, Esq. on account of printing Gally-slips of his articles on Mongolian Vocabularies, ...	100	0	0			
Ditto from Lieut. Raverty, on account of transcribing Pushtu MSS. for him,.. ..	30	0	0			
				130	0	0
To Secretary's Office.						
Received (by transfer) Postage paid on 31st August, 1852, on account of Babu Rajendralal Mittra and charged under this head, ..			..	2	1	0
Carried over,..				17,027	2	6

				Brought forward, Co.'s Rs.	10,801	1 7
By Journal.						
Paid Rev. J. Thomas, Printer of the Baptist Mission Press, for printing Journal, No. I. of 1851 to No. III. of 1852, ...				1,961 0 0		
Paid Sundry Draftsmen, Engravers and Lithographers for drawing, engraving, lithographing and colouring plates for Journal, ..				519 5 6		
Ditto ditto for extra copies and paper for plates,				669 14 6		
Ditto Agent of P. and O. S. Navigation Co. freight for despatching the Journal to Europe, ...				90 1 0		
Ditto Contingencies, ...				37 12 6		
Ditto H. Torrens, Esq., Balance of Account for the purchase of a stock of old Journals, ..				774 0 0		
					4,052	1 6
By Building.						
Paid Rohim Mistry for repairing a closet and spreading khoah on the Society's compound,				36 6 0		
Ditto Ramdhone Mistry for repairing a window,				7 0 0		
Ditto Glazier for supplying glass for window-frames, ...				17 2 0		
Ditto R. C. Ghose, Collector of Assessment, assessment for the premises of the Asiatic Society, from August, 1851 to September, 1852,				236 4 0		
					296	12 0
By Secretary's Office.						
Paid General Establishment from December, 1851, to November, 1852, at Rs. 86-8 per mensem,				1,038 0 0		
Ditto Establishment from December, 1851, to November, 1852, at 42 Rs. per mensem, ..				504 0 0		
Ditto Stationery, &c, ...				70 12 0		
Ditto Postage, ...				84 4 0		
Ditto Petty Charges, ...				21 4 6		
Ditto Extra Writer, ...				42 10 9		
Ditto Contingencies, ...				14 5 6		
					1,775	4 9
By Deposits.						
Paid Rev. J. Thomas, Printer of the Baptist Mission Press, for composing and setting up Mr. B. H. Hodgson's article, Nos. 1, 2, 3,	51 12 0					
Ditto ditto for lithographing and drawing a Monk's head, ..	12 12 0					
Ditto ditto by transfer for a copy of Bird Catalogue, sold to him, ..	4 0 0					
				68 8 0		
Ditto on account of Lieut. Raverty, for a ream of French Foolscap for copying Pushtu Books,				4 0 0		
					72	8 0
				Carried over,..	16,997	11 10

Brought forward, Co.'s Rs.	17,027	2	6
To BALANCE.			
As per Account closed on the 31st December, 1852, ..	3,481	9	1
Company's Rupees,..	20,508	11	7

Errors and

Calcutta, Asiatic Society, the 1st Jan., 1853.

Examined and found correct.

A. J. M. MILLS,
A. GROTE. } *Members of the Finance Committee.*

Brought forward, Co.'s Rs,				16,997	11	10
By Miscellaneous.						
Paid charges for packing and shipping 10 boxes of sculpture, ...	16	4	6			
Ditto for Advertising Meeting of the Society,	45	8	0			
Ditto Mr. J. Chaunce for winding the clock of the Society, ...	25	0	0			
Ditto Sundry Contingent charges for Meeting, and oil for night-guard, ...	141	15	6			
Ditto tinman for a pair of Gate Lamps, &c. ..	8	8	0			
Ditto Rev. J. Thomas, for printing the Bye-laws of the Society on two different occasions, ..	180	0	0			
Ditto ditto for printing a Financial Report, ..	27	0	0			
Ditto Babu Rajendra Lall Mittra, postage and freight, for letters and parcels on his account on the 31st August, 1852, ...	2	1	0			
Ditto Sir James Colvile (by transfer) in part payment of the sum advanced by him on account of his contribution,..	64	0	0			
Ditto ditto by ditto, as a loan, ...	158	8	0			
Ditto J. Muir. Esq. (by transfer) balance of his account, ...	45	12	0			
Ditto H. Torrens, Esq. (by transfer) on account, ...	48	0	0			
				762	9	0
By Balance.						
In the Bank of Bengal, ...	2,432	12	0			
Cash in hand, ...	88	5	3			
				2,521	1	3
By Inefficient Balance.						
Paid freight on a case of books despatched to Allahabad, per Goomtee on account of R. N. Cust, Esq.	1	8	0			
Ditto ditto on account of H. Templeton, Esq.	1	8	0			
Balance on account of sundry advances, ..	224	5	6			
				227	5	6
Company's Rupees,..				20,508	11	7

Omissions Excepted.

Ishanchandra Mazumdar,
Accountant.

Dr. *The Oriental Publication Fund in*

January 8th, 1852.—To Cash paid Establishment for the Custody of Oriental works for December last, ... Rs.	42	0	0			
Ditto 22nd, Ditto Babu Isser Chunder Sarmana, Pundit for Babu Rajendra Lall Mittra, Lib., his salary for December last, ...	20	0	0			
Ditto ditto, Babu Rajendra Lall Mittra, Lib., Contingencies for December last,.....	0	8	6			
Ditto 30th, ditto Rev. K. M. Banerjea, Subscription for 200 copies of the Purana Sangraha No. 1 per Bill, ...	200	0	0			
Ditto ditto, Dr. E. Roer, Editor of the Bibliotheca Indica, his salary for Dec. last, ...	100	0	0			
Ditto ditto ditto Establishment for ditto, ...	35	0	0			
Ditto ditto ditto Contingencies for ditto, ...	22	10	0			
				420	2	6
February 5th, ditto Establishment for the custody of the Oriental works for Jan. last, ..	42	0	0			
Ditto ditto, ditto Babu R. L. Mittra, Lib., Contingencies for January last, ...	1	0	0			
Ditto 9th, ditto Dr. E. Roer, Editor of the Bibliotheca Indica, his salary for Jan. last, ...	100	0	0			
Ditto ditto, ditto Establishment for ditto, ...	35	0	0			
Ditto ditto, ditto Contingencies for ditto, ...	35	2	0			
				213	2	0
March 3rd, ditto Establishment for the custody of the Oriental works for Feb. last, ..	42	0	0			
Ditto ditto, ditto Babu Rajendra Lall Mittra, Lib., Contingencies for February last,.....	1	0	0			
Ditto 5th, ditto Dr. E. Roer, Editor of the Bibliotheca Indica, his salary for Feb. last,....	100	0	0			
Ditto ditto, ditto Establishment for ditto, ...	35	0	0			
Ditto ditto, ditto Contingencies for ditto,.....	22	7	6			
				200	7	6
April 1st, ditto Establishment for the custody of the Oriental works for March last,.....	42	0	0			
Ditto 5th, ditto Shama Charana Sarmana for Sanscrita MSS., ...	45	0	0			
Ditto 6th, ditto Dr. E. Roer, his salary for March last, ...	100	0	0			
Ditto ditto, ditto Establishment for ditto, ...	35	0	0			
Ditto ditto, ditto Contingencies for ditto, ...	37	0	0			
				259	6	0
May 8th, ditto Establishment for the custody of the Oriental works for April last,.....	42	0	0			
Ditto 11th, ditto for binding Oriental works, per Bill, ...	24	0	0			
Ditto ditto, ditto for copying Persian and Arabic MSS. for publication in the Bibliotheca Indica, ...	30	10	6			
	96	10	6			
Carried over,...				1,093	2	0

Account Current with the Asiatic Society. *Cr.*

Jan. 1st, 1852.—By Balance of Account closed and published down to the 31st Dec. 1851,..						
Company's Papers of the new 5 per cent. Loans deposited with the Government Agent, ...	5,500	0	0			
Ditto ditto, Cash in the Bank of Bengal, ...	1,272	8	3			
Ditto ditto, ditto in hand,.....	36	4	9			
				6,808	13	0
Ditto 21st ditto, By amount received from the General Treasury, being the monthly grant sanctioned by the Court of Directors for the month of December, 1851,.....	500	0	0			
Feb. 21st ditto, ditto ditto for Jan. 1852 last,	500	0	0			
March 19th ditto, ditto ditto for Feb. last,....	500	0	0			
April 23rd ditto, ditto ditto for March last, ..	500	0	0			
May 1st ditto, ditto ditto for April last,.....	500	0	0			
June 22nd ditto, ditto ditto for May last, ...	500	0	0			
July 1st ditto, ditto ditto for June last, ...	500	0	0			
Ditto ditto received from Society's Cash on account of Cash short, ...	1	15	9			
Augt. 25th ditto, ditto ditto for July last, ...	500	0	0			
Sept. 22nd ditto, ditto ditto for Augt. last,....	500	0	0			
Oct. 22d ditto, ditto ditto for Sept. last,.....	500	0	0			
Ditto 16th ditto, received from Asiatic Society's Cash on account of Cash short,.....	0	2	3			
Nov. 18th ditto, ditto ditto for Oct. last, ...	500	0	0			
Ditto 30th ditto, Received from Asiatic Society's Cash on account of Cash short, ...	7	12	3			
Dec. 22nd ditto, ditto ditto for Nov. last, ...	500	0	0			
				6,009	14	

Carried over, 12,818 11 3

Brought forward, Co.'s Rs.				1,093	2	0
	96	10	6			
May 11th, 1852.—To Cash paid Dr. E. Roer, his salary for April last,	100	0	0			
Ditto ditto, ditto Establishment for ditto,	35	0	0			
Ditto ditto, ditto Contingencies for ditto,	23	14	0			
Ditto ditto, ditto for Yayur Veda per Bill of Exchange,	200	0	0			
				455	8	6
June 1st ditto, Establishment for the custody of the Oriental Works for May last,	42	0	0			
Ditto ditto Babu Rajendra Lall Mittra, petty charges for May last, per Bill,	1	9	6			
Ditto 9th ditto, Dr. E. Roer, his salary for May last,	100	0	0			
Ditto ditto Establishment for ditto,	35	0	0			
Ditto ditto Contingencies for ditto,	22	0	0			
Ditto ditto Sarietullah Duftry for binding Oriental Works, per Bill,	37	4	0			
Ditto ditto a ream of Serampore paper,	6	13	0			
Ditto ditto for Kharoäh cloth and Paste Board for binding Oriental Works,	18	3	0			
Ditto ditto for copying Persian and Arabic MSS. for publication in the Bibliotheca Indica,	13	4	0			
				276	1	6
July 1st ditto, Establishment for the custody of the Oriental Works for June last,	42	0	0			
Ditto 12th ditto, Dr. E. Roer, his salary for do.	100	0	0			
Ditto ditto Establishment for ditto,	35	0	0			
Ditto ditto Contingencies for ditto,	22	8	0			
Ditto 13th Ditto, Rev. J. Thomas, for printing and supplying paper for 500 copies of Lalita Vistara in Sanscrita, p. 1 to 296=296 pp., at 2-3, per Bill,	647	8	0			
Ditto ditto for printing, &c. for 500 copies of Bibliotheca Indica, No. 37, being the Sahitya Darpana, by Dr. Ballantyne, p. 57 to 112= English matter, 56 pp., at Rs. 2-6 each,	133	0	0			
Ditto ditto p. 33 to 80=Nagree matter 48 pp. at Rs. 2-3 each,	114	0	0			
Ditto ditto and for cover and doing up,	12	0	0			
Ditto ditto for printing, &c. for 500 copies of Bibliotheca Indica, No. 38, p. 81 to 160 and list of corrections, 2 pp. = 82 together with many corrections, at Rs. 2-6 each,	194	12	0			
Ditto ditto and for cover and doing up,	12	0	0			
Ditto ditto for ditto of ditto, No, 39, being the Uttara Naishada Charita, p. 1 to 96=96 pp. at Rs. 2-3 each,	210	0	0			
Ditto ditto for cover and doing up,	12	0	0			
				1,534	12	0
Carried over,				3,359	8	0

Brought forward, Co.'s Rs. 12,818 11 3

Carried over,... 12,818 11 3

				Brought forward, Co.'s Rs.	3,359	8 0
August 3rd, 1852.—To Cash paid Establishment for the custody of Oriental works for July last,	42	0	0			
Ditto ditto ditto R. L. Mittra Lib. contingencies for ditto,	2	7	0			
Ditto 4th ditto, George F. Lackersteen for purchasing 8 Iron clamps with 32 cut screws,	35	0	0			
Ditto ditto ditto Society's Cash for balance of last month's Cash short,	1	15	9			
Ditto 19th Dr. E. Roer his salary for July last,	100	0	0			
Ditto ditto ditto Establishment for ditto,	35	0	0			
Ditto ditto ditto Contingencies for ditto,	22	11	0			
					239	1 9
September 1st ditto, To Moonshee Ashrutullah for purchasing Innam Ghazzaly's Ohya Olum complete in 1 Vol.,	90	0	0			
Ditto 8th ditto, J. C. McArther, Supdt. Bishop's College Press for printing Bibliotheca Indica,	245	0	0			
Ditto do. Dr. E. Roer his salary for Aug. last,	100	0	0			
Ditto ditto ditto Establishment for ditto,	35	0	0			
Ditto ditto ditto Contingencies for ditto,	23	13	0			
Ditto ditto ditto Babu R. L. Mittra, his salary and Establishment for the custody of Oriental works for ditto,	42	0	0			
Ditto ditto ditto Rupchand Mistry for Plank for Suspension-shelf, per Bill,	33	0	0			
Ditto ditto ditto Cooley-hire to bring the plank to the Society,	0	10	6			
Ditto ditto ditto, ditto for raising and fixing the shelf in its proper position,	0	4	0			
Ditto ditto ditto for 4 coolies for their working 3 days to remove Book-shelves with Oriental works from the Society's room, at 3 as. per day,	2	4	0			
Ditto ditto ditto for 3 Coolies for work done in arranging the Bibliotheca Indica, at 3 as.	0	9	0			
Ditto 22nd ditto, G. Adams, Esq., Offg. Govt. Agent, to be invested in Govt. Security,	1,050	0	0			
					1,622	8 6
October 5th ditto, Babu R. L. Mittra his salary and Establishment for the custody of Oriental works for September last,	42	0	0			
Ditto 11th ditto, Dr. E. Roer his salary for September last,	100	0	0			
Ditto ditto ditto Establishment for ditto,	35	0	0			
Ditto ditto ditto Contingencies,	22	6	0			
Ditto ditto ditto To Cash paid Sarietullah Duftory for binding Bibliotheca Indica,	8	0	0			
Ditto ditto ditto Bissonauth Shastry his salary from 13th September to 12th October last being 1 month, at 10 Rs. per mensen,	10	0	0			
					217	6 0
				Carried over,	5,438	8 3

Brought forward, Co.'s Rs. 12,818 11 3

Carried over, .. 12,818 11 3

Brought forward, Co.'s Rs.				5,438	8	3
November 4th ditto, Babu R. L. Mittra his salary and Establishment for the custody of Oriental works for October last, ...	42	0	0			
Ditto ditto ditto Society's Cash on account of last month's Cash short, ...	0	2	3			
Ditto 23rd ditto, Dr. E. Roer his salary for October last, ...	100	0	0			
Ditto ditto ditto Establishment for ditto, ...	35	0	0			
Ditto ditto ditto Contingencies for ditto, ...	22	0	0			
Ditto ditto ditto Babu R. L. Mittra, Petty charges for ropes on account of tying the Bibliotheca Indica and sundry pieces of wax-cloth for ditto, ...	0	10	0			
Ditto ditto ditto Sorietullah Duftory for binding Oriental works per Bill, ...	15	0	0			
				214	12	3
December 4th ditto, Babu R. L. Mittra his salary and Establishment for the custody of Oriental works for November last, ...	42	0	0			
Ditto ditto ditto Asiatic Society's Cash for last month's Cash short, ...	7	12	3			
Ditto 18th ditto, Bissonauth Shastry his salary as Pandit from 15th Oct. to 30th Nov. being 1 month and 15 days at 14 per mensem,....	21	0	0			
Ditto ditto ditto R. L. Mittra for Contingent charges,.....	1	8	0			
Ditto ditto ditto Dr. E. Roer, his salary for November last, ...	100	0	0			
Ditto ditto ditto Establishment for ditto, ...	35	0	0			
Ditto ditto ditto Contingencies for ditto, ...	22	7	6			
				229	11	9
To Balance.						
Company's paper of the new 5 per cent. Loan, deposited with the Government Agent, ...	7,000	0	0			
Cash in the Bank of Bengal,.....	1,397	15	3			
Cash in hand, ...	37	11	9			
Cash in the hands of the Government Agent,..	1,077	15	10			
				9,513	10	10
Co.'s Rs.....				15,396	11	1

Asiatic Society,
1*st Jan.* 1853.

Examined and found correct.

A. J. M. Mills,
A. Grote. } *Members of Finance Committee.*

			Brought forward, Rs...	12,818	11 3
By amount received from the Government Agent on account of interest due on Government Securities in his custody, as per account-current, dated the 15th Sept. 1852, ..	1,521	15 10			
By amount invested in Government Security on the 22nd Sept. last, ...	1,050	0 0			
				2,577	15 10
			Company's Rupees,..	15,396	11 1

Errors and Omissions Excepted.
ISHANCHANDRA MAZUMDAR.
Accountant.

Assets.				*Liabilities.*			
Cash Balance, ...	Rs. 3,638	3	3	By Amount due to Sir J. Colvile, Kt., ...	Rs. 791	8	0
Amount of Bills outstanding on Account Contribution and Admission Fees, ...	9,631	10	8	Ditto ditto J. W. Laidlay, Esq.....	418	7	4
Ditto on Account Subscription to the Journal,	2,612	5	0	Ditto ditto Dr. Sprenger and Capt. Nicholls,..	7	10	6
Ditto on Account Sale of Books, ...	982	4	0	Ditto ditto Baptist Mission Press, for printing the Journal, No. IV. to VII. of 1852, say, ... 800 0 0			
Ditto on Account Subscription to the Bibliotheca Indica, ...	159	0	0	Ditto for plates for the above, say, 250 0 0	1,050	0	0
Ditto due from the Batavian Society of Sciences and Arts for books purchased for, and supplied to, them, ...	83	1	9	Ditto Messrs. Smith, Elder and Co. for books, as per account, £17. 17. 6. say at 2 shillings per Rupee, ...	178	12	0
Balance due from Mr. Bennett,.....	304	1	4	Ditto Lieut. E. Raverty and B. H. Hodgson, Esq. on Account of their Deposits, ...	61	4	0
Ditto Government grants for December, 1852,	614	0	0	Ditto Sundries on Account of Subscription to the Bibliotheca Indica paid in Advance, ...	50	0	0
Ditto from B. H. Hodgson, Esq.	33	10	0	Ditto Establishment for December, 1852, ...	826	8	0
Company's Rupees,.....	18,058	4	0	Company's Rupees,.....	3,384	1	10

E. E.

A. J. M. Mills,
A. Grote, } *Members of the Finance Committee.*

1*st January*, 1853.

LIST OF MEMBERS

OF THE

ASIATIC SOCIETY OF BENGAL.

Anderson, W. Major, Bengal Artillery, Ishapur.
Avdall, J. Esq., Calcutta.
Abbott, J. Major, Bengal Artillery, Punjab.
Allen, C. Esq. B. C. S., Calcutta.
Barlow, R. Sir, Bart. B. C. S., Calcutta.
Beaufort, F. L. Esq. B. C. S., Pubnah.
Birch, R. J. H. Lieut.-Col., Calcutta.
Blagrave, T. C. Captain, 26th Regt. B. N. I., Trans-Sutledge Provinces.
Bogle, A. Lieut. Col. Amherst.
*Benson, R. Colonel, Europe.
Batten, J. H. Esq. B. C. S., Almorah.
Beckwith, J. Esq., Calcutta.
Bell, A. Dr. B. M. S., Lucknow.
Blundell, E. A. Esq. C. S., Penang.
Banks, G. S. Major, Calcutta.
Beadon, C. Esq. B. C. S., Calcutta.
Bruce, R. C. D, Captain, H. M. 29th Foot, Wazirabad.
Byng, R. B. P. Hon. Capt. 62d Regt. B. N. I., Darjeeling.
Boyes, W. E. J. Captain, 6th B. L. C., Meerut.
Baker, W. E. Major, B. E., Calcutta.
Bayley, H. V. Esq. B. C. S., Calcutta.
Bowring, L. B. Esq. B. C. S., Umballah.
*Brodie, T. Captain, 5th Regt. B. N. I. Europe.
Burgess, F. S. Lieut. 74th Regt. B. N. I., Pellibheet.
Cust, R. N. Esq. B. C. S., Banda.
Christison, A. Dr. B. M. S., Rangoon.
*Clint, L. Esq. Europe.

* Absent from India.

Campbell, A. Dr. B. M. S., Darjeeling.
Cheap, G. C. Esq. B. C. S., Rajshaye.
Colvin, J. R. Esq. B. C. S., Calcutta.
Colvin, B. J. Esq. B. C. S., Calcutta.
*Colvin, J. H. B. Esq. B. C. S. Europe.
Corbyn F. Esq. B. M. S., Lahore.
Colvile, Hon'ble Sir J. W., Calcutta.
Cautley, P. T. Col., F. R. S., Bengal Artillery, Roorkee.
Colebrooke, E. Esq., Calcutta.
Douglas, C. Captain, B. A., Mooltan.
Dwarkanath Doss Basu, Babu, B. M. S., Punjab.
Dalton, E. T. Lieut. 9th Regt. B. N. I., Assam.
*Earle, W. Esq. Europe.
Edgeworth, M. P. Esq. B. C. S., Mooltan.
Elliott, W. Esq. M. C. S., Vizagapatam.
*Elliott, H. M. Sir, B. C. S. Cape of Good Hope.
Frith, R. W. G. Esq., Jessore.
Faithfull, G. Lieut. 68th Regt. B. N. I., Akyab.
Fayrer, J. Dr. B. M. S., Rangoon.
French, G. R. Esq., Nowhatta.
Falconer, H. Dr., B. M. S. F. R. S., Botanical Garden, Seebpúr.
Forbes, W. N. Col., B. E., Calcutta.
Fytche, A. Captain, 70th Regt. B. N. I., Bassein.
Gubbins, C. Esq. B. C. S., Meerut.
Govinda Chandra Sena, Babu, Calcutta.
Grote, A. Esq. B. C. S., Calcutta.
*Gladstone, M. Esq. Europe.
Gray, J. J. Esq., Maldah.
Gyanendra Mohana Tagore, Babu, Calcutta.
Hodgson, B. H. Esq. B. C. S., Calcutta.
Houstoun, R. Esq. B. C. S., Chittagong.
Hopkinson, H. Captain, 70th Regt. B. N. I., Arracan.
Hannyngton, J. C. Major, 24th Regt. B. N. I., Hazareebaugh.
Hall, F. E. Esq., Benares.
Hamilton, R. N. C. Esq. B. C. S., Indore.
Huffnagle, C. Esq., Calcutta.
Hearsey, J. B. Col. 10th Light Cavalry, Wuzeerabad.

* Absent from India.

Heatly, S. G. T. Esq., Chandernagore.
Hayes, F. C. C. Captain, Lucknow.
Jerdon, T. C. Esq., Madras.
Jackson, W. B. Esq. B. C. S., Calcutta.
Jackson, L. S. Esq. B. C. S., Shahabad.
Jenkins, F. Lieut.-Col., Assam.
*James, H. C. Lieut. 32nd Regt. B. N. I., Europe.
Jádabakrishna Sinha Babu, Calcutta.
Kittoe, M. Major, Benares.
Kay, W. Rev., Bishop's College, Howrah.
*Laidlay, J. W. Esq. Europe.
Layard, F. P. Captain, 19th Regt. B. N. I., Berhampore.
Latter, T. Captain, 17th Regt. B. N. I., Prome.
Loch, G. Esq. B. C. S., Moorshedabad.
Logan, J. R. Esq., Singapore.
Lawrence, Col. Sir H. M., Lahore.
Lees, W. Captain, 42nd Regt. B. N. I., Benares.
Muir, J. Esq. B. C. S., Futtehghur.
*Maclagan, R. Lieut. B. E., Europe.
Money, D. J. Esq. B. C. S., Moorshedabad.
Morton, D. T. Esq. M. M. S., Moulmein.
Marshman, J. C. Esq., Serampore.
Martin, W. Esq., B. M. S., Calcutta.
Mills, A. J. M. Esq. B. C. S., Calcutta.
Mitchell, A. Esq., Calcutta.
Manickjee Rustomjee, Esq., Calcutta.
Newmarch, J. Esq., Calcutta.
Nicholls, F. W. Captain, 44th Regt., M. N. I., Saugor.
*O'Shaughnessy, Dr. W. B., F. R. S., B. M. S. Europe.
Oldham, T. Professor, F. R. S., Cherra Punji.
Ommaney, M. C. Esq. B. C. S., Jaunpore.
Ouseley, R. Major, 50th Regt. B. N. I., Benares.
Peel, L. Hon'ble Sir, Calcutta.
Phayre, A. P. Captain, Rangoon.
†Prinsep, C. R. Esq., Calcutta.
Prosonno Coomar Tagore, Babu, Calcutta.

* Absent from India.

† Exempt from payment of subscription, according to the old rules.

Pratt, J. H. Venerable Archdeacon, Lahore.
Pratápchandra Singh, Raja, Calcutta.
Rammanath Tagore, Babu, Calcutta.
Ramgopaul Ghose, Babu, Calcutta.
Ramchundra Singh, Raja, Nishapore, Moorshedabad.
Ramáprosád Roy, Babu, Calcutta.
Rogers, T. E. Captain, Calcutta.
Row, J. Dr. B. M. S., Dacca.
*Royle, Dr. J., London.
Rajendra Datta, Babu, Calcutta.
Rammánáth Banerjee, Babu, Calcutta.
Stephens, Captain, 8th Regt. B. N. I., Shajehanpur.
Seton Karr, W. Esq. B. C. S., Calcutta.
Sleeman, W. H. Lieut.-Col., Lucknow.
Sherwill, W. S. Captain, 66th Regt. B. N. I., Berhampore.
Spilsbury, G. G. Esq. B. M. S., Cawnpore.
Stewart, Dr. D., B. M. S., Calcutta.
Samuells, E. A. Esq. B. C. S., Calcutta.
Suttchurn Ghosaul, Raja, Calcutta.
Shave, J. T. Esq., Jessore.
Smith, W. O. Rev., Calcutta.
Sprenger, A. Dr., B. M. S., Calcutta.
*Strachey, R. Lieut., B. E. Europe.
*Strachey, J. E. Esq. B. C. S. Do.
†Strong, Dr. F. P., B. M. S., Calcutta.
Thomason, J. Hon'ble, B. C. S., Agra.
Trevor, C. B. Esq. B. C. S., Calcutta.
*Thornhill, C. B. Esq. B. C. S. Europe.
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By Death.

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His Highness the Nawab Nazim of Bengal.
Dr. J. D. Hooker, R. N., F. R. S., London.
Professor Henry, Princeton, United States.

Abstract of the Meteorological Register kept at the Field Hospital, Rangoon for the Month of October, 1852.

Rangoon, 1st November, 1852.

	Thermometer Sunrise.			Thermometer 9 A. M.			Thermometer Noon.			Thermometer 3 P. M.			Thermometer Sunset.			Thermometer 9 P. M.			Remarks.
	Maximum.	Minimum.	Mid. of 30 observations.	Maximum.	Minimum.	Mid. of 30 observations.	Maximum.	Minimum.	Mid. of 29 observations.	Maximum.	Minimum.	Mid. of 24 observations.	Maximum.	Minimum.	Mid. of 7 observations.	Maximum.	Minimum.	Mid. of 21 observations.	
Wet.	79	71	75.2667	81.5	74	77.7334	81.5	76	78.5689	82	75.5	78.2708	80	73.5	77.5711	81	73	77.4809	Quantity of rain fallen this month, 1.54 Inches: fell in 6 days. Prevailing winds E. N. E., S. E., N. E. Beautiful cool mornings; in evenings and nights, fine, clear, dry weather.
Dry...	82	74	77.5667	84	77.5	81.8667	91	82	87.3104	92	81.5	87.6667	86.5	82	83.5	85	78	81.696	

	Barometer Sunrise.			Barometer 9 A. M.			Barometer Noon.			Barometer 3 P. M.			Barometer Sunset.			Barometer 9 P. M.		
Dates.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.
27th	30.17			21st 30.15°			6th, 7th, 20th, 25th, 10th. 30.09°			27th 30.07°			19th 30.09°			24th 30.12		
2d & 16th	30.02°			16th 30.04°			2d 30°			2d & 14th 29.97°			15th 30°			23d, 13th, 14th, 30.03°		
			30.0756			30.0943			30.0558			30.02709			30.05428			30.0695

J. Fayrer, M. D.
Assistant Surgeon, Field Hospital.

Meteorological Register kept at the Field Hospital, Rangoon, for the Month of October, 1852.

Date.	At Sunrise.					At 9 a. m.					At Noon.				
	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.
	Wet.	Dry.				Wet.	Dry.				Wet.	Dry.			
1	77	78	30.04	E. light.	Cirri.	79	82	30.07	W. light.	Cumuli.	80	88	30.04	S. W. light	Cumuli.
2	75	77	.02	S. W. do.	Fog.	79	81	.06	Ditto.	Ditto.	80	89	30.	W. do.	Ditto.
3	78	80	.03	N. E. do.	Hazy.	79.5	82.5	.05	N. E. do.	C.-cumuli.	78.5	89	30.01	E. do.	Ditto.
4	77.5	79.5	.05	Ditto.	Ditto.	80.5	86	.06	E. do.	Cumuli.	80.5	91	30.04	Ditto.	Ditto.
5	78	82	.05	E. do.	Ditto.	80	84	.07	S. E. do.	Clear.	81	89.5	.05	E. b. S. do.	Ditto.
6	76	78	.09	Ditto.	Clear.	80	86	.10	Ditto.	Ditto.	80	90	.09	E. do.	Cirri.
7	77	79	.07	Ditto.	Ditto.	80	85.5	.11	E. do.	Ditto.	77.5	88.5	.09	Ditto.	Ditto.
8	75	78	.07	Ditto.	Ditto.	78	82	.09	N. E. do.	Ditto.	78	88	.06	E. b. N. do.	Ditto.
9	76	78	.06	Ditto.	Cirri.	78	83	.09	Ditto.	Ditto.	79	89	.05	E. do.	Cumuli.
10	76	78	.04	N. do.	Ditto.	78	83	.10	Ditto.	Ditto.	80	88.5	.09	N. E. do.	C.-cumuli.
11	77.5	78.5	.05	N. W. do.	Fog.	79.5	82	.07	N.b.W.lt.	Cirri.	81.5	89.5	.04	Ditto.	Cumuli.
12	79	81	.03	N. do.	Ditto.	80	85	.07	Ditto.	Ditto.	81	91	.03	N. b. W. do.	Ditto.
13	78	80	.05	Calm.	Cumuli.	79.5	82	.05	Ditto.	Cirro-strati.	80	84.5	.02	Ditto.	Cirro-strati.
14	75	77.5	.05	N. E. lt.	Ditto.	79	81.5	.05	N. E. do.	Cumuli.	77.5	82	.02	E. do.	Cumuli.
15	75	77.5	.05	Ditto.	Ditto.	77	79	.06	ENE. do.	Ditto.	80	88	.03	S. E. do.	Ditto.
16	76	78.5	.02	Ditto.	Ditto.	78.5	81	.04	N. E. do.	Ditto.	77.5	82	.04	Ditto.	Ditto.
17	76	78.5	.05	Ditto.	Ditto.	78	82	.07	Ditto.	Ditto.	79.5	84	.03	E. do.	Ditto.
18	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
19	76.5	78	.05	Ditto.	C.-Cumuli.	78	83	.12	Ditto.	Ditto.	79	88	.01	N. E. do.	Ditto.
20	75.5	77.5	.10	Ditto.	Cumuli.	79	82	.12	Ditto.	Ditto.	78.5	84	.09	Ditto.	Ditto.
21	73.5	75.5	.12	E.b.N.do.	Cirro-strati.	75.5	78.5	.15	E.b.N.lt	C.-cumuli.	78	87.5	.07	E. b. S. do.	Ditto.
22	75	77	.11	North do.	C.-Cumuli.	76	78	.14	Ditto.	Ditto.	78	83.5	.10	E. b. N. do.	C.-strati.
23	72.5	75.5	.11	N. E. do.	Ditto.	75	79	.13	Ditto.	Ditto.	77	86	.07	Ditto.	Cumuli.
24	75	77	.13	Ditto.	Ditto.	77	83	.14	Ditto.	Ditto.	..	..	..	..	..
25	72	75	.12	Calm.	Clear.	75	78	.13	E. do.	Clear.	77.5	86.5	.09	E. do.	Ditto.
26	73	76	.10	Ditto.	Ditto.	76.5	83	.11	Calm.	Ditto.	77	88.5	.06	Ditto.	Ditto.
27	74	76.5	.17	Ditto.	Ditto.	76.5	81.5	.11	Ditto.	Ditto.	76.5	88	.05	S. E. do.	C.-cumuli.
28	73	75.5	.11	Ditto.	Ditto.	76	79	.12	Ditto.	Ditto.	76	87	.10	Ditto.	Cirri.
29	71	74	.12	N. E. lt.	Ditto.	74	77.5	.13	Ditto.	Ditto.	76.5	87	.11	N. E. do.	Cumuli.
30	72	75	.12	Calm.	Ditto.	75	82	.11	Ditto.	Ditto.	77	86.5	.08	Ditto.	Ditto.
31	73	76	.09	Ditto.	Ditto.	75	84	.11	N. E. lt.	Ditto.	76	88	.06	Ditto.	Ditto.
Total.	2258.0	2327.0	902.27			2332.0	2456.0	902.83			2278.5	2532.0	8716.2		
Mean.	75°.2667	77°.5667	30.0756			77°.7334	81°.8667	30.0943			78.5689	87.3104	30.0558		

Mean of 29 observations.

At 3 P. M.					At Sunset.					At 9 P. M.					Rain Gauge.	
Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	At Sunrise. Inches.	Remarks.
Wet.	Dry.				Wet.	Dry.				Wet.	Dry.					
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Heavy after sun-
80	91	29.97	S. W. lt.	Cumuli.	..	..	..	..	..	79	82	30.03	S. W. lt.	Clear.	..	Ditto. [rise.
80	88	.98	S. do.	Ditto.	..	..	..	..	..	78	82	.03	E. do.	Cirri.	..	
76	90	30.02	E. do.	Calm.	..	..	..	..	..	79	84	.05	Calm.	Clear.	0.24	Shower yester-
80	90.5	.03	S. E. do.	Clear.	..	..	..	..	..	..	..	..	..	..	..	day at 2 P. M.
81	90.5	.05	Ditto.	Ditto.	..	..	..	..	..	78	84	.07	S. E. do.	Cirri.	..	
82	89	.04	E. do.	Cirri.	..	..	..	..	..	78	82	.05	E. do.	Ditto.	..	
77.5	89.5	.01	N. E. do.	Ditto.	..	..	..	..	..	..	..	..	..	..	..	
..	..	..	..	..	..	..	..	..	..	77	82	.04	N. E. do.	Ditto.	..	
80	91	.04	N.b.W.lt	Ditto.	..	..	..	..	..	..	..	..	..	..	0.30	Shower yester-
81	92	.02	N. W. do.	Ditto.	..	..	..	..	..	81	84	.06	N. lt.	Ditto.	..	day about noon.
81	93	30.	Ditto.	Ditto.	..	..	..	..	..	79	85	.07	N. W. do.	Ditto.	..	Showering.
80	86.5	29.99	W. do.	Cumuli.	80	83	30.01	E. light.	Cumuli.	80	82.5	.03	W. do.	Cumuli.	0.50	Thunder during
78	81.5	.97	E. do.	C.-strati.	..	..	..	..	..	77	80	.03	W. do.	C.-cuml.	..	the night.
79	85.5	.99	S. E. do.	Cumuli.	78	82	30.	S. E. do.	Cirri.	77.5	80.5	.03	S. E. do.	Cirri.	0.20	
78.5	83.5	30.	E. do.	C.-cuml.	..	..	..	..	..	..	..	..	..	..	..	
78	83	30.03	S. E. do.	Cirri.	..	..	..	..	..	..	..	..	..	..	0.20	Rain yesterday.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0.10	Ditto.
78	87	30.06	E. fresh.	Cumuli.	78	82	30.09	E. do.	Ditto.	77	80	.10	Ditto.	Ditto.	..	[ther.
79	86	.05	Ditto.	Ditto.	79	83	30.07	S. E. do.	Ditto.	78.5	82	.10	Calm.	Clear.	..	Fine clear wea-
79	86	.05	E.b. S. lt.	Ditto.	80	86	.07	N. E. do.	Ditto.	78	82	.11	Ditto.	Ditto.	..	Ditto.
76	86	.06	E. do.	C.-cuml.	..	..	..	..	..	77	80.5	.10	N. lt.	Ditto.	..	Ditto.
78	87.5	.06	Ditto.	Ditto.	..	..	..	..	..	78	83	.11	Calm.	Ditto.	..	Ditto.
75.5	86.5	.07	E.b.S.do.	Ditto.	74.5	82	.07	E. do.	Ditto.	75	80	·12	Ditto.	Ditto.	..	Ditto.
77	87	.06	Ditto.	Ditto.	73.5	86.5	.07	Calm.	Calm.	75	81	.10	Ditto.	Ditto.	..	Ditto.
77	86.5	.04	E.S.E.do.	Ditto.	..	..	..	..	..	75	80	.07	Ditto.	Ditto.	..	Ditto.
77	87	.06	Ditto.	Clear.	..	..	..	..	..	77	81	.06	Ditto.	Ditto.	..	Ditto.
..	..	..	..	..	..	..	..	..	..	73	78	.10	Ditto.	Ditto.	..	Ditto.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Ditto.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
1882.5	2104.0	720.65			543.0	584.5	210.38			1627.1	1715.5	631.46			1.54	
18.2708	87.6667	30.02709			77.5711	83.5	30.05428			77.4809	81.696	30.0695			Fell on 6 days.	

Mean of 24 observations. Mean of 7 observations. Mean of 21 observations.

J. Fayrer.

REMARKS.

On the 3rd, a heavy shower of rain fell. Prevailing winds up to 3rd E. N. E., E. S. E.; very cool air, but hot sun. A catarrhal complaint beginning to appear.

9th. At noon to-day a shower fell with squall of wind from N. E., during which the rain was heavy, 0.3 inches, having fallen. The first rain we have had from the N. East.

12th. Weather continues hot with fine clear atmosphere; winds prevailing in the E. and N. E., and very light.

14th. A heavy shower, accompanied by thunder and lightning, fell last night. The winds much cooler and the sky more cloudy.

The latter half of the month has been beautifully fine and clear. The sun during the day hot, but the nights cool; air dry, and wind prevailing (generally very light) in the East, S. E., and N. E.

J. Fayrer.

Meteorological Register kept at the Surveyor General's Office, Calcutta, for the Month of November, 1852.

Date.	Observation made at 6 A. M.						Observations made at 10 A. M.						Observations made at Apparent Noon.					
	Bar. red. to 32° F.	Temperature. Of Mer.	Of Air.	W. Bulb.	Wind. Direction at 6 A.M.	Aspect of Sky.	Bar. red. to 32° F.	Temperature. Of Mer.	Of Air.	W. Bulb.	Wind. Direction at 10 A.M.	Aspect of Sky.	Bar. red. to 32° F.	Temperature. Of Mer.	Of Air.	W. Bulb.	Wind. Direction at Noon.	Aspect of Sky.
	Inches	°	°	°			Inches	°	°	°			Inches	°	°	°		
1	29.971	73.1	73.0	71 4	....	Cloudless [W.	30.029	79.1	81.7	71.7	W N.W	Cloudless	29.980	82.5	84.5	71.5	W.S.W.	C.-cml. near E.H.
2	965	70.3	69.9	67.4	N. W.	C.-st. rod H. expt.	.023	76.9	79.0	68.1	N.N.W.	Ditto	.977	80.9	83.5	68.5	W.S.W.	Cirri
3	30.006	69.8	70.0	68.2	W.	Cloudless	066	77.4	79.4	69.6	W.	Ditto	30.019	81.0	83.0	70.8	W.	Cml. near E. H.
4	.021	69.8	69.9	67.4	S. S. W.	Ditto [N. W. H.	.069	78.0	80.5	69.8	S.	Ditto	.015	81.3	82.7	70.4	N. W.	Cirro-cumuli
5	.008	69.8	69.8	67.9	Calm.	C.-st. near the S.&	.062	76.6	78.7	69.9	W.	Ditto	.002	80.1	82.2	70.5	W.	Scatd. cumuli
6	29.991	70.0	70.2	68.5	W.	Foggy	.056	77.4	79.7	70.5	N. N.E.	Cir.-st. near E. H.	.009	80.9	82.1	71.5	N.	Cumuli
7S.	..	..	..	..	....	.....	..	..	..	..	....	.....	..	..	..	..	....	.....
8	30.009	71.7	72.2	70.2	N.	Overcast	.077	76.0	77.5	72.2	N.	Cloudy	.022	77.0	78.0	72.8	N. W.	Cloudy
9	29.991	73.0	73.3	71.4	Calm.	Cloudy [horizon	.041	76.3	78.4	72.8	N.	Cirro-strati	29.986	80.2	82.9	74.2	N. W.	Cml.-st. in the E.
10	.983	72.8	72.8	71.4	N.	Cir.-st. near the E.	.022	79.0	81.0	74.6	N. W.	Cloudless	.977	82.0	83.8	74.7	N. W.	Cumuli [S. to E
11	.963	71.0	71.0	68.7	N.	Cloudless	.019	77.0	79.2	71.0	N. N.E.	Cir.-st. in the S.E.	.976	81.7	84.2	73.3	N.	C.-st. near H. fr.
12	.990	69.5	69.5	66.5	....	Ditto	043	77.2	79.0	70.3	N.	C.-s. n.H.fr.s.s.w.	.975	82.0	84.8	71.4	N. W.	Fr. sw. TONE. H. abt.
13	.946	68.1	68.0	65.5	Calm.	Ditto	.005	76.2	79.0	69.4	N. W.	Cloudless [to E.	.946	81.0	83.0	70.0	W N.W.	Cless. [20° C.-st.
14 S.	..	..	..	..	....	.....	..	..	..	..	....	..... [E. H.	..	..	..	..	....	..... [of Z
15	.952	69.6	69.6	67.0	N. W.	S. & E. H. C.-st.	.015	75.0	77.2	71.2	N. W.	C.-st. & Cml. near	.964	79.4	82.0	70.3	N.	Cml. rod. H. & NW.
16	.949	70.5	70.0	67.0	N. W.	Cloudless [the H.	.004	76.4	78.8	70.2	N.	C.-st. near E.S.E.H.	.955	79.7	82.2	70.8	N. W.	Scatd. cumuli
17	.940	68.4	68.1	67.1	N. W.	A thick Mt. ro'd.	29.995	74.8	77.1	70.6	W N.W.	Cloudless	.928	79.0	81.0	70.1	W N.W.	Ditto
18	.901	69.9	69.5	67.5	Calm.	C.-st. near the EH.	.958	75.7	77.7	70.2	W.	Ditto	.905	78.9	80.9	70.6	W.	Cml. round the H.
19	.881	68.4	68.8	66.6	Calm.	Cloudless	.938	75.9	78.6	71.0	S.	Ditto [S. to E.	.877	80.4	83.0	73 2	S. S. W.	Cloudless
20	.849	72.0	72.0	70 2	S.	Scatd. cumuli	.942	75.7	78.0	71.1	W N.W.	Cml. near H. from	.896	80.2	82.6	69.7	N. W.	Ditto
21S.	..	..	..	..	....	.....	..	..	..	..	....	.....	..	..	..	..	....	.....
22	30.003	66.1	66.0	62.8	Calm.	Scatd. cirro-strati	30.068	73.0	75.9	66.8	N.	Cloudless	30.019	76 5	78.7	66.5	W.	Cloudless
93	.001	65.2	65.7	64.2	Calm.	Cloudless	.076	72.3	75.0	65.7	N. W.	Ditto	.024	76.5	79.0	67.4	N. W.	Cml. near N. H.
24	29.981	66.0	66.0	63.8	N. W.	Ditto	.062	71.6	73.8	67.2	W N.W.	Ditto	.010	75.9	78.4	69.2	W.	Cloudless
25	30.010	65.8	65.4	63.0	Calm.	Ditto [the sky	.093	72.6	75.7	68.0	N. W.	Ditto [the sky	.057	77.3	79.3	67 5	W.N.W.	Scatd. cumuli
26	.066	65.6	65.7	62.4	N.	Cir.-cml. all over	.155	73.0	76.0	68.5	N.N.W.	Cir-cuml. all over	.108	76.5	79.8	68.9	N.	Cumuli
27	.038	65.5	66.0	63.5	....	Cloudless	.090	71.9	74.5	67.5	N. W.	C.-st. in the N.W.	.025	76.4	78.8	69,3	N. W.	Scatd. cumuli
28S.	..	..	..	..	....	.....	..	..	..	..	....	.....	..	..	..	..	....	.....
29	29.979	66.8	67.0	64.5	N.	Cirro-strati	.030	72.5	75.0	68.0	N.N.W.	Cumulo-strati	29.987	75.9	77.4	68.5	N.N.W.	Cloudy
30	.960	67.0	67.0	64.0	N.	C.-st. allo'er sky & Th. clds. near E.H.	.035	71.3	73 3	64.2	N. W.	Cir.-st. near E. H.	.993	76.0	78.7	63.5	N. W.	Cirro-strati
Mean.	29.975	69.1	69.1	66.9	....	.....	30.037	75.3	77.7	69.6	....	.....	29.986	79.2	81.4	70.2	....	.....

[*Meteorological Register, continued.*]

Date.	Observations made at 3 P. M.						Minimum Pressure observed at 4 P. M.						Observations made at 5 P. M.						Maximum and Minimum Thermometer.			Max. Therm. in Sun's rays.	Rain Gauges. Elevations.		Moon's Phases
	Bar. red. to 32° F.	Temperature. Of Mer.	Of Air.	W. Bulb.	Wind. Direction at 3 P. M.	Aspect of Sky.	Bar. red. to 32° F.	Temperature. Of Mer.	Of Air.	W. Bulb.	Wind. Direction at 4 P. M.	Aspect of Sky.	Bar. red. to 32° F.	Temperature. Of Mer.	Of Air.	W. Bulb.	Wind. Direction at 5 P. M.	Aspect of Sky.	Max.	Mean.	Min.		Feet. 60. Upper	Feet. 5. Lower	
	Inches	o	o	o			Inches	o	o	o			Inches	o	o	o			o	o	o	o	Inches	Inches	
1	29.920	85 4	86.0	71,3	W.	C.-cl. all rod. H.	29.921	85.0	85.0	71 0	S. W.	Scatd. cumuli	29.924	83.8	83,0	71.6	S. W.	Clm. in E. & S.W.	87.5	78,8	70,0	..	..	..	
2	.916	84.9	85 8	68.8	W.	C.-st. [& E. of Z.	.917	84 2	84.2	69.0	N N W	Cirri & Cir.-st	.926	83.1	82 9	71.0	N N W	Cirro-strati [C.-st.	85.5	75.8	66.0	102.0	..	..	
3	.946	84.0	85.0	70.4	N. W.	Cl. n. N.W. H.SE.	.947	83.4	83 3	70.2	W.N.W.	C.-cl.on Z.& NW	.954	82,2	81.4	69.8	W.	Fr. Z. to WSW. hor.	85.2	75,9	66,6	..	..	..	
4	.951	83.8	84.4	69.8	W.	Cirri all rod. Z.	.952	83.3	83.0	69.6	N. W.	C. all rd. Z. [of it	.964	82,0	82.0	71.0	N. W.	Crs. abo. Z. & C.-s	84.8	75.7	66.5	99.4	..	..	
5	.916	83.4	83 9	71.0	W.	A cmlus. in W.	.914	82,9	82.8	71.0	N. W.	Cloudless	.928	81.6	81.3	71.1	W.	Cloudless [in N.W.	84.5	75.3	66.0	99.8	..	..	☾
6	.953	83.6	85.0	72.1	N.	Cumuli	.948	82,9	82.8	70.8	N. W.	Cumuli	.956	81.8	81.6	71,0	N. W.	Cir.-st. & cumuli	84,9	73,2	61.5	101.5	..	..	
7	..	..	..	..	....	.....	..	..	..	..	....	.....	..	..	..	..	....	.....	..	..	..	..	..	..	
8	.963	76.9	77 2	71.3	N. W.	Cloudy	.968	77.0	77.2	71.7	N.	Cloudy	.971	76.6	76.8	72.2	W.	Cloudy	..	..	..	..	..	..	
9	.913	83.5	82 9	71,6	N.	Scatd. cumuli	.915	82.6	83 5	72,1	N.	Scatd. cumuli	923	81.8	81.6	72.8	N.	Cumulo-st. [S.W.	84.6	77,8	71.0	104.7	..	..	
10	.914	85.4	86.3	74.5	N. W.	Cumuli [S. to E.	.896	84.8	84.2	73.8	N. W.	Cumuli [S. to E.	.903	83.2	82.9	73.3	N. W.	C.-st. tow'ds SSE. &	86.3	77.9	69.4	102.2	..	..	
11	.915	85.0	85.6	72.8	NNW	C.-st. near H. fr.	.911	84.0	83.4	71.4	N. W.	C.-s. near H. fr.	.927	82,5	82,2	72,4	N. W.	C.-s, n. H. fr. s. to E.	86.0	76.8	67.5	100.5	..	..	
12	.913	84.6	85.0	68.0	NNW	Fr, s. to NE H.C.-s.	.902	83.5	83.3	68.7	N. W.	Fr. S. to NE. H.	.907	81.8	81.4	69.0	N. W.	Fr. s. to NE. H. C.-st.	85 6	..	..	101.0	..	..	
13	.861	83.8	84.8	70.0	N. W.	Cloudless	.852	83.0	82.3	68.0	W N.W.	Cloudless [C.-s.	.858	81.0	80.7	68,7	NNW	Cloudless	84.5	77,8	71.0	99.1	..	..	●
14	..	..	..	..	....	.....	..	..	..	..	....	.....	..	..	..	..	....	.....	..	..	..	..	..	..	
15	.903	82.2	83.3	71.0	N	Scatd. cumuli	.900	81.8	81.8	70.4	N. W.	Scatd. cumuli	.907	80.8	80.6	70,0	N. W.	Scatd. cumuli	83.5	74.0	64.4	102.4	..	..	
16	.889	83.1	82.9	69.9	W.N.W.	Cloudless	.891	82.0	81.4	69.9	W N.W	Cloudless	.897	80.5	80.0	70.1	Calm.	Cloudless	82,4	75.1	67.7	99.0	..	..	
17	.863	82.4	83.0	70.8	N. W.	Scatd. cumuli	.852	81.6	81.5	69.0	N. W.	Scatd. cumuli	.850	80.0	79,4	71.0	N. W.	Scatd. cumuli	83.4	76,2	69.0	104.2	..	..	
18	.850	82,8	83,1	70.1	W.	Cirro-cumuli	.850	81.5	81.5	69.9	N. W.	Cless. [in S.W.Z.	.866	80,2	79.9	69.8	N. W.	Cless. [H. fr. s. to NW.	84.0	75,0	66.0	97.0	..	..	☽
19	.796	84.8	85.2	72,3	S. W.	Scatd. cumuli	.795	84,0	83.8	74.6	S.	Cl.n.s.& E.H.C.-s.	.805	82,2	80.8	73.8	S.	Cml. n.E H.& C.-s.n.	85.8	75.4	65.0	98.8	..	..	
20	.825	83.7	84 0	66.8	W.	Cloudless	.829	82,4	82.2	66.2	W.	Cloudless	.841	80.8	80.0	68,5	Calm.	Cloudless	84.3	..	..	97.3	..	..	
21	..	..	..	..	....	.....	..	..	..	..	....	.....	..	..	..	..	....	.....	..	..	..	..	..	..	
22	.944	80,4	81,0	67.3	N. W.	C.-s. in S.& SE.	.937	79,4	79,1	67.0	N. W.	Cir.-st. in the E.	.947	78.0	77.9	67.2	N. W.	Cloudless	84,0	73.1	62,2	96.1	..	..	
23	.935	80,3	80,2	68.3	N. W.	Scatd. cumuli	.931	79.4	79.2	67.8	N. W.	C -st. N.W. of Z	.935	78,2	77.7	67.9	N. W.	Ditto	81.8	71,9	62,0	95.2	..	..	
24	.924	79.9	80.9	67.8	W.	Cirro-cumuli	.918	79.2	79.5	67,5	Calm.	C.-cl on S.& E	.927	78,0	77.7	67.7	Calm.	Ditto	81.2	..	..	96.2	..	..	
25	.994	80.0	79,9	68.0	N. W.	Scatd. cumuli	.985	78.8	78.7	66.9	N. W.	C.-cml. abt. Z.	.999	77.2	76.7	67.0	N.	C.-cml. abt. the Z.	81.4	71,6	61.7	98.5	..	..	
26	30.032	79.9	80.9	69.0	N. W.	Cumulo-strati	30.019	78.9	78 8	67,6	N. W.	Cirro-cumuli	30.021	77.2	77.0	68,0	N. W.	C.-st. abt. the H.	81.2	71.6	62 0	97.5	..	..	⊙
27	29.931	80.3	80.7	69.3	NNW	Cloudless	29,929	79.0	79.0	69,2	NNW	Cloudless	29.937	78.0	77.6	68.9	NNW	Cloudless	81.8	71,9	62,0	93.8	..	..	
28	..	..	..	..	....	.....	..	..	..	..	....	.....	..	..	..	..	....	.....	..	..	..	..	..	..	
29	.915	77,2	78.4	69,0	NNW	Cloudy	.908	77 0	77.4	68,8	NNW	Cloudy	.906	76.5	76 4	68,3	NNW	Cloudy	78.6	..	..	85.3	..	..	
30	.910	80.0	80.7	64.4	N. W.	Cirro-strati	.910	79.0	79.2	63.9	N. W.	Cirro-strati	.925	77.5	77.4	65,6	Calm.	Cirro-strati	79.0	71.0	63.0	..	..	..	
..	29.915	82.4	82.9	69,8	....	.....	29.911	81.6	81.5	69.5	....	.....	29.919	80 3	79.9	69.9	....	.....	83 7	74.8	65.7	98 7	..	..	..

Meteorological Register kept at the Surveyor General's Office, Calcutta, for the Month of December, 1852.

Date.	Observations made at Sun-rise.						Maximum Pressure observed at 9 h. 50 m.						Observations made at Apparent Noon.					
	Bar. red. to 32° F.	Temperature. Of Mer.	Of Air.	W. Bulb.	Wind. Direction at Sun-rise.	Aspect of Sky.	Bar. red. to 32° F.	Temperature. Of Mer.	Of Air.	W. Bulb.	Wind. Direction at 9h50m.	Aspect of Sky.	Bar. red. to 32° F.	Temperature. Of Mer.	Of Air.	W. Bulb.	Wind. Direction at Noon.	Aspect of Sky.
	Inches	°	°	°			Inches	°	°	°			Inches	°	°	°		
1	30.025	64.0	63.4	57.2	N. W.	Cirro-strati [E.	30.090	68.6	70.3	60.7	W.N.W.	Cirro-strati	30.042	74.0	77.1	64.7	N.	Cirri tow'ds zen. &
2	.021	63.0	63 0	57.1	N.N.W.	Cirro-strati in the	.078	68.8	71.0	61 0	N. W.	Scatd. cirro-strati	.037	73.9	77.0	64.2	N.	Cirro-strati in E.
3	.036	63.5	63.0	55.0	N W.	Strati	.087	66.5	68 5	58.0	N.N.W.	Overcast	.037	70.4	72.0	61.1	N.N.W.	Cloudy
4	.049	61.4	62.0	58.8	Calm.	Scatd. cirro-strati	.118	69.0	72.0	64.0	N.N.W.	Scatd. cirro-strati	.069	73.4	76.0	65.8	N.N.W.	Scatd. cirro-strati
5S.	..	..	..	..	....	..	..	..	..	..	....	....	..	..	..	..	....	....
6	.045	63.5	64.0	61.2	Calm.	Cir.-c. all ov. Sk.	.120	70 7	73.4	65.7	N	Cloudless	.058	75.3	78.0	67.8	N.	Cloudy
7	.013	63.0	62.8	61.0	Calm.	Cir.-str. in the E.	.086	71.0	74.5	66.0	N.N.W.	Ditto	.038	75.0	78.0	66.8	W.N.W.	Cloudless
8	29.978	63.6	64.3	62 2	....	Cloudless	.054	71.6	74 3	68 0	N. W.	Ditto	29.991	76.8	78.0	68.0	W.	Ditto
9	.960	68.6	69.0	67.8	S. S. W.	Cloudy	.030	72.3	75.3	72.2	S. S. W.	Cloudy	.974	77.2	80.0	71.4	S. S. W.	Scatd. cumuli
10	.981	70.8	71.3	70.2	N.	Drizzling	.027	71.0	71 4	68.0	N.	Ditto	.996	71.4	71.9	68.2	N.N.W.	Cloudy
11	.990	68.0	68.0	66.8	N.	Cloudy	.050	69.4	70.8	68.4	N.	Ditto	30.005	72.2	73.4	69.2	N.N.W.	Ditto
12S.	30.038	65 6	65.8	65.6	Calm.	Foggy [horizon	.110	68.0	70.2	69.0	N.N.W.	Foggy	.070	73.0	75.6	67.9	N.	Scatd. cumuli
13	.100	61.2	60.8	59.0	Calm.	Cir.-str. near E.	.150	67.8	70.6	62.6	N.N.W.	Cloudless	.093	72.0	73 8	63.0	NNW.shp.	Cloudless
14	.042	61.5	61.3	57.8	N.N.W.	Cloudless	.083	66.4	69 0	61.6	N.N.W.	Ditto	.032	72.4	75.6	65.6	N.N.W.	Ditto
15	.029	62.4	62.7	59.0	N.N.W.	Ditto	.087	67.6	70.6	63.6	N.N.W.	Cirro-strt. in N.W.	.037	73.3	75.6	65.8	N.N.W.	Scatd. cumuli
16	.055	62.0	61.7	59.8	Calm.	Ditto	.121	67.7	70.1	64.6	N. W.	Cloudless	.068	73.1	76.4	67.6	N. W.	Ditto
17	.058	61.3	61.7	59.0	Calm.	Scatd. cirro-strati	.120	66.1	68.7	60.6	N.N.W.	Ditto	.084	72.2	75.0	63 3	N.N.W.	Cloudless
18	.073	57.6	57.3	54.0	Calm.	Cloudless	.126	63.0	66.0	58.2	N. W.	Cirro-strati in W.	.060	69.5	72.3	61.8	N W.	Cirro-strati [Z.
19S.	.039	61.8	61.4	59 8	N.N.W.	Cirro-cumuli	.103	67.8	70.2	64.2	N.	Cir.-str.abt. zenith	.049	72.6	75.6	66.2	N.	Cir.-cumuli about
20	.059	62 2	62.1	60.4	N.	Scatd. cirro-cuml.	.112	67.8	70.9	65.2	N.	Cloudless	.056	72.6	75.4	66.2	N.	Cloudless
21	.070	63.1	63.2	61 8	N.N.W.	Th.clds. E. & W. h	.133	68 9	71.9	65.8	N.N.W.	Mty. hor.—Z. clr.	.081	74.1	76.9	67.6	N. W.	Cumuli in the E.
22	.064	63.2	62.8	59.2	N.N.W.	Scatd. cirro-cuml.	.134	67.7	71.0	62.0	N.N.W.	C.-cum. allo'er sky	.071	73.4	76 3	64.0	N.N.W.	Cloudless
23	.009	60.4	60.2	55 5	N.N.W.	Cloudless	.072	66.1	68.3	61.4	N.N.W.	Cloudless [abt. h.	.004	71.4	74.3	62.2	N.	Ditto
24	29.976	59.0	58.8	55 2	W.	Cir.-str. abt. hor.	.052	64.7	67.1	58.4	N. W.	Cir.-str. N.W. 36°	.005	70.0	72.0	60.0	N. W.	Ditto
25	30.052	56.0	56.0	54.2	Calm.	Cir.-str. abt. zen.	.121	63.7	67.4	59.4	N. W.	Cloudless	.080	69.4	71.4	60.6	N. W.	Ditto
26S.	.062	57.7	57.4	54.4	N.	Scatd. cirro-strati	.135	63.7	66.8	59.4	N.	Scatd. cirro-strati	.080	70.0	72.4	62.0	N.N.W.	Scatd. cirro-strati
27	.106	57.3	57.3	53.6	N.	C.-str. all o'er sky.	.175	63.7	66.9	57.8	N.N.W.	Ditto	.114	69.6	71.6	60.7	N.N.W.	Ditto
28	.034	57.4	57.0	54.9	N.N.W.	Cloudy	.104	61.2	63.2	57.4	N.N.W.	Cloudy	.046	67.4	69.6	61.0	N. W.	Cloudy [sky
29	.025	58.6	58.0	55.5	N.	Ditto	.077	62.6	65 3	59.6	N.	Cir.-str. all o'er sky	.028	68.4	70.7	62.0	N.N.W.	Cir.-str. all o'er
30	.060	59.0	58.6	55.8	N.	C.-str. all o'er sky.	.121	62.2	65.1	59.8	N.	Ditto	.088	68.0	70.6	62.0	N.N.W.	Ditto
31	.096	57.0	57.0	53.8	N.	Cloudless	.169	64.6	68·4	59.7	N.	Cloudless	.107	71.5	75.0	62.3	N.	Cloudless
Mean.	30.038	61.8	61.7	58.9	....	.....	30.102	67.0	69.6	62,7	....	.....	30.050	72.1	74.6	64.6	....	.....

[*Meteorological Register, continued.*]

Date.	Observations made at 2h. 40m.						Minimum Pressure observed at 4 p. m.						Observations made at sun-set.						Maximum and Minimum Thermometer.			Max. Therm. in Sun's rays.	Rain Gauges. Elevations.		Moon's Phases
	Bar. red. to 32° F.	Temperature. Of Mer.	Of Air.	W. Bulb.	Wind. Direction at 2h 40m p. m.	Aspect of Sky.	Bar. red. to 32° F.	Temperature. Of Mer.	Of Air.	W. Bulb.	Wind. Direction at 4 p. m.	Aspect of Sky.	Bar. red. to 32° F.	Temperature. Of Mer.	Of Air.	W. Bulb.	Wind. Direction at Sun-set.	Aspect of Sky.	Max.	Mean.	Min.		Feet. 60. Upper	Feet. 5. Lower	
	Inches	°	°	°			Inches	°	°	°			Inches	°	°	°			°	°	°	°	Inch.	Inch.	
1	29.968	78.3	79.0	63 8	N. W.	Scatd. cirro-str.	29.964	77.0	77.0	63.8	N. W.	Scatd. cirro-st.	29.977	75.9	75.8	64.8	N. W.	Scatd. cirro-st.	80.0	69.5	58.9	..	..	..	
2	.966	78.3	78.8	65.5	N. W.	Scatd. cirri	.955	76.7	76.8	65.5	w. NW.	Cirro-strati	.962	75.7	75.0	66.0	W.	Ditto	80,0	69.5	59,0	..	..	..	
3	.975	72.0	72.8	63.3	NNW	C.-str. all ov.S.	.960	71.8	72.0	63.5	NNW	C.-st. all ov. sky	.971	71.3	71.2	64.0	N. W.	C.-st. all ov.sky	73 6	66.3	58.9	..	..	..	
4	.983	78.0	78.2	66.3	NNW	Scatd. cirro-str.	.978	76.9	76.4	65.6	NNW	Scatd. cirro-st.	.992	75.5	75.2	66.3	N.	Scatd. cirro-st.	79.5	68.8	58.0	..	..	..	
5	..	..	..	..	....	.... [S. to E	..	..	..	..	....	... [E. H.	..	..	..	..	....	.... [E. H.	..	..	..	..	..	..	☾6 h. A.M.
6	.969	79.5	80.0	67.8	N.	C.-st. near H.fr.	.961	78.5	78.3	66.3	NNW	C.-st. near S. &	.961	76.8	76.1	66.7	NNW	C.-st. near S. &	81.3	70.6	59.9	..	..	..	
7	.965	79.0	80.0	68.0	W.	Cloudless [H.	.966	78.2	78.2	66.6	N. W.	Cloudless [H.	.974	76.9	76.4	67.9	N. W.	Cloudless	81.0	70.1	59.1	97.0	..	..	
8	.914	79,9	80.3	69,3	WSW	Cuml. near S.E.	.912	78.7	78.8	69.0	WSW	Cuml. near S.E.	.918	77.0	76.4	69,9	WSW	Ditto	81.4	70,9	60.4	93.0	..	..	
9	.913	79.6	80.7	72.0	SS.W.	Cloudy	.904	79 3	80.3	72.4	S.SW.	Cloudy	.918	78.4	78.5	72.8	SS.W.	Cloudy	81.4	73.2	65.0	91.5	0,27	0.26	
10	.944	71,4	71.4	68.5	N. W.	Raining	.943	70.6	69.4	67.4	N,	Raining	.960	68.6	68.3	66.4	N.	Ditto [W. H.	72.4	69.4	66.4	75.4	0.17	0.24	Per0h. A.M.
11	.948	74.1	74.8	69,3	N.	Scatd. clouds	.944	74,0	74,2	68 8	N.	Scatd. cumuli	.956	73,2	72.8	68.7	N.	Cml.-st. near N.	75 3	69.7	64.0	92,3	..	..	●9 h. A.M.
12	30.011	76.6	77.8	68.0	N.	Cumulo-strati	30.004	75.6	75.0	65.8	NNW	Cumuli	30.018	73.6	72.8	66.0	NNW	Cumuli	77.7	69.8	61.8	91.8	..	..	
13	.014	75.4	76.4	63.3	NNWsp	Cloudless	.015	74.3	74.0	62.9	NNWsp	Cloudless	.022	72.4	71.7	64.0	NNW	Cloudless	76.4	66.6	56.7	88.5	..	..	
14	29.954	77.0	78.4	66.2	NNW	Scatd. cumuli	29.951	76.0	76.0	64.4	N. sp.	Scatd. cumuli	29.964	74,0	73.6	64.6	NNW	Ditto	78 4	67.9	57.4	91.5	..	..	
15	.981	77.4	78.6	66,7	N. W.	Ditto	.967	76.4	76.4	65.8	N. W	Cloudless	.976	74.6	74.2	66 0	N. W,	C.-st. near S. H.	79.0	68.9	58.8	93.4	..	..	
16	.988	77.6	78.6	66.8	NNW	Cloudless	.985	76.6	76.6	65.4	N. W.	Ditto	.985	74.7	74.2	65 4	N. W.	Scatd. cirro-st.	78.7	68.5	58.3	92.6	..	..	
17	30.022	76,0	77.0	62,0	N. W.	Ditto	30.009	74.5	74.2	60.2	NNW	Ditto	30.017	72,4	71.6	62.4	N. W.	C.-st. near W H.	77.0	67 3	57.6	90,0	..	..	
18	29.976	74.6	76.0	64.0	N. W,	Cirro-strati	29.961	74.2	74.2	63.8	N. W	Cirro-strati	29.968	72.4	71.8	65.0	N. W.	Cirro-strati	76.6	65.1	53 5	90.6	..	..	☽ 2 h. P.M.
19	.969	75.3	76.6	66.4	N. W.	Scatd. cumuli	.964	75.2	75.5	65.1	N. W.	Scatd. cumuli	.967	73.6	72.8	64.8	N.	C.-st. about H.	77.0	67.5	58.0	92 5	..	..	
20	.992	77.0	78.3	67.4	N. W.	Cumuli W. H.	.991	75.9	75.6	65.4	N. W.	Cloudless	.996	74.0	73.5	66.7	N. W.	Cloudless	78.8	68.6	58.4	92.4	..	..	
21	30.002	77.5	78.0	67.2	W.	Scatd. cumuli	.995	76.6	76.6	67.0	W.	Scatd. cumuli	30.015	74.8	74.2	67.8	W.	C.-st. about H.	79.0	69,3	59.6	91.8	..	..	
22	29.992	77.0	78.0	64.0	N.	Cloudless	.983	75.6	75.0	62.6	NNW	Cloudless	29.989	73.4	72.4	63.0	NNW	Cloudless	78.4	68.8	59.2	92 2	..	..	Ap.0h A.M.
23	.930	75.2	76.4	62 5	NNW	Ditto	.920	74.2	73.8	61.4	N. W.	Ditto	.920	72.3	71.4	62.3	w.NW.	Ditto	76.6	66 5	56 4	90.2	..	..	
24	.951	73.7	74 4	60.4	N. W.	Ditto	.949	72 4	72.0	58.3	N. W.	Ditto	.956	70.4	69.3	59.6	N. W.	Ditto	74.8	64.9	55.0	86.3	..	..	
25	30.020	72.8	74.0	61.0	NNW	Ditto	30.013	71.8	71.4	59.4	NNW	Ditto	30.025	70.0	69.2	60.2	NNW	Ditto	74.4	63 4	62.4	88.4	..	..	
26	.018	73,2	74,0	61.8	NNW	Scatd. cirro-st.	29.996	72.3	72.3	60.0	N. W.	Scatd. cirro-str.	.005	70.6	69 6	60.8	N. W.	Scatd. cirro-st.	74.7	64.1	53 4	86 3	..	..	⊙7h. P.M.
27	.034	74.5	75.8	62.4	N.	Ditto	30.019	73.4	73.0	61.4	N.	Ditto	.011	71.4	70.7	61.2	NNW	Ditto	76.3	64.9	53 5	88.6	..	..	
28	29.970	72.6	74.5	63,0	N.	Ditto	29.952	72,0	72,3	62,4	N.	Cloudy	29.962	70.0	69.0	62.7	N. W.	Cloudy	74.7	64 1	53.5	88.6	..	..	
29	.979	72.3	74,0	63 2	NNW	C.-st. all ov. sky	.971	72.2	72.2	62.7	NNW	C.-st. all ov.sky	.986	70.4	69.6	62 4	N. W.	C.-st. all ov.sky	73.8	64.2	54 6	87.0	..	..	
30	30 012	73.6	75.4	63.6	N. W.	Ditto	30.000	73.3	73.3	62.3	NNW	Ditto	.997	71.4	70,3	62.4	NNW	Ditto	75.3	65.3	55.2	87.8	..	..	
31	.019	76.8	78.5	63.0	N.	Cloudless	.007	76.4	76.8	61.6	N.	Scatd. cirro-str.	30.009	72,4	71.4	62.8	N. W.	Scatd. cirro-st.	78.6	66.0	53.4	96.7	..	..	
..	29.979	75.9	76.9	65.2	....	.....	29.971	75.0	74.9	64,2	....	.....	29.979	73.3	72.6	64 8	....	.....	77.4	67.7	58 2	90 3	0.44	0.50	..

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Sifán and Hórsók Vocabularies, with another special exposition in the wide range of Mongolidan affinities and remarks on the lingual and physical characteristics of the family.—By B. H. Hodgson, *Esq.*

I now submit to the Society my promised Sifán and Hórsók vocabularies with such geographic illustrations as may tend to render them more easily and fully appreciable. I intended to have retained these vocabularies till I had completed my pending investigation of the grammar of the Gyárúng and Hórpa tongues. But the high interest attaching to the discovery of another surprising instance of the wide-spreading relations of these tongues, made in the course of that investigation, and which discovery is sufficiently verifiable even by the vocabularies, though by no means limited to their evidence, together with the bearings of these vocabularies upon my two last communications to the Society, induces me not to postpone the sending of them. I can follow them up, by and bye, by the proposed grammatical elucidations. In the meanwhile there is abundant matter for the present communication in such a statement as I now propose giving of the present discovery, in some general remarks on the characteristics of the vast group of tongues to which the vocabularies now and priorly submitted belong, and in some descriptions of the physical attributes of the almost unknown races more immediately now in question. Nor do I apprehend that the want of the grammatical details adverted to will materially impair the interest of the present communication, since I have anticipated so much on that

head in the way of practical exposition by samples as to make the special discovery I announce perfectly appreciable without those details, which, moreover speaking generally of this vast group of tongues, I have shown reasons for deeming less important than they are wont to be held both philologically and ethnologically.

This series of vocabularies is entirely my own work in a region equally interesting and untrodden. It consists of seven languages, viz. the Thóchú, the Sokpa, the Gyámi, the Gyárúng, the Hórpa, the Takpa and the Manyak; and so novel is a deal of the matter that it will be necessary to explain at once what these terms mean, and to show where the races of men are to be found speaking these tongues. Hórsók is a compound Tibetan word by which the people of Tibet designate the Nomades who occupy the whole northern part of their country, or that lying beyond the Nyenchhen-thánglá* range of mountains, and between it and the Kwanleun or Kuenlún chain. Hórsók designates the two distinct races of the Hór or Hórpa and the Sók or Sókpa, neither of whom, so far as I have means to learn, is led by the possession of a native name at once familiar and general, to eschew the Tibetan appellations as foreign; though it will soon be seen that they are really so, if our identifications fail not. The Hórpa occupy the *western* half of the region above defined, or northern Tibet; and also a deal of Little Bucharia and of Songaria, where they are denominated Kao-tsé by the Chinese, and Ighúrs (as would seem) by themselves.

The Sokpa occupy the *eastern* half of northern Tibet as above defined, and also, the wide adjacent country usually called Khokhonúr and Tangút by Europeans, but by the Tibetans, Sokyeul or Sókland.

* This important feature of the geography of Tibet is indicated by the Nian-tsin tangla of Ritter's Hoch Asien and by the Tanla of Huc. I have, following native authority, used in a wide sense a name which those writers use in a contracted sense; and reasonably, because the extension, continuity and height of the chain are indubitable. Nevertheless Ritter and Guyon have no warrant for cutting off from Tibet the country beyond it up to the Kuenlún, nor are Katché and Khór, the names they give to the country beyond, admissible or recognised geographic terms, Khór, equal Hór, is purely ethnic, and Katché is a corruption of Kháchhé or Mahomedan, literally, big-mouth.

In southern Tibet, or Tibet south of the Nyenchhen-thánglá chain, there are numerous scattered Hórpas and Sókpas, as there are many scattered Bodpas in northern Tibet; but, in general, that great mountain chain, the worthy rival of the Himálaya and the Kuenlún, may be said to divide the nomadic Hórpas and Sókpas from the non-nomadic Bodpas or Tibetans proper. Though the major part be Buddhists, yet are there some followers of Islam among the Hórpas and Sókpas of Tibet; more beyond the Tibetan limits. They are all styled Kháchhé by the Tibetans, of which word I think the Chinese Kao-tsé is a mere corruption, despite Cunningham's ingenious interpretation of Kao-tsé.

The Islamites are also called Godkar, of which term again Klaproth's Thógar seems to be a metamorphosis.

Between the Hórpa and Sókpa in the central part of northern Tibet, are the Drókpa* vel Brógpa, whose vocables I have as yet failed to obtain; and also, numerous "Kazzâk" or mounted robber bands, styled by the Tibetans Chakpa vel Jagpa, who recruit their formidable association from any of the neighbouring races, but especially from the Bodpa (Tibetans proper), the Hórpa, the Sókpa and the Drókpa. The language of the Chakpa is the ordinary Tibetan, and therefore, and because also of their very mixed lineage, they are of little ethnic importance though always cited by the Tibetans, with fear and trembling, as a separate element of their population. The predatory habits of the Chakpa often carry them beyond their own limits, and they and the erratic Drókpa are often seen in Nári where Gerrard and Cunningham speak of them under the designations of Dzakpa and of Dókpa. I doubt the ethnic independance of both, and believe them to be mixed associations, composed of people of the above specified races, from among which the Hórpa or Turks contribute an element even to the Himálayan population of Kanáwer, as is proved by the infinitives in "mak" of the Taburskad tongue.

From Khokhonúr to Yúnán the conterminous frontier of China and Tibet is successively and continuously occupied (going from north to south) by the Sókpa above spoken of, by the Amdóans who for the most part now speak Tibetan, by the Thóchú, by the Gyá-

* Quite distinct from the Dúkpa vel Brúkpa of Bhútán, The 'vel' indicates the distinction of the written from the spoken words.

rúng, and by the Manyak, whose vocabularies are all subjoined; whilst returning back westward, along the pente septentrionale of the Himálaya we have, after passing through the Kham districts of Chyárúng and Kwombo, the region of the Takpas, or Takyeul, styled* Dakpo by Ritter, who however places it East of Kwombo, whereas it lies west of that district, written Combo by him. The Brahmapútra or Yárú quits Tibet in the district of Kwombo, as he states.

Takpa, the Towang Ráj of the English, is a dependency of Lhása. Its civil administrator is the Chónajúng peun; its ecclesiastic head, the Támba Lama, whence our Towang.

The peoples of Sok-yeul, of Amdo, of Thochú, of Gyárúng, and of Manyak, who are under chiefs of their own, styled Gyábo or King, Sinicé Wang, bear among the Chinese the common designation of Si-fan or Western aliens; and the Tibetans frequently denominate the whole of them Gyárúngbo from the superior importance of the special tribe of Gyárúng, which reckons eighteen chiefs or banners of power sufficient, in days of yore, often to have successfully resisted or assailed the celestial empire, though for some time past quietly submitting to a mere nominal dependancy on China. The word Gyá in the language of Tibet, is equivalent to that of Fan (alienus,† barbaros) in the language of China; and, as rúng means in the former tongue, proper or special, Gyárúng signifies alien par excellence, a name of peculiar usefulness in designating the whole of these Eastern borderers, in order to discriminate them from the affined and approximate, but, yet distinct, Bodpa of Kham. Others affirm that Gyárúng means wild, rude, primitive Gyás, making rúng the same as túng in Myamma; and that the typical Gyás (Gyámi) are the

* I should add that Ritter's Gakpo and Gangpo, and Dakpo are not three separate places, but merely various utterances of the single word Takpa, and no more admissible therefore than his Katché and Khor before explained. This great geographer is rather too prone to give a "local habitation" to the airy nothings of this polyglottic region, as I have formerly had occasion to point out, though no one can more admire than I do his immense learning and the talent that guides and animates it.

† Hence Gyá philing, or Frankish stranger. European foreigner is the name for Europeans in Tibet. Philing=Frank, indicé Feringi; *not* as interpreted by M. Huc.

Chinese, though the latter be usually designated specially black Gyás (Gyá-nak).

The Gyárúngs themselves have no general name for their country or people, a very common case. When I submit the interesting itinerary I possess of a journey from Kathmandú to Pekin, I shall more particularly notice the topography of Sifán. At present it will be sufficient to add that this country, which extends from the Blue Sea to Yúnán, with a very unequal width varying from several days' march to only two or three, forms a rugged mountainous declivity from the lofty plateau of Kham to the low plain of Sechuen, and which is assimilated by those who well know both, to the Indian declivity of the Himálaya, the mountains being for the most part free of snow and the climate much more temperate than that of Tibet. *Within* this mountainous belt or barrier of Sifan, are the Takpa, who are consequently Tibetans: *without* it are the Gyámi who are consequently Chinese, as will be seen by their respective vocabularies —vocabularies, not the less valuable for being dialects merely, (if no more) of languages well known, because the dialectic differences of the Chinese and the Tibetan tongues are little understood,* at the same time that they are very important for enabling us to test the alleged distinctness of the great groups of people nearest allied to these divisions.

For my part I apprehend that the true characteristics of the Chinese and Tibetan languages have been a good deal obscured by book-men,† Native and European; and, though it be somewhat pre-

* Leyden reckoned ten Chinese tongues (As. Research. X. 266). Others hold that there is but one. Again Remusat (Recher. sur les lang. Tartares) insisted that there must be several tongues in Tibet, whereas DeCoros (Jour. No. 4,) considers that there is but one. This comes in part of the want of a standard of ethnic unity, whether lingual or physical, and in part of the mixture of distinct races by regarding them under a large geographic and political unity, thus the Horsok belong undoubtedly to Tibet, but do not belong to the Bodpa race. I have given, I believe, all the languages of Tibet, that is, the languages of all the races now and long settled in Tibet. My Gyámi vocables exhibit a vast difference from the Kong one of Leyden, ut supra. But I do not rely on mine, nor have I means to test it.

† A deal of DeCoros' abundant grammatical apparatus of the Tibetan tongue is positively repudiated by the people of Tibet, whilst the learned and sage Remusat

mature to venture an opinion before I have completed my pending investigation of the Gyárúng and Hórpa tongues, I still must say that I suspect few competent judges will rise from the attentive study of this and my two prior series of vocabularies without feeling a conviction that the Indo-Chinese, the Chinese, the Tibetans, and the Altaians have been too broadly contradistinguished and that they form in fact but one great ethnic family, which moreover includes what is usually called the Tamulian element of Indian population as well as nearly every element of the population of Oceanica.*

My former vocabularies showed how intimately the Indo-Chinese tongues are allied with the Himálayan and Tibetan by identity of roots, of servile particles, and even of entire words as the integral results of the combination of the two former, provided only that the comparison be drawn from a field large enough to exhibit the necessary range of admitted mutation both in the primary and secondary parts of words in use for ages among widely sundered and often also extremely segregated races. How large that range of admitted mutation is, I have illustrated by examples in the note appended to the present series of vocabularies, and I recommend those who would properly appreciate the great apparent deviations from a type of language which is, as I suppose, one and the same, to take good heed of what is there instanced. In the meanwhile without fatiguing the reader with more analyses at present, I proceed to remark

teaches us to question the over-strained and unintelligible assertions about the monosyllabism of the Chinese tongue, as if there were no dissyllables, no adjuncts to the roots! and as if the roots of Sanscrit, Hebrew and Arabic were *not* monosyllables. For some valuable remarks on monosyllabism, see Recherches sur les langues Tartares, I. 351-4, and compare what occurs in the sequel as to the monosyllabic polysyllabism (different aspects of the case) of Gyárúng and Tagala. Thus in Gyárúng the root zo becomes Masazangti by mere cumulation of particles, ma sa, ng, and ti.

* The elder oceanic element or Alforian,=our Tamulian and the analogous dispersed and subdued tribes of Indo-China and China: the younger oceanic element or Malayo-polynesian,=the now dominant tribes of Indo-China, China, Tibet, and Himálaya. I must content myself at present with pointing to the special illustration of the *latter* part of this reunion of the continental and insular races in the sequel, though every proof of the wide common domain of the continentals is also an illustration, inferential yet clear, of both parts of it.

that the analogies and affinities indicated by the last series of vocabularies between the Himálayan and Tibetan tongues on one hand and the Indo-Chinese on the other, are carried on and confirmed by some of the present series, whilst others extend the links to the Altaic group of languages; the Gyárúng, Takpa, and Manyak carrying the chain of connexion onwards from the South-east, and the Thóchú, Hórpa, and Sókpa, transmitting it over the Kwanleun to the North and West; the Gyárúng by its grammatical structure exhibiting also marvellous correspondencies with remoter regions; with Caucasus, as has been separately shown already, and with Oceanica, as will appear in the sequel of this communication. How far precisely the other languages now submitted may participate these express and peculiar features of grammatical affinity I am not yet prepared to say. But the whole of them certainly exhibit a great general resemblance in the broader traits of syntactic,* and yet a greater in those of etymological construction. In a word they are evidently members of that single and vast family of languages the singleness and the vastness of which I conceive to be justly inferrible even from its vocables: 1st, because of the similarity of the roots, 2nd, because of the similarity of the serviles, 3rd, because of the similar principles governing the uses and the mutations of both, and the consequent composition and the character of the integral words which exhibit an essential identity in numberless terms of prime necessity after due allowance for synonymous changes in their roots and for euphonic and differential changes in their serviles within known limits and upon a demonstrably single plan. And I infer that the differences characterising this vast family of languages, however striking at first sight, are subordinate, because when the languages are examined upon a broad enough scale these differences are seen to pass away by insensible gradations. Such as they are, they arise

* I may instance the universal substitution of a continuative participle in lieu of conjunctions and of conjunctive (relative) pronouns, because this feature has been supposed to be specially characteristic of the Altaic group. It is no more so than the vocalic harmony of Turki, or than the inverted style and tonic system of the Indo-Chinese tongues. These appear to me to be blending differences of degree only, not absolute differences of kind, and to have been used to sever unduly the several groups.

from 1st, a greater or lesser use of the prefixed, infixed and postfixed particles, amounting to nearly constant employment of some or all of them in some tongues, and to nearly total* disuse of some or all of them in others. 2nd, from a preference by one tongue of the prefixes, of the infixes by another, and of the suffixes by a third. 3rd, from that transposed position and function of the primary and secondary part of words† (root and particle) which is a law of these languages eminently obscurative of identities in its partial operation. 4th, from the substitution of a reiterated root, for a root and particle in the composition of words when the various meanings of the root might otherwise transcend the differencing power of the particles, or at all events, not satisfy the demand for an unusually broad distinction.‡ 5th, from the disjunct or conjunct (elided vowel) method of

* The disuse or non-use is often only apparent, for the surplus "silent" letters are really prefixes, with a blended instead of a separate utterance. That this is so may be proved to demonstration by identity of *function* (differential) in the two: and yet the blended or separate utterance makes all the difference between monosyllabism and its opposite, besides causing other differences that are apt to conceal the essentlal identity of words. See analysis of Caucasian and Mongolian words in appendix to my last communication.

† Compare overleap and leap over: what holds good chiefly as to our verbs, holds good equally as to the verbs and nouns of these tongues wherein indeed the two classes of words are but faintly distinguishable, or not at all so. Abundant fresh evidence of the law may be found by comparing Leyden's Indo-Chinese with my Tibeto-Himálayan vocabularies: compare mim-ma and sa-mi, Burmese, with mi-sa, Newari, Root mi; and ma-nek, Burmese, with Nyi-ma, Tibetan, Root Nyi. Day, sun and morning, when compared speak for themselves.

‡ In Gyárúng the root pyé, bird, is so near to the root pé, father, that they have been segregated by the application to one of the usual prefix, to the other of the iterative principle, or root repeated, whence tápé, a father, and pyé pyé, a bird, forsan et pé pé. I might add, as a 5th cause of difference between these tongues, the different degrees in which each employs the tonic or accentual variant, which principle has been most erroneously supposed to be exclusively Chinese and Indo-Chinese, whereas it prevails far and wide, only more or less developed; most where the servile particles and so-called silent letters are least in use; least, where they are most in use; so that the differential and equivalent function of all three peculiarities, that is, of "empty words," (see Chinese Grammar) of "silent letters" and of tones is placed in a clear light such as Remusat vainly strove to throw upon one of the three, viewing it separately. See Recherches sur les langues Tartares, p. 355-7, Vol. I. DeCoros strangely enough says nothing about tones or servile

using the prefixed serviles, whence results at once all the difference of soft polysyllabism or harsh monosyllabism. The resulting disparities of the vocables are certainly often very marked, as in the Watú and Uí instance of Gyárúng and Circassian, (so singularly confirmed by the Malay and Tagala itú, that) as well as in those given at the end of the present series of vocabularies, so that it is no great wonder that the Mongolidan tongues have been referred to many groups so trenchantly separated as virtually to fall under different families. And, if I incline so strongly to unitise the family, it is only because, as far as my investigations have gone, I have been able to discern nothing absolute and invariable in the distinctions—which though no doubt distinctions proper to the vocables only and not affecting structural diagnostics (in the usual narrow sense, for composition of words *is* structure) are yet unusually and as I conceive decisively important owing to the extremely inartificial character which belongs to the grammar of these tongues with some apparently borrowed exceptions, such as that of the Turkish verbs. Not that the grammatical or the physical evidence of this assumed family identity conflicts with that of the vocables*—much the contrary, as we shall soon see—but that the latter has unusual relative value. And, would we speak plainly, we should say that grammar relates equally to the construction of words and to the construction of sentences, and that the former sort of putting together or syntax is always equally, and often more, important than the latter. Certainly it is more so in the Mongolidan tongues which are as much distinguished by their immensity of nicely discriminated terms,† most of

particles and hence his remarks on the silent letters want point and significance. The language of Nepal proper is remarkable for its numerous tones and its scanty serviles, whether literal or syllabic.

* I may mention here an interesting sample of this identity derived from the substantive verb. It is 'da' in Myamma, a-da in Malay, da in Hórpa, gdah in Tibetan, dan in Uraon, &c. So also it is mena in Sontal and mna in Tibetan; and again, it is dúg in Tibetan, dong in Bodo and Garo and dú in Newari.

† See vocab. voce 'give' and 'take.' A Tartar cannot endure that confusion of the precative, optative and imperative which our imperative mood exhibits. But he remedies the defect not by the multiplication of grammatical forms but by the use of distinct words, or distinct multiplications of the same word, thus Davo solicits

them *necessarily* compounds—and compounds of no unskilful contrivance—as by the scantiness and infantine simplicity of the contrivances by which those terms are held together in sentences. Nay, if we look carefully to what has been so well done in one's own day for the elucidation of our own language, we shall discern that the new lights have been principally etymological, borrowed from, as thrown upon, the construction and composition of words, not of sentences.

Perhaps it will be urged that, after all, the structural analogy I have established between the Gyárúng and Circassian tongues belongs rather to the etymological than to the syntactic department of language. Let it be granted, and I would then ask whether the analogy be therefore less important? And is it not singular and a proof wherein resides the essential genius and character of these tongues, and where therefore we are to seek for their true and closest relations, that my scanty knowledge of the Himálayan and Tibetan group of them should enable me unhesitatingly to analyse the words of the Caucasian group, of which I know nothing and to pronounce, for instance, Didi to be a reduplicate root, and Dini to be a root and servile prefix, with perfect confidence and, as I doubt not, with equal accuracy? *That* will at all events be known by and bye, and should the result be such as I look for, the consequent affinity of the Caucasian and Mongolian tongues will take an unquestionable shape and stand on the unassailable basis of words similarly constructed in all their parts and similarly employed throughout.

I must, however, whilst thus insisting on the pre-eminent importance of Mongolidan vocables, freely admit that those of all my present series are by no means entitled to equal confidence, my access to the individuals who furnished the Sokpa and Gyámi words in particular having been deficient for such analytic dissection as I hold by, and the competence of my informants, moreover, not beyond question. I am likewise much in want of adequate original information respecting the Altaic group, and of the books that might supply it. Nevertheless, I think, I may safely affirm upon the strength of my vocabularies that the Sókpo of the Tibetans are, as has been already assumed in

and Davong commands, et sic de cæteris. Compare the disjunctive we, so common in these tongues.

this paper, no other than the Olet and Kalmak of Remusat and Klaproth,* whilst their confrères the Hórpa are almost as evidently Turkish, the Turkish affinity of the latter being inferred, not only from the vocables but from the complex structure of Hórpa verbs and from the quasi Arian physiognomy of the samples I have seen of the Hórpa race. And thus, quoad Sokpo, is dissipated the dream of twenty years, during all which time I have been in vain endeavouring to get access to the Sokpo, assured from the identity of names (Sok pronounced Sog) that in the much talked of people of Eastern Tibet, I should discover that famous race which gave their appellations to the Sogdiana and Sogdorum regio (on the Indus) of the classics, and whose identity with the Sacæ of Indian and Grecian story, whose genuine Arianism and resplendant renown, I never permitted myself to doubt. Reverting to what I have better assurance of, I shall next note a fact as extraordinary almost as that which formed the subject of my last communication to the Society, to wit, that some of Humboldt's characteristics of the Malayo-polynesian tongues hold good as to the Gyárúng language even more strangely than Rosen's of the Circasian; so that we may have possibly in the unsophisticated tongue of this primitive race of mountaineers, situated centrally between the Chinese, the Indo-Chinese, the Tibetans and the Altaians and protected from absorption, assimilation or conquest by their fastnesses, the main and middle link of that vast chain which unites the insular and continental nations of the East and the most remotely dispersed scions of the immensely diffused family of the Mongolidæ!!† Those who are acquainted with the famous Kavi

* I might now add, having just laid my hands on M. Huc's book, the synonyme of Turgot to those of Kalmak and Olet, but that Turgot, like Dúrbét, designates only a tribe of this race, and a tribe whose tribual denomination as well as its migration to the Volga and back to the Ili, had been already stated by Remusat. M. Huc's amusing work in fact adds nothing to our stores of accurate ethnological knowledge, his mere assertion, for instance, that the Hiongnú were Huns throwing no fresh light upon a long debated point, and the nullity of the absolute identity of names in reference to the Sog teaching us yet more to doubt vaguer identifications of this sort. Let me add that M. Huc's account of the habits, manners and characters of the several peoples is capital, and most evidently accurately as vividly delineated.

† It may reconcile some of my readers to this startling announcement to hear

Sprach (known to me alas! only at second hand) will know what I mean when I solicit their attention to the accompanying Gyárúng vocabulary, as bearing on the face of it evidence that in the Gyárúng tongue almost all the words in their ordinary* state are dissyllables, whilst I can assert positively from my own knowledge of the language that the two syllables may be resolved into a monosyllabic root and its affix, *or* into a repeated monosyllabic root. Now these features (which by the way are very noticeable even in the small samples accessible to me of the Circassian tongue) Humboldt has denoted as special characteristics of the Malayo-polynesian languages; and they are certainly most conspicuous attributes of the Gyárúng tongue. Thus, in the first column of the Gyárúng vocables there are thirty-five words, whereof not less than thirty-one are dissyllables and only four monosyllables, and the dissyllables are all resolvable into a monosyllabic root and its customary prefix (Ta, mutable into Ka), save those (Pyépyé, Nyényé) that are formed by reduplication of the radical.

That Pyé, bird, and Nye, cow, are roots, any one may prove for himself by turning to their Tibetan and Chinese equivalents; and that in the Gyárúng tongue the root is in these instances repeated to constitute the current term or integral word is self-apparent. That, again, in Gyárúng Ta is the common and almost indispensable prefix, and is mutable into Ka, both liable to euphonic changes of vowel, to suit that of the radical, the vocabulary also demonstrates, testably to any extent by its predecessors of the allied tongues. And if it be urged, as in truth it may be, that the above constitution of the vocables belongs in essence to all the continental tongues, as Humboldt's sagacity divined it did to all the insular ones, the more frequent use of the prefix and consequent dissyllabism being all that is excessively Gyárúng, I have still to produce another Gyárúng

that there are historical or traditional grounds for supposing this very region to be the common nest and original seat of the Chinese and Tibetan races. See Klaproth's Tabl. Histor. and Memoires relatifs a l'Asie and Remusat's Recher. sur les Lang. Tart.

* I say ordinary state because when all the apparatus of composition attaches, they become polysyllabic. See the sequel, and mark the consequence as to the monosyllabic test.

trait which it shares with what has been deemed the most primitive Malayopolynesian type; and I shall do so by the following quotation from* Leyden. "Few languages present a greater appearance of originality than the Ta-gala. Though a multitude of its terms agree precisely with those of the languages just enumerated (the Western Polynesian), yet the simple terms are so metamorphosed by a variety of the most simple contrivances that it becomes impossible (difficult B. H. H.) for a person who understands all the original words in a sentence to recognise them individually or to comprehend the meaning of the whole. The artifices which it employs are chiefly the prefixing or postfixing (or infixing B. H. H.) to the simple vocables (roots) of certain particles (serviles) which are again combined with others; and the complete or partial repetition of terms in this reduplication may be again combined with other particles." The above, as well as what follows (p. 211-12) upon Ta-gala verbs, is in general remarkably coincident with Gyárúng,† the differences being such only as, when compared with other allied tongues, to show that

* Researches, B. A. S. Vol. X. p. 209.

† I subjoin some samples as significant as Leyden's illustrations of the Tagala verbs. From the root Ching, to go, we have almost indifferently, Yaching, Kaching, Daching, Taching, Naching, in a present sense, and Yataching, Kataching, Dataching, Tataching, Nataching, in a past sense, with some speciality of sense as to the na and ta prefix that need here be particularized. Next we have Yatachinti, Katachinti, Datachinti, Tatachinti, Natachinti, meaning 'one who goes or went, or the goer,' if one's self; and, if any other, then the series becomes Yatachisi, Katachisi, &c. The negatives are Matachinti vel Matachisi according to the person, the particle of negation displacing the first of the prefixes indifferently. So from Máng to sleep, Karmáng, Marmáng, Tatarmáng, Matarmángti, Tatarméti, Matarmési, I sleep, I sleep not, I slept, I who slept not, Thou who sleepedst, He who slept not, or the sleepless, (other than one's self). From Zo, eat, Tasazo, feed, Tasazángti, I who feed, Tasazési, he who feeds, Masazángti, I who feed not. Of these I give the analysis of the last as a sample. Ma, negative prefix. Sa, causative infix. Záng, I eat, from the root Zá with suffixed pronoun. Tí mutable to Si, the participial attributive suffix.

These are the simplest verbal forms and the most usual, whence the prevalent dissyllabic character of the verbs as of the nouns, as seen in the vocabulary consisting of a root and one prefix. But the vocabulary, whilst it demonstrates this, indicates also the more complex forms, put rather too prominently forward by Leyden in his Tagala samples.

the characteristics, however pre-eminently, are by no means exclusively, Gyárúng among the continental tongues, any more than they are exclusively Ta-gala among the insular ones. Among the latter, Humboldt considers that the Ta-gala (a specimen by the way of the inseparable prefix) preserves the primitive type of the whole group; and that that type is revealed in the Gyárúng I am inclined to assert, without however forgetting that my investigation is far from com-

Thus, in our Gyárúng vocabulary the words, cry, laugh, be silent, run, or four out of twenty-four verbs, instead of a single prefix, have a double and even a treble supply in the simple imperative form there used; as Da-ka-krú from the root Krú; Ka-na-ré from the root Ré; Na-ka-chúm from the root Chúm; Da-na-ra-gyúk from the root Gyúk. Hence, compounding as before, we have from the last cited simple term, Danarasagyúk, cause to run; Madanarasagyúk, do not cause to run; Danarasagyúngti, I who cause to run; Manarasagyúti or Madanarasagyúti, he who does not cause to run; I believe also that the reiterative form Matarmáng is quite as usual as the substitutive form Marmáng, and Matsazángti, for Matasazángti, as Masazángti, time and tense notwithstanding. Repetition and other changes above illustrated in the prefixes, belong much less to the roots, infixes and suffixes whether in verbs or nouns, and when the root is repeated the prefix is commonly dropt, as has been explained as to substantives. But there are instances in the verbs of root repeated and yet prefix retained, though the vocabulary affords none such as its Kalarlar, round, which is a root repeated yet retaining its prefix; whilst the adjectives of the vocabulary, unlike the substantives also afford several instances of the doubly and trebly reiterated prefix, as Kamgnár, sweet; Ka-magnár from the root of gnár, and Kavándro, cold, Ka-va-na-dro from the root dro. The elided forms, however, and particularly Kamagnár show that leaning towards dissyllabism which has been dwelt on,—perhaps too strongly, though it assuredly be a most marked feature of this tongue, and one too which Leyden's mistake as to his own sample verb shows to be pre-eminently proper to Tagala; for "tolog, to sleep" is *not* the radical form of the word, as he assumes, but a compound of the root and its customary prefix, ta, with the vowel harmonised to that of the root.

The prefixes are the great variants, and besides being so much repeated, they can be transposed and interchanged almost at pleasure owing to their synonymous character, and these variations of the prefixes, with the elisions consequent on much reiteration of them, constitute the greatest part of that enigma which Leyden emphasizes; though it be in the actual use of the speech much less excessive (I still speak of Gyárúng), than his samples would lead any one to suppose.

In the above samples of Gyárúng I have given the verbs alone, without the added pronouns of Leyden's Tagalan instances—such additional complication being rather suited to create wonderment than to promote sound knowledge.

plete, and without insisting so much upon the primitiveness of this type as upon its much more interesting feature of a connecting bond between the so-called monosyllabic aptotic and the so-called polysyllabic* non-aptotic classes—classes which appear to me to have no very deep or solid foundation much as they have been insisted on to the obscuration of the higher branches of philology and ethnology rather than to their illustration (as I venture to think), and but for which obscuration our Leydens and our Joneses, our Bopps and our Humboldts, could never have been found at such extreme apparent diversity of opinion. I may add, with reference to the disputed primitiveness of Ta-gala, owing to its use of the "artifices" above cited that throughout the Himálaya and Tibet it is precisely the rudest or most primitive tongues that are distinguished by useless intricacies, such as the interminable pronouns, and all the perplexity caused by conjugation by means of them with their duals and two plurals. The more advanced tribes whether of the continent or of the islands have, generally speaking, long since cast away all or most of these "artifices."

I have thus, in the present and two former communications shown what a strange conformity in the essential components of their speech still unites the long and widely sundered races inhabiting now the Himálaya, Tibet, Indo-China, Sifan, Altaia, Caucasus and Oceanica; and, as a no less strange conformity of physical conformation, unites (with one alleged exception) these races, it cannot much longer be doubted that they all belong to one ethnic family whose physical attributes it shall next be my business to help the illustration of by describing the heretofore unknown peoples whose languages have been submitted to inspection and examination. Before however I

* Compare the monosyllabic roots and dissyllabic simple vocables of Gyárúng with the sesquipedalians just given? The comparison is pregnant with hints, especially as there are in the cognate tongues, all grades of approximation. Thus Kanaré, laugh, in Gyárúng with its double prefix, is Yere in Limbu with one, and Rer, in Magar without any; and thus Taliáng, air, in Lepcha with its prefix and suffix, is Tali, in Gyárúng with prefix only, and Li or Lé in Burmese without either. Innumerable instances like this make me conclude that the Gyárúng differs only in degree, not in kind notwithstanding that its verb, like that of the Ta-gala, certainly presents an extraordinary and seemingly unique spectacle in some aspects—but not in all; for, in the sentence tizé-kazé papun, he called them to feast, though the root za to eat be repeated and each time with a differently vowel-ed servile attached, yet the combination is not grotesque nor the root smothered.

turn to the physical characteristics I must add that all the languages whose vocables are herewith submitted to the Society, are and always have been devoid of letters and of literature, what writing there is among these races being confined to the Tibet-trained monks whose religious ministry they all accept, and who (the monks) use the Tibetan system of writing applied solely to the Tibetan language and never to that of their flocks, the several races now in question or any of them.

I cannot learn that in Tibet the Sokpo or the Hórpa ever employ any system of writing of their own, though I need not add (assuming their identification to be just) that the Mongols and the Eastern Turks have each their own system quite distinct from the Tibetan. Having always considered the physical evidence* of race quite as important as the lingual, and the one as the true complement of the other, I have not failed to use the opportunity of access to the peoples whose vocables are now transmitted in order to note their physical traits.

The following are the chief results of that investigation:—

	Amdóan. I.	*Hórpa.* II.	*Gyárúng.* III.	*Manyak.* IV.
Height without shoes,	5.8.½	5.7.½	5.3.0	5.4.0
Length of head, from crown to chin (with calipers),	0 8.½	0.8.½	0.9.0	0.9.½
Girth of head,	1.10.0	1.9.¼	1.10.¾	1.10.¾
Length of head, fore and aft or forehead to occiput,	0.7 ¾	0.7.¾	0.8.0	0.8 0
Width of head, between parietes,	0.6.½	0.6.0	0.6.⅞	0.6 ⅞
Crown of head to hip,	2.4 ¾	2.4.0	2.3.½	2.3.0
Hip to heel,	3 3.¾	3.3.½	2.11.½	3.1.0
Width between the shoulders,	1.4.0	1.1.0	1.1.½	1.4.0
Girth of chest,	3.1.0	2.9.0	2.11.¼	2.11.¾
Length of arm and hand,	2.6.¾	2.6.0	2.4.¾	2.4.0
Length of arm,	1.0.0	1.0.0	0.11.½	0.11.¼
Ditto of fore-arm,	0.11.0	0.10.0	0.9 ½	0.9.¾
Ditto of hand,	0.8.0	0.7.¾	0.7.¾	0.7.¼
Ditto of thigh,	1.8.0	1.7.0	1.6 ½	1.7.0
Ditto of leg, to ankle,	1.4.½	1.5.0	1.3.0	1.5.0
Ditto of foot,	0.11.0	0.10.0	0.9.½	0.9.¼
Width of hand,	0.4.¾	0.4.⅝	0.4.0	0.4.0
Ditto of foot,	0.4 ¾	0.4.¼	0.4 ⅛	0.4 0
Girth of thigh,	1.9.0	1.4.¾	1.6.¾	1.7.½
Ditto of calf,	1.3.½	1.1.¾	1.2.0	1.1.½
Ditto of fore-arm,	0.11.0	0.9.¾	0.10.0	0.9.½

* Some attempts have recently been made (see last vol. of Brit. Assoc. and Journal of Roy. As. Soc.) to disparage the value of this evidence. But no one well acquainted with the Tartars in various remote locations could for a moment think of so doing. I refer with confidence to Dr. Buchanan's remarks on the subject in the V. vol. Asi. Res.

No. I.—A native of Amdo, aged 35 years, a finely formed and very strong man, capable of carrying three maunds or 250 pounds over these mountains, which he has done several times in order to turn a penny during his sojourn here, though the lax state of his muscles shows that he is usually an idler, and not now in training for such work, nor much used to it.

A Gélúng or monk of the mendicant class, and of course a shaveling, so that his head has been examined with unusual advantage. Five feet eight and a half inches tall, and more than proportionably broad or bulky, with large bones and ample muscle, not however showing any bold development, the surface on the contrary being smooth and even, like the body of an idler. Not fat at all, but well fleshed. Colour of the skin, a very pale clear brown, or isabelline hue, like dry earth, or dirty linen, or unbleached paper; not yellow nor ruddy at all. No trace of red on the cheeks which are moderately full. Colour of eyes, dark brown; of hair, generally, black, but that of moustache, auburn. No hair on chest, nor on legs or arms. Moustache spare. No beard nor whisker. Hair of head, so far as traceable, abundant, strong and straight. Cranium not compressed nor depressed. Not raised pyramidally, yet brachycephalic rather than dolichocephalic, and the occiput truncated or flush with the thick neck, but not flattened. Vertical view of the head, ovoid not oval, widest between the ears, and thence narrowing equally to the forehead and to the occiput. Facial angle good. Profile inconspicuous. Contour of the face (front view) rather ovoid than angular or lozenge-shaped, the cheek-bones having no conspicuous lateral saliency, nor the forehead and chin any noticeable attenuation. Forehead sufficiently high and broad, and not appearing otherwise from any unusual projection of the orbitar periphery or of the zygomæ. Eyes sufficiently large and not noticeably oblique, but remote from each other, and flush with the cheek and the upper lid, drooping and constricted to the inner canthus which is large and tumid. Nose, good, straight; the bridge well raised between the eyes and the terminal part nor spread nor thickened, though the nostrils be shorter and rounder than in Europeans, and the saliency of the whole organ less than in them. Ears large and standing out from the head, but occupying the usual relative position. Mouth good but large, with fine vertical teeth, not

showing the least symptom of prognathism in the jaws. Very full lips, but not gaping nor at all Negro-like in their tumidity. Chin not retiring nor yet roundly salient, but level with the gums, or in the same plane with the teeth, and square and strong, as well as the jaws which afford ample room in front for an uncrowded set of beautiful teeth. Body well proportioned, but somewhat long (as well as massive and square) in the trunk and in the arms, relatively to the legs. Hands and feet well made and large, but rather as to breadth than length. Head well set on the short thick neck, and shoulders high. Chest, splendid, wide and deep, and general form, good. Expression Mongolian, (but not at all markedly so as to features) and calm and placidly good-natured. Ears bored, but not distended; and tattooing or other disfigurement of the skin quite unknown to all these races, as I may say once for all.

No. II. A Hórpa of Tángo, west of Gyárúng towards Amdo. Name Isaba. Age 38 years. A man of good height (5-7½) and figure, but far less powerful than the Amdóan, and somewhat darker in colour. Spare of flesh, but not actually meagre. Colour, a pale brown, without yellow or red, like all the Himálayans and Tibetans, and the eye, of a dark clear brown, as usual with them. No trace of ruddiness on cheek. Hair of the head, moustache and whisker, pure black. Hair of head, long, straight, strong, abundant. Moustache small and feeble. Whisker rather ampler. No beard, nor a trace of hair on the chest, back or limbs. Head longer (fore and aft) than wide, but scarcely dolichocephalic, though not truncated occipitally, nor compressed nor depressed nor pyramidised. Vertical view, oval, the wider end being the posteal or occipital, and being wider there than between the ears. Facial angle, good. Contour of the face long and oval, without any trace of the lozenge breadth and angularity. Forehead, narrow and rather low, but not retiring. Cheek bones not salient laterally, nor the frontal sinuses or orbits, prominent. Ears large and loose. Eyes of good size, remote, but not noticeably oblique, though the inner angle be tumid with the usual constriction thereto of the upper lid which somewhat narrows the parting of the lids. Nose straight, not very salient, yet well raised between the eyes, and not dilated towards the tip, and the nares elliptic and long, but the bridge nevertheless broad and obtusely rounded. Mouth good, but large and prominent from the fullness of the

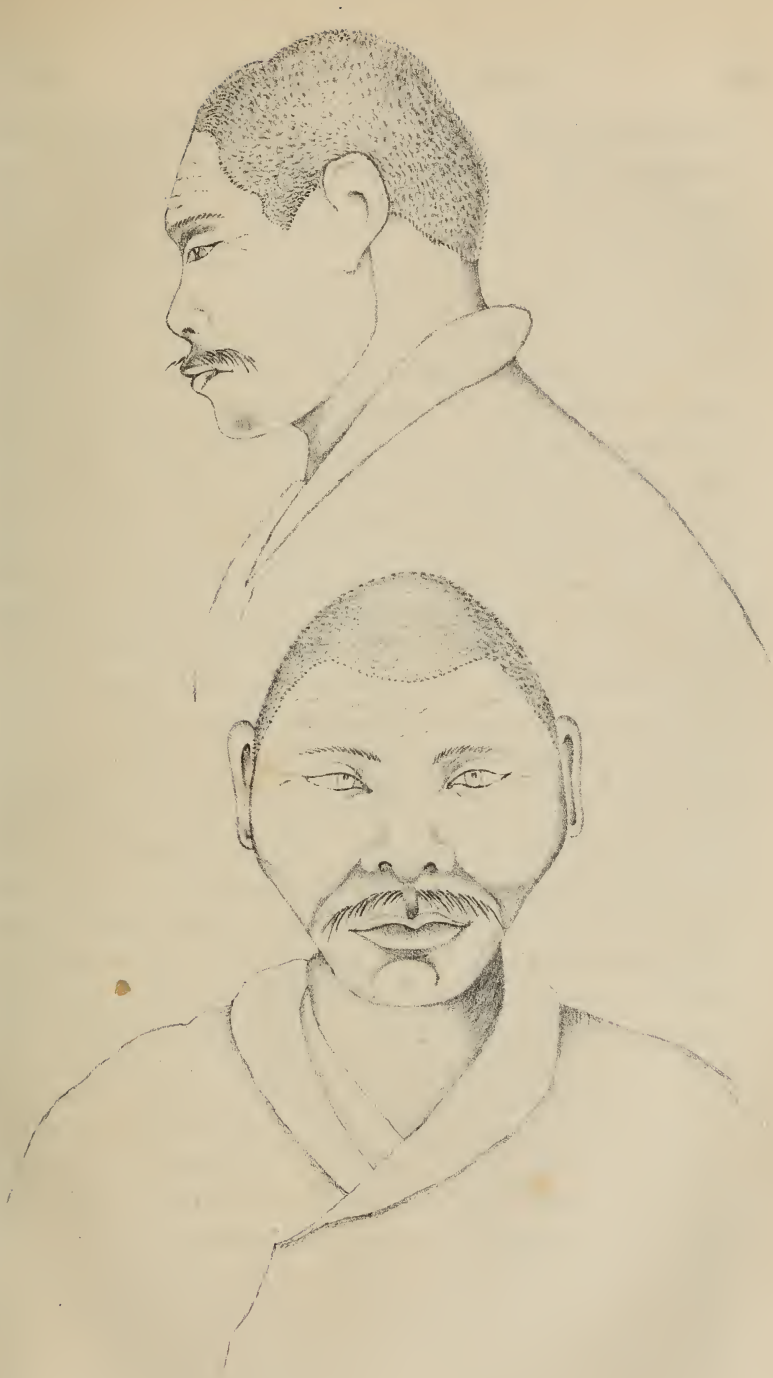
lips which however are not gaping nor are the teeth at all prognathously inclined; well made and vertically set, but not sound. Chin not pointed nor heavy nor retiring, nor jaws unduly large and angular; whence, with the non-saliency of the zygomæ, the face takes a good and Arian contour. Figure good, almost elegant, but the arms rather long, and the legs rather short in comparison of the European form. Hands and feet well made and well proportioned. Hair plaited into a tail, a la Chinoise. Ears bored, but not dilated, and furnished with small earings. Expression pleasing, and cast of features but faintly Mongolian.

No. III.—A Gyárúng of Tazar, north of Tachindo, by name Máching, and by age 33 years. Height 5-3-0, or much shorter than either of the above. A well made smallish man. Bony and muscular development moderate, especially the former. In moderate flesh, but thigh and calf very fine; arms much less so. Arms longish. Legs shortish. Colour of skin a pale earthy brown or isabelline hue without the least mixture of yellew or of red; like Chinese but deeper toned. No ruddiness on the spare cheeks. Eye dark hazel. Colour of hair in all parts, uniformly black; long, straight, abundant, strong, on head; spare on upper lip; none on chin, nor on body nor on limbs. Cranium large, nor compressed, nor depressed, nor pyramidally raised towards the crown, though there be a semblance of that sort from the width of the zygomæ (but this feature belongs to the face). Occiput not truncated posteally. Fronto-occipital axis the longer and vertical view oval with the wide end backwards, the occiput being conspicuously wider than the frontal region or than the parietal, and the maximum occipital breadth lessening regularly forwards to the forehead. Facial angle good with a vertical, but inconspicuous profile. Contour of the face (front view) lozenge-shaped, widest between the cheek-bones which project much laterally, and are flattened to the front causing great breadth of face just below the eyes, whence there is a regular narrowing upwards and downwards. Forehead sufficiently high and not retiring, but narrowed apparently upwards, owing to the salient zygomæ and molars. Frontal sinus not salient. Eye smallish and not well opened nor hollowed out from the cheek and upper lid drooping and drawn to the inner, inclined and tumid canthus. Eyes wide apart and oblique. Nose long, straight, thick, with a broad base between the eyes where,

however, the bridge is not flat but raised into a wide, low arch: Width great there and spreading into an expanded fleshy termination with broad alæ and large round nostrils. Mouth large and salient, yet good. Lips moderate and closed, and teeth vertically set, and very fine in shape and colour. Chin pretty good, not retiring, nor yet projecting, flush with the teeth and somewhat squared as also the large jaws. Ears large and loose. Figure good with head well set on; neck sufficiently long; chest deep and wide, and well made hands and feet. Hair worn plaited into a pig tail. Ears bored, but declaredly contrary to the custom of his country, and not distended. A very Chinese face and figure, and belonging to one who has in his character a deal of the shrewdness tending to knavery that marks the Chinaman.

No. IV.—The Manyaker is 40 years old, and bears the euphonious name of Ídrophúncho. He is a native of Rákho, six days south of Tachindo, and by profession a Gélúng or mendicant friar; and a cross made ugly fellow he is, as one could wish to see, with round shoulders and short neck, but stout and good tempered exceedingly; and, moreover, accomplished in reading, writing, drawing and carving like most of the regular troops of Lámaism to which corps he belongs, though to the heterodox branch of it, or Bonpo sect, called by him Beunpo or Peunpo, and which he has enabled me to say is no other than Tántrika Búddhism, or what is commonly called Shamanism.* This very interesting and important discovery I therefore make no apology for inserting here though it be somewhat out of place; and, as I am digressing, I may as well add that to confound the Lámas with the Gélúngs, as Huc and Gabet invariably do, is a worse error than it would be to confound the Bráhmans with the Pandits in India. To return to my friend Ídro, whose shaven head has afforded me a second excellent opportunity for closely examining the cranial characters of these races, I proceed to note that he is a man of moderate height (5-4-0), but strongly made with large bones and plenty of muscle, but no fat. Colour, a pale pure whitey brown. No trace of

* In saying that Shamanism is nothing but Tantrika Buddhism I speak most advisedly and fully aware of the opinions I oppose. That the Bonpo also are Buddhists there can be no doubt and my friend Idro's statements and drawings show that his sect follow the Gyút or Tantras which, though canonical, are in bad odour, and have been so since the Gelukpa reform. A Bonpa and a Moslem are alike odious to the orthodox in Tibet, though the Bonpas have many Vihars of high name and date all over the country.



Idro Phüncho, a Sefan Monk, aged 40.

red in the spare cheeks, winter though it be. Eye, dark rich brown, and hair throughout, unmixed and pure black. Like the others, he has none of the Esau characteristic, but on the contrary is, as usual, scant of hair, having not a trace of it on the body or limbs, and not much on the face. No beard. No whisker. A very wretched lean moustache and a spare straight eyebrow. Cranium bachyocephalic and large. Vertical view of the head, ovoid not oval, widest between the ears as in the Amdóan. Thence regularly and equally narrowed to the frontal and occipital extremities. No compression nor depression of the cranium, but on the contrary a distinct pyramidal ascension from a broad base, the point of crinal radiation being somewhat conically raised from the interaureal and widest part of the scull. Occiput truncate and flattened, that is, not projecting beyond the neck nor rounded posteally, like most heads. Facial angle pretty good, but rather deficient in verticality of profile. Contour of the face (see accompanying sketch) lozenge shape, owing to the large laterally salient cheek bones, though the forehead be not very noticeably narrowed (except with reference to its bulging base), nor the chin pointed. Forehead sufficiently good, high but somewhat compressed and retiring, and appearing more so by reason of the heavy frontal sinuses and zygomæ which project beyond the temples towards the sides and front. Ears big and salient. Eyes, remote and oblique, with the inner angle down and tumid and the upper lid drooping and drawn to the inner canthus. Nose rather short, straight, not level with the eyes nor yet much raised to separate them nor elsewhere. Not clubbed at the end, but the alæ spreading, and the nares large and round. Mouth large and forward with very thick lips, but no prognathism, the teeth being vertical and the lips not gaping so as to expose them. Teeth well formed and well set in an obtusely convex large arch, those of the upper jaw however overhanging those of the lower. Chin rather retiring, or flat and square. The partial retirement of the chin and the large frontal sinuses are what mar the verticality of the profile which moreover shows little of nasal and much of oral projection. Figure bad with thick goitrous neck, high forward shoulders, and somewhat bowed legs. Hands and feet well made. Muscular development of arms, poor, of legs, good. A thoroughly Mongolian face, but the ugliness in part redeemed by the good-natured placid, yet somewhat dull, expression.

Vocabularies of Sifán and of

English.	*Tho-chu.*	*Sókpá.*	*Gyámí.*
Air	Mozyú	Sálki	Sphún
Ant	Tú-khrá	Khoró-khwé	Mai-thún
Arrow	Já*h*	Sé li mé	Chen
Bird	Marwó	Thá-kôl	Sphúï-chher
Blood	Sá*h*	Khóro-gwé	Syé
Boat	Phyá	Sákersú	Sí-thú, Thú
Bone	Ripat	Yá so	Kú-thó
Buffaloe	Caret	Caret	Swi-nyú
Cat	Ló-chi	Si-mí	Mau, Myau
Cow	Gwa*h* (Bull zyáh)	Sá-lo	Neu, Nyeu
Crow	Nyágwo	Khéré	Láwa
Day	Styákló	Wúndúr	Péth-yan
Dog	Khwa*h*	Nhókhwé	Kou
Ear	Núkh	Khikhé	Airto
Earth	Zip	Wonnish	Ti, Thou
Egg	Kiwóst	Caret	Chitun
Elephant	Caret	Lháboché	Syáng
Eye	Kan	Nútú	Yen-chin
Father	Ai	I'chiki	Dhá-dá
Fire	Mé*h*	Kwál	Ak-khá
Fish	Izhá*h*	Khélé	Yúé
Flower	Lámpá*h*	Chichúk	Khwá
Foot	Jákó	Khóil	Chya a
Goat	Tsáh	Yá má	Chúlyú
Hair	Hompá, Grong } Kachú of head	} Kéchigé	Thou phwá
Hand	Jipa*h*	Kar	Syú, Syeu
Head	Kapat	Tholá-gwé	Thau
Hog	Pi	Khá-khai	Dhú
Horn	Rak	Yé-bour	Tiko
Horse	Ró*h*	Má-ri	Má
House	Ki*h*	Pá-syáng	Shhangcha
Iron	Sormo	Thúmár	Thé
Leaf	Thrompi	Náí	Yé-cha
Light	U'ik	Caret	Réyai
Man	Ná*h**	Khún	Rin
Monkey	Wáissi	Méchi	Khouch
Moon	Chhá*h*	Sárá	Yoliáng
Mother	Ou	A'khi, Yekhi	Má
Mountain	Spyá*h*	Tává	Sán, Syan
Mouth	dzúkh	A'má	Chwé
Moschito	Beup	Khó-khwé	Wocha
Name	rMá*h*	Nér	Minn
Night	A'shá	Sú	Khélo
Oil	Chingyú	Má-chin-thóso	Eué, Yú
Plantain	Sarmi	Caret	Máchouker

* h, underscored, thus, *h*, marks the abrupt accent.

Northern and South-eastern Tibet.

Gyárúng.	*Hórpa.*	*Túkpa.*	*Manyak.*
Talí	Púryú	Rhót	Mérda*h*
Ko-rok	s Khró	Rhok-pó	Ba-ra*h*
Ki-pi	l Dá	Mlá	Má (Rili, bow)
Pyé-pyé	Gyó	Pyá	Há
Tá-shí	Syé, Sé*h*	Khrá	Shá*h*
Brú { Tabrú, small / Shabru, / great }	Grá	Grú	Gú
Syá-rhú	Ré-rá	Róspá	Rúkhú
Caret	Caret	Caret	Dingmi
Ta-rhú	Chúla*h*	Syimbú	Macheu
Nyé-nyé	Gnaume*h*	Bá*h*	Womi (Gnázi, bull)
Ta-brok	Kálé	A'kpo	Kali
Pish-né, nyé	Nyé-lé	Nyénti	Nashchâ*h*
Khí	Katá*h*	Khi	Ksha*h*
Tir-né	Nyó	Nebláp	Nápi
Sé*h*	Kcha	Sá*h*	Mali, Mli
Kí-tan	Sgangá	Khálúm	Rácha
Láng-chhen	Lámochhén	Láng-chhén	,,
{ Tai-myék / Tam-myek }	Mó	Mélóng	Mni
Ta-pé	A'-pá	A'-pá	Apá
Ti-mí	U'-ma*h*	Mé*h*	Sa-me*h*
Chú-ngyó	Hyá	Gná, Nyá	Yú
Tau-den	Métó	Ménto	Ménto
Tá-mi	Kó	Lémi	Lipchhé*h*
Kús-so	Chhé	Rá	Tsáh
Tár-ni	Spú*	Pú (Krá of head)	Múí (Tsi of head)
Ta-yak	Lhá	Lá	Láp-ché*h*
Tá-ko	Ghó (hard)	Gók-ti	Wúlli
Kí	Váh	Phá	Wáh
Tá-rú	K-rúm-bo	Rú-ba	Rú-bu
Bó-ro*h*	Rhí, Ryí	Té*h*	Bó-ro*h*. Bróh
Chhém	Hyó	Khém	Nyé*h*
Shóm	Chú	Lékh	Shi
Tai-mek	Bálá*h*	Blap	Nipché*h*
Caret	Sphó	Wot	Wú*h*
Tir-mi	vzih	Mi*h*	Chho*h*
Shé-pri, Ti	Zumde*h*	Prá	Miyaháh
Tsi-le, vel Chile*h*	Slikno	Le*h*	Lhe*h*
Tó-mó	Ama	Ama	Amá
Ta-vet	Ri*h*rap	Ri	m Bi
Ti-khe	Ya	Khá	Yebá
Caret	l vasa	Pholi	Bimo
Tir-ming	Smen	Myéng	Ming
Tó-di, Tong-mor	Spha	Senti	Kwaka*h*
Chin-swí, { mustard seed / juice }	Marnak	Kyamar	I'chírá, I'tira
,,	,,	Lamrep	,,

* Ghórmé hair of head. Yá-spú hair of mouth or moustache. Pá-spú hair of body.

Vocabularies of Sifán and of

English.	*Thochu.*	*Sókpa.*	*Gyámi.*
River	Chabrá*h*	Wassú, U'sú	Shúí
Road	Gri*h*	Chám	Lú
Salt	Che*h*	Tâvósó	Yan
Skin	Rápí	Sárú	Phi-cha
Sky	Mahto	Théng-gré	Khen
Snake	Brigi	Thólé	Shré
Star	Ghada	,,	Singh-syú
Stone	Gholopi (hard / arabic gh)	Chhilo	Hri-thou
Sun	Mún	Nára	Ré-thou
Tiger	Kho*h* (hard)	Pár	Khú
Tooth	Swé*h*	Syú-chi	Yá
Tree	Gwozósi	Mótó	Hrú
Village	Wékhá	Hótó	Twáng-cha
Water	Chah	Wassú, U'sú	Shúí
Yam	Jyah	Caret	Yángsú
I	Chi, Ká	Mi, Bi, A'bú	Gnó
Thou	Kwâ, Kwé	Chhá	Ni
He, She, It	Kwán-Thá-cha	Thá	Thá
We	Chúklar Chiki, pl. Cheun, dual	Mini	Gnómé
Ye	Kwéniko, Kwa-nik-lar	Chhini *	Nimé
They	Thákо, Thák-lar	Tháni	Thámé
Mine	Kák chi	Caret	Gnóti
Thine	Kwék chi	Caret	Niti
His, Hers, Its	Thákchi, Kwa-nákchi	Caret	Tháti
Our's	Chikúk	Caret	Gnométi
Your's	Kwánikúk	Caret	Nimeti
Theirs	Thakúk	Caret	Thámeti
One	Ari	Négé	Ikú, I'
Two	Gnari	Hóyúr	Liángkú, Ar
Three	Kshiri	Kórbá	Sángkú, Sán
Four	Gzharé	Tírbá	Sikú, Si
Five	Wáré	Thábá	Wúkú, Wú
Six	Khataré	Chórka	Leukú, Leu
Seven	Staré	Tóló	Chhikú, Chhi
Eight	Khráré	Némá	Pakú, Pa
Nine	r gúré	Yésó	Chyúkú, Chyú
Ten	Hadúré	A'rbá	I'shsa
Twenty	Gninaso	Hóré	Air sa
Thirty	Kshyáso	Kóchhen	Sán sa
Forty	Ghyiso	Téché	Syú sa
Fifty	Wásso	Tháché	Wú sa
Hundred	Akshi	Chóvó	I'pé

* But for the analogy of the Hórpa plural in 'ni' I should say these were genitives and possessives and that the plurals were wanting.

Northern and South-eastern Tibet.

Gyárúng.	*Hórpa.*	*Tükpa.*	*Manyak.*
Ti-chí	Hrá*h*	Chhi	Dyá*h*
Tri	Ché*h*	Lémdáng	Rá*h*
Chhé	Chhá*h*	Tsá	Che*h*
Ti-dri [meun	Gla	Phyekh (hard)	Gra*h*
Tú-món, Teu-	Ko*h*	Namdúng	Ma*h*
Kha-bri	Phri	Mrúï	Brú
Tsi-ni	Sgré	Karma	Kra*h*
Rú-gú	r Gámé	Górr	Wobi
Ki-ni	Gna	Pláng	Nyi-ma
Kóng	Ták	Té é	Léphé
Ti-swé	Syó	Wá*h*	Phwi*h*
Shi [khyú	Nah	Shéng dong	Sápo*h*
Wo-Khyú, Tú-	Rhava	Yú	Hú
Ti-chí	Hrá*h*	Chhi	Dyá*h*
Sé-ten	Zó	Khé	Zgwá*h*
Gná, Gná-yó	Gná	Gné, Nyé	A′
Sán-ré	Ni	I′	Nó
Gná-pos, Wa-tú	v Ja, v Jya	Pé, Bé	Thi
Yó	Gnáni, Gnáriggi or rigya	Gna-rá	Plural, A′dúr; Dual, Ajú
Nyó	Nini, Ni-riggi	I′-rá	Nóndúr
Ya pos [fix*	v Jini. v Ji-riggi	Pé-rá	Thídúr
Gná, conjunct pre-	Gná-á (elongation)	Gnékú	Aï
Ní, the same	Niï	I′kú	Nóë
Wá, the same	v Jya a	Pékú	Thié
Caret	Gnáárígya	Gná rá kú	A′durí
Caret	Niï rigya	I′ rákú	Nóndurí
Caret	v Jaa rigya	Pérákú	Thidúri
Ka-tí	Rá	Thi	Tábí
Ka-nés†	Gné	Nai	Nábi
Ka-sám	Sú	Súm	Síbi
Ka-dí	Hla	Pli	Rébi
Kung-gnó	Gwé	Liágné	Gnábi
Kú-tók	Chhó	Kro	Trúbi
Kúsh-nés	Zné	Nis	Skwibi
Or-yét	Rhiéé	Gyet	Zibi
Kúng-gú	Gó	Dúgú	Gúbi
Si*h*	Sgá	p Chi	Chéchibi
Kinnis-si	Naská	Khali	Náchábi
Ka-sam-si	Súská	Caret	Sá chá bi
Kaplis-si	Léská	Caret	Zyizabi
Kúngnósi	Gwéská	Caret	Gná zabi
Par-yé	r Hyá	Caret	Téjé

* A disjunct and complete series of possessives formed by adding the suffix ‘ young’ to the personals has been alleged to me, but it is so rarely used, I doubt its genuineness. Here it is Gnayong vel Gnong. Nayong vel Nong. Gna posyong. Yoyong. Nyoyong. Yaposyong.

† In composition these names of the numerals are liable to variation, as tirmi targé, one man : tirmi tagú, two men : but three men is tirmi kasam, unchanged.

Vocabularies of Sifán and of

English.	*Thóchú.*	*Sókpá.*	*Gyámi.*
Of	K.	Na, Né	Ti
To	Shil	Tú	Khá
From	K, To, Gé	Gásá	Li
By, instru.	I'	Rá	Lá
With, cum	Ong	Théngdi	Kháng chhen
Without, sine	Marúk	U'g gwé	Mómá, Meyú má
In, on	Kúkú, Tik, Ti	Thú, Tú	Lá
Now	Patino	O'tó, Wótó	Chhá yé
Then	Stáka, Hatús	Caret	Lá khún
When?	Thisni	Khech ché	Ná khún
To-day	Pashi	In dúr	Chin thé
To-morrow	Sózyú	Mágár	Min thé
Yesterday	Narr [si	Nokhor	Hou thé
Here	Cho, Kúzgá, Chak-	In dé	Thi mé
There	Háto, Thúzga,	Yá bú	Lá mé
Where?	Tano [Thaksi	Thyerthar	Lá li
Above	Tíkh	Téré	Syáng thou
Below	Kól	Tóró	Ti syá
Between	Tigú	Toung dú	Túng jen
Without, outside	Khanyis	Gáchá	Wai thú
Within, inside	Kúkú	Tótar	Lithú
Far	Grikho	Khóló	Ywén
Near	Grin, Grinista	Nangni	Jhin
Little	Khwini	Bágá	Syóti (small)
Much	Brobo	Elvik	Tá-ti (great)
How much?	Nikal	In chhin yúbi	Tó syó
As, rel.	Tek	Caret	Ah men-ti
So, correl.	Stáká	Caret	Lá men-ti
Thus, pos.	Cheu [chan	Yénichhin	Thi men-ti
How?	Nikanjú, Nika-	Caret	Thi má
Why?	Niblin, Nishi	Tharichhin	Syá chú
Yes	Gnówá, Gno	Bi	Syó
No	Mángwá, Mang	Bi si	Púsitiéyó
(Do) not	Chi	Puthi ké	Púsyo
And, also	Tah, Dah	Pichhé	Orcha
Or	Gnóá	,,	Tháng
This	Chá	A'ni. Yéni	Thikou
That	Thá	Théni	Lákou
Which, who, tón	,,	,,	Hi mé
Which, who, ton	,,	,,	Lá mé
Which who, kon?	Sú	,,	Syá, Himé
What? kyá	Ning	,,	Syácha, Hima
Anything	Ningwan	,,	Hiong
Any body	Sóngwan	,,	Ohki, Hiong

Northern and South-eastern Tibet.

Gyárúng.	*Hórpá.*	*Tákpa.*	*Manyak.*
*Caret. Um?	I'. Dang?	Kú	I'
Caret	Gi? Da	Syá, Lá	Wé
Shis. S	Lháno, Gha	I'	Tha, Ni.
Gi	Khá, Wú	Gi	Lé
Kri, Khyás	A'ché	Núm láng	Pháë
Kameï	Máchú	Ma nóna	Májú
S. Pri	Ná, No, Chá	Ná	Khú, Choh
Púz-dúi	Habdeu	Dá	Milé
Tis-dúï	Tabdeu	Téné	Thilé
This-dúi, Kwústra	Sa deu	Kashú	Ninkhé
Pish-nyi	Pas-ni	Tashi	Tanyúr
Sós-nyi	Khasi	Nogor	Sórúh
Púsyúr	Maga, A'wesni	Dáng	Yáhá
Chidú	U'dú	Wo cho	Khopú, Dait
Hadú	Outhú	Wo tho	Thúngá pu, Kwa-
Katú	Lóré	Gá, Gáhá	Khadé [nait
U'rkyé	Chhá	Gáng	Chú
Wáki	Wó	Wá	Zyé
U'lé, Tilé	Kyúkú	§Bút ká, Képá	Onglhé
Wónpo	Pheu-so	Phit ka	Nwá
U'gú, Wógú	Náng	Néngá	Khú
Ka sri	Chéchi	Ringbú	Rassá
Kaching	Tháné	Thúngbú	Rini
Kúh ché	A'mché	Chúti	Tameh
Kak-ti	Kagaré	Shibo	Tabrá
This-ti	Haisyi	Gó	Trimni
Caret	Naya	Dantang	Mi
Caret	Nyú	Dantarang	Thúzyó
Caret	Wodé	Ustúm	Thúsú, Thúsú, moh
Thígúpso, This-pé	A'chibi	Katin gyá	Hanus moh
Thús-pé	A'chú gnô	Sagyak	Hámilé
Do-mos	Gnór†	In†	Zyi
Di-mek	Nyér	Men	Má Zyi
Met	Má, Di‡	Má,‖ Magyá	Thá‖
Caret	Ré	,,	,,
Kó, Wóvé.	Ná	Na, Iná	Lé
Chidi	U'dé	Wochú	Thú
Hadi	Outhá, Yé	Wotho	Quathú
Caret	Caret	Caret	,,
Caret	Caret	Caret	,,
Sú	Sú, Ló	Sú	Sú
Thú	Achin	Si	Háno
Tenzi, Tizzé	A'ke	Sirang	Táká
Sú	Súyó	Sirang	Súyé

* No declensional signs as the general rule; but úm has been obtained as an anomalous exception of very special and narrow use, as Lama-úm-boroh the Lama's horse.

† These are the positive and negative forms of the substantive verb = the Persian hast, nést, exactly.

‡ Di, an infix, medial Ma, prefix.

§ Horizontal and perpendicular betweenity. ‖ Initial and medial.

Vocabularies of Sifán and of

English.	*Thóchú.*	*Sókpa.*	*Gyámi.*
Good	Náï	Chháng béné	Houkhou. Houti
Bad	Ghái. Ghé. Mari	Má béné	Hou ti myú
Cold	Styú	Khou thún	Sidi
Hot	Si	Há lon	Ré-di
Ripe	An. Min	Ból chhén	Phú-ti
Raw	A-min	Chhik thé	Myúphú
Sweet	Jam	Am thé thé	Syángdi
Sour	Chak	Ammahálon	Lá-ti
Bitter	Khák	,,	Khú-ti
Handsome	r kwi	Cháng béné (good)	Houti (good)
Ugly	Márkwi	Má béné (bad)	Houti myú (bad)
Straight	Kasth	,,	Ting-di
Crooked	Jaggra. Jablá gwé	,,	Ting-di myú
Black	Nyik	,,	Khidi
White	Phyokh	Chhágán	Pi-di
Red	Shidzi	U'lán	Khóng-di
Green	Zyángkú	Khó khó	Lig-di
Long	Drithú	U'r thú	Thang-ti
Short	Wóngchithá	,,	Thóng-ti
Tall	Bráthá	U'n dúr	Kou-ti
Short	k Thâthá	,,	Ti-ti
Small	Bratsi tha	Bágá	Syou-ti
Great	Pwí tha	I'khï	Tá-ti
Round	Ashyára	,,	Eang-di. Yángdi
Square	Ghzírú	,,	Pyáng-di
Fat	Charwá	Yokhwé thé	Hou-ti (good)
Thin	Charghé	O'khú ná é	Syou-ti (small)
Weariness	Darvatch	Yá tava	Sphwá leu
Thirst	Tírpitch	U'léso	Kháng ti
Hunger	Ashpitch	Wolúso	O'-ti. Wó-ti
Eat	Adz	E'thé	Thyé, Khyé
Drink	A'thí	Wúó	Khwá
Sleep	A'nan	Wúm tha	Swikyór
Wake	Toron (get up)	Pós	Khilé
Laugh	Daran	Enna	Syó
Weep	Arzan [kochin	Wún na	Shúhrin
Be silent	r Sgástan. Dzúk	A'h má hópchhi	Quápótho
Speak	Kwor, Kúrr	Caret	Caret
Come	Hai	Iré	Lé
Go, depart	Dákan	Yá bú ?†	Chhi
Stand up	Toron	Posth	Chhilé
Sit down	Ajon	Só	Chó
Move. Walk	Dákan	A'hyar yábo	Chú. Chhi.
Run	Dádran	Thúr keng	Théwo
Give	Dagsh (cuivis)* Kwúgsh (mihi)	Wúg. Euk	Kí. Yoho
Take	Jádjh	Caret	Rákwó

* In all these tongues there is a special and general term, indicated by the Latin appendage.

† Quære? Iré bú, come not, in Kalmak.

Northern and South-eastern Tibet.

Gyárúng.	*Hórpa.*	*Tákpa*	*Manyak.*
Kasné	Gáyé gnor	Lihúni	Deunda*h*
Ma-kasné [mishta	Gáyé nyér	Lihúmani	Mánda
Kavandró. Ka-	Kúrkú	Krang-mo	Phemphé
Kassí. Kavassi	Ché ché	Gromo	Chéché
Ka-sman	Núlúmsi	Choso	Demi
Ma-ka-sman	Númálúmsi	Machoso	Demámi
Kam-gnar	Thú-thú	Nyok-pa	Debi
Kúch-chúr	s Gús-go	Kyúr-pú	Da-chú
Kúc-ché*k*	s Nésné	Khák-bó	Dá-khá
Kúm-chhúr	Kam-syúr	Lihúni. Gnómánó	Phyún phú
Ma-kumchhúr	Mem-syúr	Lihúmáni. Gnómá-	Mám phyu
Ka-kasto	Kathóng	Tráng bó [mano	Chú chú
Ma-kasto	Gúngú	Kyok po	Kho kho
Ka-nak	Nyá nyá	Nak po	Dáná
Kaprom	Phrú phrú	Khérú	Dallú
Kaver ni	Gingi	Leu	Dani
Karmyak	Jhángú	Chángú	Chúgindo
Kasri	Kachi	Ringbo	Sháshá
Kachan	Kalgé	Thongpo	Dridra
Kasri	Gakhyé	Zúgring	Hrá hra
Kachin	Gádé	Zúg thung	Dridrá
Kahchai	Kamma	Chúngbo. Prú	Yíí
Ka*h*tí	Kamthú	Thénbo	Kah kah
Kalarlar	Lóló	Birhi	Wá*h* wa*h*
Zhirdo	Súr zhi	Túp-zhi	Drazo
Kwipan	Kalbo. Galvo	Gyák pa	Dachú*h*
Kwichem	Chú chú	Kámrháng	Kárí
Disdúk	Nertha	,,	Ná brída
Taskom	Nasyá	,,	Depsyá
Tomos	Namjóngsi	,,	Vitengné
Ta-zó	Nangi	Zó	Gnajeu
Ta-mot	Wathi	Thong	Gnachhó*h*
Korman	Gúrgyún	Nyet	Khaiya*h*
Tar-was	Taryén	Láng (get up)	Dougwá*h*
Ka-náré	Khá khé	Gyé	Narir
Da-ka-krú	Nakabrá	Gnú	Dangwá
Nák-chún	Yá-gúzi	Thámá	Thathadyu
Ta-chén	Nap-shé*h*, Tayin	Syát	Thadyu
Ka-pún. Pa-pún*	Kwi-lhe*n*	Syó	Lemo
Yeyen, Da-chin,	Ta-shin. Wa-shin	Gai	Yú
Tar-yúp [Ya-chin	Zúryén	Láng	Khanjéh
Ná-nen	U'nzún. Wanzún	Zúk	Naijeu
Ye-yen. Ya-chin	Tashin	Gai	Yú
Danar-gyúk	Tamgyo	Pshet	Tachimoyú
Da-vo (cuivis) }	{ Tú-khyé (cuivis)	} Bé. Bin	Wa-khi. Ta-khi
Da-vong (mihi) }	{ Tú-khóng (mihi)		
Da-ven	Gwonkhé. Túshthú	Yá.† Lóngá	Dangó

* Ka prefix becomes pa, according to that alliterative principle which prevails so greatly though irregularly.

† Bé, Yá, have a special sense. Give to *me*: take from me. Bin, Lóng, a general sense. One solicits; the other, commands.

Vocabularies of Sifán and of

English.	*Thóchú.*	*Sókpá.*	*Gyámi.*
Strike	Da-gatch	Chhok ka	Tá
Kill	Ta-séh	,,	Sá
Bring	Dzi-la	A'hbá-thira	Lá-le
Take away	Doukwa	A'hbá-chhi	Lá-chhé
Lift up	Ta-chi	Wúra	Máyú
Put down	Kwaksh	Caret	Caret
Hear	Kokshustan	Súnú	Thyén
Understand	A'khchan	Háriya	Syá
Tell, relate	Kúrr	Khala	Shró

Note.—The orthography is in general that sanctioned by the society and commonly used by me, but there are a few deviations necessitated by the peculiar articulation of these races whose gallic j and ú are of incessant recurrence; I have represented the former sound by zy and the latter by eu. Both sounds are found in the French word jeu. The system of tones or accents, so important for discriminating the many otherwise-identical roots in these tongues, there is no practicable method of doing justice to. But I have marked the chief one, or abrupt final, by an underscored h, thus *h*. In Thóchú and in Hórpa, the h, kh, and gh, have often, nay generally, a harsh Arabic utterance. I use the short vague English a, and e, as in cat, yet, for their common equivalents in these tongues, but u has always the oo sound, whether short or long. It so occurs in English though rarely, as in put, pudding. The continental (European) and eastern system of the vowels is that pursued, and the long sound of each is noted by accent superscribed. It is the common vocalic system, the English being wholly beside the mark. Y is always a consonant. It blends with many others to give them a sliding sound as in the zy, above instanced. It gives S the sound of Sh, as in the Syán of (Shan) tribe's name. It must never be made a vowel, a l'anglaise, for that makes monosyllables dissyllabic and totally changes the proper sound of words. The same as to W, which we English are however more familiar with. From é, I make the diphthong ai; from á that of au; from ó that of ou, sounded as in aye aye, hawfinch, how; which, with the gallic eu (beurre heurre), are invariably diphthongs, each with a single blended sound. If two vowels come together and require separate utterance, the latter is

Northern and South-eastern Tibet.

Gyárúng.	*Hórpa.*	*Tákpa.*	*Manyak.*
Ta-túp	Nazbi	Dúngá	Dan-thá
Ná-sé	Ta-shé	Sótá	Na-sya
Ko-pet	Wú-khyé	Rotá	Trúlhé
Di-cháng	Wúm-bé	Khor	Túyú
Ta-yok	Rang-ké. Rházi	Longna	Da-chi
Na-tok	Ralé	Nina	Wúchi
Kar-nyou	Wul min	Nyan	Khabé ní
Ti-sen	Sam tenchú	Sém	Najinjé
Ta-chen	Ta-yin. Nap-shé	Syat	Thai-dyú

superscribed with a double dot, as dáï. I have marked off the prefixes (tir-mi, man, see Gyárúng column) to facilitate access to the root and comparison on a large scale such as that lately employed to illustrate ethnic affinities. This and the like marking off of the suffixes will be a great aid to those who wish to make such comparisons without knowledge of these languages. But the procedure is hardly correct since the root and its prefix in particular are apt to be blended in utterance by transfer of the accent (mí, tír-mi) and since the sense also of the roots is occasionally as dependant (though in a different way) on that of their prefixes, as it is in regard to the prepositions of the Arian tongues (tir-mi, man; ti-mi, fire). Nevertheless these important particles are liable to a large range of mutation, synonymous as well as differential, merely euphonic as well as essential, whilst some of the tongues use them very amply, and others very rarely. Add to these features the infixes and the suffixes, with the occasional change of place and function between all these, and you have before you the causes of the differences of these languages which are often so operative as to merge their essential affinity and make it indiscernible except by those who, knowing the roots, can pursue them *and* the servile portions of the vocables through their various metamorphoses and transpositions.*

* Compare in Tibeto-Himálayan and Indo-Chinese series, as follows:
Day.—Nyi-ma, Ma-ni, Nye-n-ti, Nhi-ti-ma, Sak-ni. Root Nyi.
Eye.—A-mik, Mi-do, Mi-kha, Ta-i-myek, Myé-t-si. Root Mig.
Dog.—Khi-cha, Ko-chu, Chóï-ma, Khwé, Ta-kwi, Ka-zeu. Root Khyi.
Ripe.—Kas-sman, Mhai-ti, Mhin, Min-bo. Root sMin.
Sour.—Kúch-chúr, Kyúr-bo, Da-chu. Root sKyúr.
Hear.—Khep-ché, Nap-syé, Ta-ché-n. Root Shé.
These are extreme cases perhaps of mutation; but they are therefore all the better adapted to illustrate my meaning; and links enough will be found in the vocabularies to bind them surely together. B. H. H.

Ibn Huokul's account of KHORASAN,—*translated by Major* W. ANDERSON, *Bengal Artillery.*

KHORASAN

Is the name of a large country divided into districts. On the East it is bounded by Seestan and India, I have already given in my map of Seestan those portions of Ghoor which are near and belong to Seestan, but the entire country is considered Indian. I have included the districts of the Khuluj tribes in Cabul. While Wakan and those places to the south of Khotul are also Indian.

To the West lie the deserts inhabited by the Goz tribes and the country of Joorjan.

To the North extends Mawarolnuhr and a portion of the Tork kingdom south of Khotul.

To the South are situated the desert of Fars and Koomis.

But I have added Koomis to the map of Duelum, Joorjan, Teberestan, Rue, and Kuzween, and of them formed a separate division.

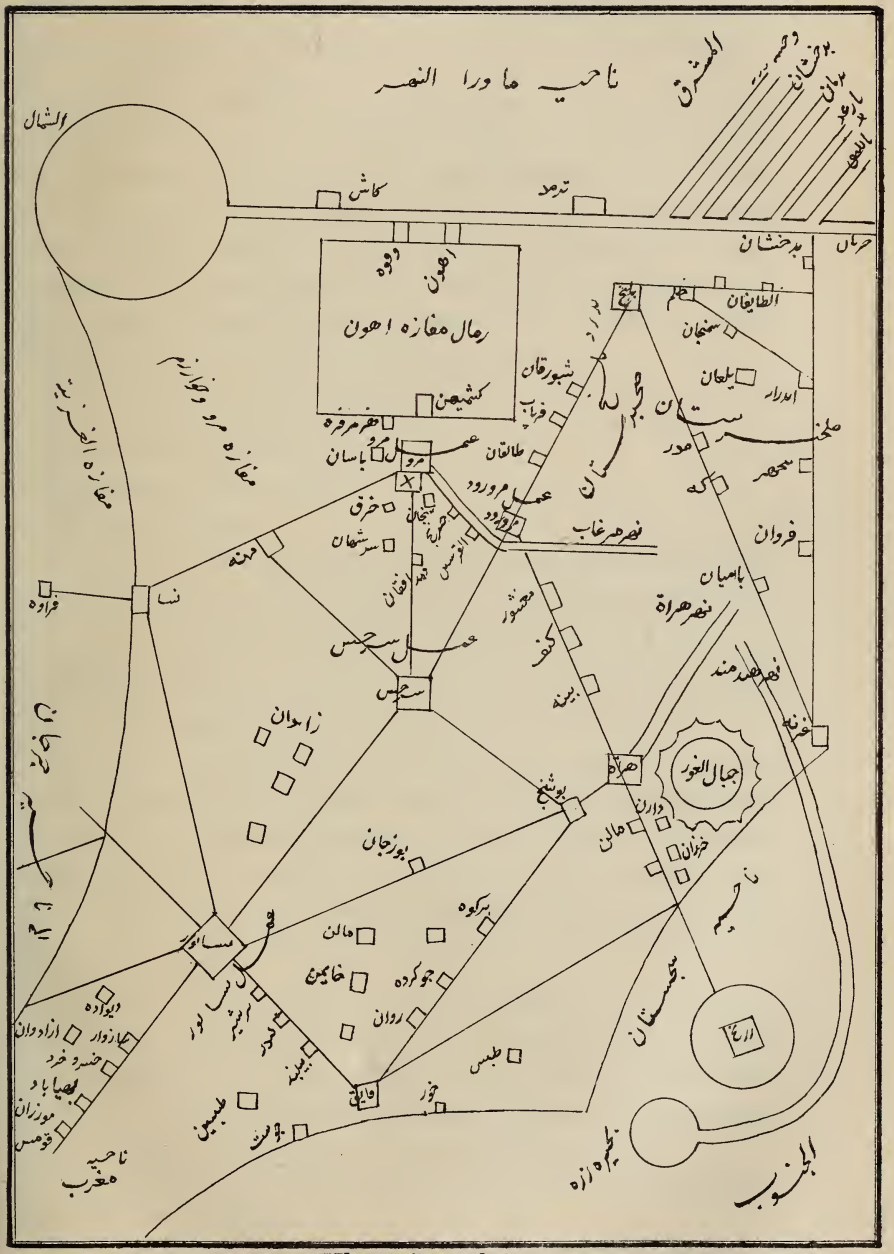
I have included Khotul with Mawarolnuhr, as lying between the Wukhshab and Khurab, and also Kharism, because it is beyond the river and its capital nearer to Bokhara than to Khorasan.

This country to the east is enclosed by a line sweeping along the desert of Fars and Herat and Ghoor, to Ghuznee; joined by a line from Koomis to Furawuh making nearly a square. Thence, along the confines of Joorjan and the Caspian to Kharism, embracing the inhabited places.

In the various aggregations and divisions of Khorasan the chief places are, Neeshapoor, Merv, Herat, Bulk.

The minor subdivisions are, Koohistan, Toos, Nesa, Abeewurd, Surukhs, Esfezar, Pooshung, Badghues, Gunj—Rostak, Mervrood, Joozjan, Bameeyan, Tokharestan, Zum, Amol. Kharism I will describe with Mawarolnuhr, as its capital is beyond the river, and nearer to that country than to Persian Khorasan.

I have not separated Neeshapoor, but have detailed under it all the various subdivisions, at the same time I have separated Tokharestan from Bulkh, as, although commonly joined in name, their description and revenue accounts are kept separate.



T. Black, Asiatic Lith.& Press.

These arrangements only involve some care in the table of routes, and in the map, as it is necessary to introduce so many places under the one map of Khorasan.

Neeshapoor was known as Eeran-Shuhr, it is situated in a level country with houses built of unburnt brick, placed at a distance from each other, the city covers a square fursukh, having a town, fort and ramparts—both the town and fort contain a large population. The Jama Musjed is in the suburbs at a place called the Cantonments. The Government house is situated on a plain called the Prison-square, near the Jail, at a distance of a fursukh from the Musjed, it was built by Omur bin Lues.

The fort has two gates, and the town four.

The Rasulkunturuh or bridge gate.

The Mokufful or closed gate.

The Kohundez or fort gate.

The Deze-Mushkan.

The fort is distinct from the town, but the ramparts enclose both; these last have gates, that leading to Urak and Joorjan is the Kobab, that on the Bulkh, Merve and Mawarolnuhr road is the Jubul or mountain gate; the entrance on the Fars and Kohistan road is the Huozol Eyaz gate; while on the Toos and Nesa road are several gates, as the Sookhtuh and Sere Sheereen.

The bazars are outside the town and the fort in the suburbs, the best is known as the Great-square and the second as the Small-square, from the great square the bazars extend to the east as far as the Musjed, and to the west they join the smaller square—to the south they extend to the tomb of the two Husuens, and to the north the streets end at the Bridge. The smaller square is near the prison and Government house.

The water is chiefly taken from kareez running near the habitations and it flows from the houses and waters the gardens inside and outside the city. They have also a large river called the Wade Sughawur. Several towns and villages are irrigated from its waters which run from this Wadee, nor is there any larger river.

In the whole of Khorasan there is no more extensive or salubrious city than Neeshapoor.

The weavers manufacture stuffs of cotton and of silk which are

so plentiful and good as to be exported to all countries of Moslems and of Kafers.

Neeshapoor possesses extensive districts and populous towns, as Boozjan, Malun called Kesrajerd, Khaemund, Suloomul, Sungan, Zoozun, Kunduz, Tersheez, Janruwan, Azad-war, Khushuogerd, Buhmunabad, Muzneyan, Subzwar, Rewaduh, Mehrjan, Esfurayun, Khuer Khan, Zurmuluh, and if Toos be included, there may be added Radgan, Taburoon, Burooghoor and Nookan.

Toos contains the tomb of Ulee the son of Moosa Reza, on whom be peace, also the sepulchre of Haroonul-rusheed; the tomb of the former is distant from the town about four fursukhs, in a village called Sunabad. The latter is at Nookan. Turquoises are extensively found in the hills near Neeshapoor and Toos, and earthen-ware is exported.

Merv, known as Merve Shah Juhan, is a very ancient place, the fort is considered to have been built by Tuhmoorus, while the old city was founded by Zool Kurnuen; it is situated on a level plain far from any hills; the soil is saline and very sandy, while the houses are of unburnt bricks. The place contains three Jama Musjeds—the oldest being the Musjed built inside the place on the first introduction of Eslam called the Muhan next is the Musjed Uteek at the city gate chiefly occupied by the traditionists; the third is the Musjed of Makhan. They consider this last Musjed, the bazars and the Government house to have been built by Abo Moslem. The Government house is in front of this Musjed and contains an arched room built by Abo Moslem under which he used to sit—and to this day the Umeers of Merv assemble under it; it is built of bricks and mortar, and covers a square of fifty-five cubits.

This doomed room has four doors, each opening into a vestibule ornamented over the entrances with sculptured representations of large fish, and in front of each vestibule is a square open court. The fort is as large as the city, but now in ruins, it is built on an elevated mound which has a kareez cut into it from which the water runs to this day; and sometimes vegetables and melons are cultivated on it.

Originally the bazars were at the gate of the city near the Ateek musjed, but in the days of Abo Moslem, they were removed to Makhan, they are cleaner than the bazars of other cities.

The Eedgah is situated in the division called Rasulmuedan near the square of Abee Jehem, and is surrounded on all sides by houses and buildings. The situation is between Makhan and the canal of Hormuz Kuruh. The streets of the city have four canals—among them is the canal above mentioned—on which are built many of the houses of the city, it enters the walls from the direction of a place called Serjosh.

Hosuen bin Taher erected many of these buildings, and wished to remove the bazars and Government house to this position. The inhabitants of the quarter of the city called Ras ol Shabaee use this water, in this division, resides the family of Shuekh ol Juleel Abu fuzl Mohummud, the son of Obuedallah.

Another canal is called the Makhan; on it is the Government house, the bazars, the musjed Hadeesan, the jail and house of the family of Abee Lukhum the slave of Abee Moeet. In which house is a dome, round the interior of which is written the declaration of election to the Khulafut of the family of Abbas, the cupola stands to this day.

Another canal is called the Zoruk—it flows to the gate of the city and its water is used by the people, on it is the Uteek musjed, and lower down is the house of the family of Khaleel ben Uhmud ben Hemad, the Governor of Bokhara.

Next is the canal of Usudee Khorasanee, which waters the Muhuluh of the Sunjar gate, Burmahan and other quarters; on this canal was the house of the Murzban of Merv.

Such are the canals on which are placed the various divisions of Merv with their buildings, a wall surrounds all these four canals with the houses; a second wall surrounds the city and the various villages and is known as the wall of Raee, of it remains are now to be seen.

The interior city has four gates.

The first leading to the Jama-Musjed is called the Sharsan.

The Homa, the Sunjar, the Malun, the Dure Mushkan leading to Bokhara, near which was the residence and the mint of Mamoon during the period he lived at Merv, previous to his being elected to the Khulufut.

Merv has one chief river rising under Bameyan from which are cut

all the above-mentioned canals irrigating the lands, it is called the Morghab or waters of Merv, some think the name is taken from that of the spring where the river rises, named Morghab ; others, that the derivation is from Murgh Ajmuh, the pasture of reeds.

This river flows to Merv rood and its villages and then enters Merv Shahjuhan at Goo Geen between Khoozan and Kurshee—the bunds are placed at the village of Zoruk where the water is thrown off into the canals—by boards having holes equalizing the division of the water to all parties, so that if any person takes more or less than his right destruction overtakes his crops. There is an officer placed in charge of the water who is even a greater man than the Walee of Muoonuh.

I have understood that ten thousand men find employment on this river. Merv was the cantonment of a large force in the early days of Eslam ; and the district was the place which determined the possession of Persia, to the followers of Mohummud, for Yezdegerd the last king of Persia was killed in a mill on the canal of Zoruk. From this quarter arose the call to the Khulufut of the Abbas family. In the house of the children of Aboo Lukhum Olmoeet was this celebrated call, written round a dome; but now hardly to be read. From this city went forth Mamoon to contend for the Khulufut with his brother Mohummud bin Zobueduh. Many bestowers of the Khulufut resided in this city.

The best penmen of Erak and Khorasan, the most celebrated theological lawyers and masters of ethics are of Merv, I have determined that my book should be a mere abstract, and hence have excluded those celebrated men, whose histories may be found in works on the subject. I have not detailed men and things which perhaps should have been mentioned.

In the days of the Persian dynasty, the most renowned of physicians and of accomplished performers came from Eranshuhr ; as Burzooyuh, the first of doctors, and Barbod, the chief of singers and of musical performers.

The provisions are better than in any other portion of Khorasan, the bread in particular is finer and better tasted—while of its dried fruits and raisins, a large exportation takes place to other countries. Much is said of the productions of Herat and the plenty in other

countries; but the delicacy and flavour of Merv productions are superior. Of its fruits the melon is large and is exported to Erak; but I am not sure if it is carried to other countries.

As to the city, the cleanliness, the beauty of the place, the arrangement of the divisions and of the houses, the windings of the canals, the vineyards, the marked difference of the people of the bazars from those of other places, all stamp the superiority of Merv over other parts of Khorasan. On its deserts flourish the Turunjbeen which is carried over the world, as also are its fabrics of silk and its raw silk. But I have heard that the original source of the silk-worm is Jorjan and Tuberestan, whence it was brought long ago to Merv.

Raw Silk is now exported from Merv rood to Tuberestan, also the superior cotton called the Leyun cotton, and ready made sheets.

Merv possesses several ancient traditionist musjeds. Merv rood has two. Keshmehun, Hoormuz Kuruh, Seenuj, Khuzukh, Khuruk Shooshukan have each one house of prayer.

Herat.—This is the name of a city having various districts, among its towns are Malun, Jusan, Serteyan, Oobuh, Marabad, Pashtan, Korookh, Chesht, Esfezar, Udruskun, Gowazan, Kooshuk, Khorasanabad.

Esfezar is the name of a district containing the four towns I have mentioned.

Herat is surrounded by walls, with plenty of water, and a large population, it has also suburbs, and contains a fort and Jama Musjed, but the Government house is outside the walls at a place called Khorasanabad about one-third of a fursukh from the city on the road to Pooshung lying to the westward. The houses are erected from unbaked bricks, and each side of the city measures about half a fursukh.

The city has four gateways, that to the north on the Neeshapoor road is called the Erak, that on the road to Bulkh is named Kepchak. The gateway leading to Seestan is known by the name of Feroozabad, while that leading to Ghoor the Khoshuk. The doors are all of wood except the Erak which is covered with iron, at each entrance is a bazar for the use of the inhabitants of the neighbouring quarter of the city. Water runs through the towns and suburbs,

the fort has also four entrances opposite to, and known by the names of, the gates of the city.

Outside the fort runs a wall on each side, to the height of a man, and about thirty paces in breadth.

The Jama Musjed is in the centre of the city surrounded by bazars, while to the west of it is placed the jail. In all Khorasan, Seestan, Mavarulnahr and the Jubal districts, there does not exist to the present time a better frequented Musjed that the one of Herat. Next in estimation is that of Bulkh, then the musjed of Seestan.

This Herat Musjed is much frequented by a large body of the profession learned in matters of religion, the congregation conduct themselves after the customs prevailing in Syria, and have a religious discourse read on each Friday's assembly.

Herat is a grand halting place between Fars and Khorasan, also a central mart for these countries as well as for Seestan.

On the road to Bulkh about half a fursukh from the city there is a hill rising from the plain lying between Herat and Esfezar, it produces neither wood nor grass but merely stones for mills and floors. On the summit of this hill stood a fire temple called *Sershak;* between it and the city is a Christian church.

No water nor any gardens exist until you reach the canal of the city near the gate, which is crossed by a bridge; beyond this canal there is neither garden nor water.

Near all the gates irrigation being obtainable, gardens are numerous—the most populous is the Feroozabad gateway. The river of this district rises at the Robate Gorwan, and as it flows from Ghoor to Herat, many canals are cut from it as follows:

Canals.	Villages Watered.
Perwan, ...	Huwadushtuk. [Odwan.
Malun,.....	Kowashan, Seyawashan, Malun, Teezan,
Ulanjan, ...	Koosnan.
Kheyaban, ...	Sulbuh.
Kumburak, ...	Kookan.
Ghoorwan, ...	Zeeruk.
Tooneyan, ...	Ghooryan Kurugurd.
Subkur, ...	Ghazurwan and Feerozabad.
Unjeel, ...	The city of Herat and the gardens on the Seestan road.

Next to Herat the largest towns are Korookh and Oobuh, from the former are exported large quantities of raisins, of which the particular sort called zubeeb tayufee is also excellent at Malun.

Kurookh is a small place inhabited by a Khowarej population. The Musjed is located in the quarter belonging to the Seyuds, the houses are of unburnt bricks, the place itself is among the mountains, about a fursukh square filled with gardens, running water, trees, and populous villages.

Oobuh—the population is of the established Sonnee sect, the place is about the size of Kurookh with gardens, water and houses of unburnt bricks.

Malun is smaller than Kurookh, but covered with gardens containing water and plenty of grapes, always well peopled.

Jusan contains few trees and is less than Malun in size, the people are of the established sect.

Serteyan, the population is Khowarij, the place less in size than Malun, contains water and a few gardens, corn being more cultivated than fruit, as the situation is among the hills.

Marabad is a place less than Malun, contains many gardens and much water, rice is exported largely.

Pashtan is less than Malun, much grain cultivation, but few gardens exist, although water is plentiful.

Esfezar contains four towns, the largest being Kowashan which is less in size than Khorookh, but contains many gardens. Kowazan, Kooshuk, Edreskun, the other three places, are nearly equal in size, with water and gardens.

The district of Esfezar extends about four marches in length by one in breadth, it is highly populous, contains but little level land and has one difficult pass called Kashkan, this is inhabited by Khowarej families—while the population of the large towns is of the established sect.

Pooshung, its chief towns are Khushruo Gerd, Berkurduh, Koosweeyuh, Koh.

Pooshung is the largest and about the extent of half Herat; it is situated on a plain distant about two fursukhs from the range which passes Herat, the houses are level constructed much as those of Herat; water and trees are plentiful, one species called the *Urur*

is superior to that produced in any other district of Khorasan, and is exported in large quantities. The water is supplied from the Herat rood, a river which flows on to a place called Surukhs, unless when the water is turned off below that place, in which year it is not obtainable so low down its bed. Pooshung is surrounded by a wall and a ditch, having three entrances.

The Ulee gate on the Neeshapoor road, the Herat and the Kohestan on their respective roads.

The next town is Koosweyuh, in size about one third of Pooshung, containing water and a few gardens with houses of unburnt brick.

Khusruo Gerd abounds in gardens and water but is less in size than Koosweyuh—Berkurduh is still smaller with some water; the inhabitants are breeders of cattle and not agriculturists. Koh is equal to Berkurduh, has both cultivation and irrigation.

Badghues, contains the towns of Jubul-ul-fezut, Koh, Koghunabad, Best, Jadoo, Kaburoon, Kalyoos, Dehestan; the Sultan resides at Koghunabad; the largest and most populous place of these is Dehestan which is about half the size of Pooshung, with houses built of clay; the country contains much lead. The town is among the hills of little water and few gardens and no grapes, its cultivation depends on rain, similar to which are Koh and Jubul-ul-fezut of which the two former is the largest place, the latter is on a hill containing mines of silver not worked from the absence of fire wood, the former, Koh, is on a plain.

Koghunabad, Best, Jadoo possess gardens, water and upland cultivation, but Kaburoon and Kalyoos are without gardens or running streams, their water being obtained from ponds and wells. The inhabitants are agriculturists as well as breeders of cattle. Jubul-ul-fezut is situated on the road leading from Herat to Surukhs. The population of Badghues is all of the established sonnee sect, except that of Hujestan, and the village of Uhmud bin Abdallah who are all Khowarej.

Gunj Rostak is a district of which Buen is a town, as also Kuef and Bugshoor, the Soltan resides at Buen which is the largest place in the district and greater than Pooshung, to which place Bughshoor is about equal; Kuef is less than half Bughshoor; Buen and Kuef possess plenty of water, gardens and grapes, but the houses are of

clay. The water of Bugshoor is from ponds and wells, the place being situated on a plain: its cultivation is small, chiefly upland; but the situation is healthy and salubrious. All these places are on the road to Mervrood.

Mervrood—one of the towns is Kusre Ukhnuf, another Duruh, the largest being Mervrood. This place is smaller than Pooshung, it has the advantage of a large river which flows on to Merv-Shajiehan; on the river are many gardens containing plenty of grapes, the air and soil are salubrious.

Kusre Ukhnuf is situated one journey on the road to Bulkh. Duruh is on the road to Unbar at the distance of four fursukhs. Kusre Ukhnuf abounds in water, gardens, grapes and fine fruits. Duruh is watered by the Merv-rood which divides the town, and is crossed by a bridge: it abounds in gardens of grapes and fruits. Mervrood is about an arrow's flight from the river. Talkan is about the size of Mervrood with running water, and a few gardens, its houses like those of Mervrood are built of clay, than which place it is more healthy.

Mervrood is situated at a distance of three fursukhs from hills to the west, and of two from those to the east. Talkan is in the hills and has villages round it.

Faryab—is in size less than Talkan, but exceeds it in water and gardens, its houses are built of clay.

Joozjan is the name of a district, of which Yahoodeyah is a town, as also are Shuburghan, Undkhod, Usluj, Kundderem, Unbar, San. Of these Unbar is the largest, being more extensive than Mervrood, it is the residence of the Sultan and situated among the hills—having gardens, water and vines, but houses of clay. San is a place of no extent, with gardens and water, its chief fruits are walnuts, being among the hills.

Yahoodeyah is more extensive than San, but of the same description. Kundderem abounds in vines, walnuts and water. Shuburghan has running water, agriculture exceeds horticulture, but it is of greater extent than Kundderem. Murshan equals in size Yahoodeyah.

Seerokh is a town. Undkhod a small one on the plains having seven villages attached to it, containing houses of the Koord popu-

lation, who are breeders of cattle and camels, and also they manufacture hair numuds. Khorasan is supplied with leather from the districts of Joozjan, which are also very fruitful.

Shuburghan is one march to the north of Unbar. To reach Yahoodeyah from Shuburghan it is necessary to go to Unbar, thence to Yahoodeyah. From Shuburghan to Undkhod two marches to the north. From Shuburghan to Kundderem, four marches, viz. three to the river and one march beyond it.

Ghorjestan or Ghorjulshar has two towns, Busheer and Soormeen, both equal in size, but neither constitutes the residence of the Sultan; the Shar to whom this kingdom belongs, resides in the hills at a place called Gungan, the country has water and gardens in plenty, and much rice is exported from it. Large quantities of raisins are produced in Soormeen. Busheer is one march from Duruh of Mervrood.

Mutlugh is an arrow's flight from the river of Mervrood to the East. From Busheer to Soormeen is one march to the south among the hills.

Ghoor is a country of infidels, which I include in the country of Eslam, because there live some Mohummudans in it. The country is one of springs, gardens and rivers, very fertile. Towards the east in early days was a tribe which professed Eslam, but were not Mohummudans in heart.

Ghoor is bounded by the districts of Herat, Furruh, Zumeendawur, the Robat Gorwan in the country of Kureeghoon, Ghorgestan, back to Herat; all of which districts are inhabited by Mohummudans, hence have I mentioned Ghoor as in the very centre of Eslam.

Surukhs is a city between Neeshapoor and Merv—situated on a level plain; river water only reaches it in particular years, and is not permanent, being the excess of the water of the Herat river. Its cultivation requires no irrigation. The city is about half the size of Merv, populous and salubrious, the neighbourhood consists chiefly of pasture-lands round a few villages, the main wealth being camels. The town is a centre of traffic for the surrounding districts of Khorasan. The mills are turned by cattle, the water being from wells; the houses are built of clay.

Nesa is a town equal in size to Surukhs, cultivated, irrigated and

having plenty of gardens. Water runs through the houses, and the streets are clean. It has many large thriving villages, being situated on outskirts of the mountains.

Furawuh is a frontier post on the deserts of the Ghoz tribe of Torks; it is separated from all villages, but has a Jama-musjed, and is the station for a guard moving to a great distance for the protection of the people. The place is a Robat with no villages, and no population near it. A spring runs through the place. There exist neither gardens nor cultivation, except a little pulse on the spring. The guard is under the strength of one thousand men.

The Kohestan of Khorasan lies near the desert of Fars, there is no town of the name, but one is called Kaen, of which the dependencies are Jonabad, Tubus called Geeluk, Khoar, Tubus known as Museena.

Kaen is equal in size to Surukhs, it has houses of clay, with a citadel surrounded by a ditch, also a Jama-musjed, and a government-house in the citadel; its water is derived from springs, with a few gardens, and villages far separated, the climate is cold.

Tubus is inferior to Kaen in size, the temperature is warm and dates appear; the place is surrounded by a wall, but has no fort, its houses are of clay and its waters derived from kareez; its dates are larger than those of Kaen.

Khoar is in size less than Tubus, and near to Khost. The Jama-musjed is at Khoar; the houses are of clay with no fortifications or fort. The gardens are few and water from kareez—indeed the want of water is excessive; the people are cattle-breeders, the place being situated on the borders of the desert with no gardens.

Jonabad is greater than Khoar—the houses are of clay—villages and gardens exist with water from kareez. Tubus Geeluk is larger than Jonabad, there is water from kareez, and villages and gardens, and houses of clay. There exist the remains of an old fortification now in ruins, but a fort is standing. Dates are found in Kohestan, Tubus, and those places which I have mentioned as of cold climate. I have well examined all of them. The population is scanty as in other parts of Khorasan. On the confines of the district is a desert inhabited by Koords, who are breeders of cattle, as camels and sheep. On the boundaries towards Neeshapoor is found an earth which is exported for use, but not for food to distant countries.

I know of no large rivers in the Kohestan; they manufacture a species of earthen-ware which is taken to other places; also cloth of silk and cotton mixed, also much thread—but nothing else of value.

Bulkh, to which belong Tokharestan, Khotul, Punjheer, Budukhshan, Bameeyan.

Tokharestan contains Kholum, Sumunjan, Bughlan, Sukulkund, Wurwageer, Urhun, Raween, Talkan, Eshkemesh, Zuwa, Serae Asem, Chesht, Indurab, Muzur, Gah.

Khotul contains Holawerd and Lawakund, towns of Wukhsh, Karteel, Ulyan, Huleel, Sekundurah, Meel, Undecharagh, Roostak Neel, sometimes Khotul is joined to the districts of Mawazlnuhr.

Bameeyan contains Bameeyan, Lushghorkund, Segawund, Kabul, Nujruo, Perwan, Ghuznee, Punjheer.

Budukhshan has a capital of the same name and is the country of Abu ul Futuh.

Bulkh lies on a plain about four fursukhs from the nearest hills called the Guz. The city has walls and ramparts with a Musjed ul Jama in the centre of the city surrounded by bazars, between which live the people. The length of the city is about half a fursukh, the houses are of clay. The gateways are called Nuo Bahar, Rukhnuh, Hudeed, Hindoo, Yuhyood, Shustbund, Yuhya. A canal called Rohaneen enters the ramparts at the Nuo Bahar gateway: it is capable of turning ten mills, and irrigates as far as the village called Seyahgerd.

The gateways are surrounded by gardens and vineyards, the walls have no ditch and are built of clay.

Tokharestan; the largest place is Talkan, situated on a plain at an arrow's flight from the hills, it possesses a large canal with gardens and vineyards, being about one-third the size of Bulkh; next in extent is Wurwageer and then Indurab which is situated in a gorge of the hills; it is a mart for the silver found in the mines of Jaryanuh and Punjheer; two rivers flow in this district called the Indurab and Kasan; vines and fruit-trees are plentiful. All the other places of Tokharestan are much of the same magnitude, but all less than Talkan. Wurwageer and Indurab are at the heads of springs containing fruit-trees, much cultivation, and a large population.

The towns of Khotul are all well supplied with springs, trees and population, they are all situated on plains, except Sekundurah.

The Jubal or hill-districts of Khotul are all mountainous, except about Wukhsh.

The large towns of Khotul are Meel, Ulyan, Huleel; the Sultan resides at the last named place. Khotul is situated between the streams Wukhsh and the river of Budukshan, which is also called Khurab. Near this district flow many streams which all unite a little above Termez near Kobadeyan and form the great river called Juehoon.

Meel is about the size of Indurabuh, Huleel less—the houses of both are built of clay, but the walls of Meel are of stone and mortar. Two districts of the Kafirs called Wukhan and Gharan are adjoining.

Budukshan is less than Meel in size, it has many villages, vineyards, a large population and cultivation with plenty of water,—being situated on the river Khurab flowing to the West. Khotul exports large numbers of cattle; and produces abundance of lapis lazuli and rubies from mines in the hills. Musk is imported by the road of Wakhan from Tubbut.

Punjheer is a place in the hills inhabited by ten thousand men chiefly robbers and thieves. There are streams and gardens but no cultivation.

Jaryanuh is a smaller place than Punjheer,—both contain mines of silver and houses for the men employed in the mines, they have no gardens or cultivation. The river of Punjheer runs through the district of that name, then flows into Jaryanuh, and passing Perwan, enters India.

Bameeyan, its city is about half the size of Bulkh. This district is called Sheer Bameeyan; the town is without walls built on a hill, a rivulet flows through it into Ghorgestan—fruits are imported, it having no gardens. There is no town near at hand situated on the hills except Bameeyan.

Guznee has no gardens but a stream flows near it; none of the places under Bulkh are more rich or more commercial than Guznee, which is a mart of India.

Kabul has a strong fort of one entrance, in which reside Mohummadans; with suburbs in which reside Hindoos. It is settled, that

the king has no right to the kingdom unless he is residing at Kabul on attaining it—should he be at a distance, he does not obtain the power until returning to Kabul. This city is also a grand emporium of Indian produce. Bulkh produces the Bactrian camel, superior to those of any other district, also oranges, water-lilies and sugar-cane, which are products of warm climates, but no dates. Snow falls in the neighbourhood. Nugruo, Segawund and Kabul are warm climates but still produce no dates.

Ghoor is surrounded on all sides by Mohummudan countries, but the inhabitants are infidels, except a few who pass for Mohummudans.

The country is of mountains; their language is different from the Persian language; the earth is fruitful in crops, cattle and flocks. I have admitted it into Khorasan, because it is surrounded on three sides by this country, one boundary is Seestan.

Most of the slaves from Ghoor are carried to Herat or Seestan or in those directions. At the back of Ghoor, stretches a range of mountains reaching to Bameeyan, Punjheer and Wakhan.

It then passes into Mawazolnuhr crossing Sar and Shash, and concluding in the country of the Khurgheez.

This range from beginning to end contains mines of silver and of lead. The most pure comes from the country of the Kherkheez, Ferghanah and Shash; but the best obtainable in Mohummudan countries is from Punjheer and its dependencies.

I will sketch the banks of the Juehoon and Kharism in my account of Mawazolnuhr.

Amol and Zum are two places of equal size on the banks of the Juehoon, having running water, gardens and cultivation. Amol is the point of meeting of the various roads from Khorasan. Zum is less populous than Amol, it is also a well known ferry. These places are surrounded by the desert which extends from Bulkh to the sea of Kharism—the soil is chiefly sandy, with no springs, only a few ponds and wells for water and pasture-lands. This desert reaches back to Merv from Amol. A similar one also separates these districts from Kharism and the countries of the Ghoz tribes. Wells are dug and much cattle are produced, but the best breed of camels in Khorasan is from Surukhs and Bulkh. The sheep are mostly imported from the Ghoz districts, from Ghoor and from Khuluj.

In Khorasan are found abundance of cattle, slaves, food, clothing and all that is necessary for man.

Marches.

From Koomis the first district of	Neeshapoor	To the banks of the Juehoon,	23
„	Neeshapoor	„ Esferayun the second district of Neeshapoor, ...	5
„	Neeshapoor	„ Boozjan, ...	4
„	Boozjan	„ Pooshunj, ...	4
„	Pooshunj	„ Herat, ...	1
„	Herat	„ Esfezar, ...	3
„	Esfezar	„ Duruh, the last district of Herat, ...	2
„	Duruh	„ Seestan, ...days	7
„	Esferayun	„ Duruh,.....	19
„	Neeshapoor	„ Toos, ...	3
„	Neeshapoor	„ Nesa, ...	6
„	Nesa	„ Furawuh,.....	4
„	Neeshapoor	„ Kaen of Kohestan,.....	9
„	Kaen	„ Herat, ...	8
„	Merv	„ Mervrood, ...	6
„	Merv	„ Herat, ...	12
„	Merv	„ Abeewurd, ...	6
„	Abeewurd	„ Nesa, ...	4
„	Herat	„ Mervrood on the Bulkh road	6
„	Herat	„ Surukhs, ...	5
„	Bulkh	„ Mervrood, ...	12
„	Bulkh	„ the border of the desert to Termez, ...	2
„	Bulkh	„ Endurabuh,.....	9
„	Bulkh	„ Bameeyan, ...	10
„	Bameeyan	„ Guznee, ...	8
„	Bulkh	„ Budukshan,.....	13
„	Bulkh	„ the border of the desert on the road to Khotul at a place called Eeluh,	3

Khorasan extends in latitude from Budukshan lying on the Juehoon to the lake of Kharism.

From Budukshan	To Termez on the river, ...	13
„ Termez	„ Zum, ...	5
„ Zum	„ Amol, ...	4
„ Amol	„ the capital of Kharism,...	13
„ The capital	„ the lake of Kharism, ...	6

I have thus stated the distances between the well known cities, I now proceed to the towns situated in each district.

NEESHAPOOR.

„ Neeshapoor	„ Boozjan, ...	4
„ Boozjan	„ Malun called Kisrajerd on the left of the road from Herat to Neeshapoor,...	1
„ Malun	„ Khaemun, ...	1
„ Khaemun	„ Sungan, ...	1
„ Sungan	„ Jonabad, ...	2
„ Jonabad	„ Kaen, ...	2
„ Suloomul is situated two days to the left of Sungan, ...		2
„ Suloomul	„ Zoozan, ...	1
„ Zoozan	„ Kaen, ...	3
„ Neeshapoor	„ Tersheez,.....	4
„ Tersheez	„ Kunduz, ...	1
„ Kunduz	„ Jonabad, ...	2
„ Jonabad	„ Kaen, ...	2
„ Neeshapoor	„ Khushruogerd, ...	4
„ Subzwar is two fursukh from Khusruogerd.		
„ Khusruogerd	„ Buhmunabad, ...long	1
„ Buhmunabad	„ Moobedan on the road to Koomis fursukh,.....	1
„ Neeshapoor,	„ Janruwan, ...	1
„ Janruwan,	„ Mehrjan, ...	2
„ Mehrjan	„ Esferayun, ...	2
„ Buhmunabad	„ Azadwar,.....	1
„ Azadwar	„ Reewaduh, ...	1
„ Reewaduh	„ Mehrjan, ...	2

MERV.

From	Merv	To Keshmehun, ... march	1
„	Keshmehun	„ Hormuz-Kuruh, near it, is the road leading over the desert to Kharism, fursukh, ...	1

Pashtan lies in front of Hormuz-Kuruh at a fursukh from the road. Seenuj is situated one march from the city between the grand road, and the Surukhs road. Khuzukh is a place six fursukhs from the city, one fursukh in front of Zoruk on the desert.

Mervzum is situated four fursukhs from the city on the desert.

Dundafkun is one march from the city on the road to Surukhs. Kurshee lies four marches from Merv on the desert.

Khuruk, three fursukhs from the city between the road to Surukhs and Abewurd.

Shooshukan lies at a distance of a fursukh from Khuruk.

HERAT.

From	Herat	To Esfezar, contains 4 places already mentioned, each less than one march in extent,.....	3
„	Herat	„ Malun,.....	½
„	Herat	„ Kurooj, ...	3
„	Herat	„ Pooshung, ...	1
„	Pooshung	„ Koh, two fursukhs on the left of the Neeshapoor road,.....	4
„	Pooshung	„ Burkurduh,.....	2
„	Burkurduh	„ Khushruogerd, ...	2
„	Khushruogerd	„ Zoozun, ...	1
„	Herat	„ Pashtan of Herat, ...	½
„	Pashtan	„ Jusan,..... ..... easy	1
„	Jusan	„ Serteeyan, ...	1
„	Serteyan	„ Marabad,..... easy	1
„	Marabad	„ Oobuh,..... easy	1
„	Oobuh	„ Chesht, ...	2

From Chesht the country of Ghoor commences.

„ Herat	„ Buenuh, ...	2
„ Buenuh	„ Kuef, ...	1
„ Kuef	„ Bugshoor, ...	1

BULKH.

„ Bulkh	„ Kholum, ...	2
„ Kholum	„ Wurwageer, ...	2
„ Wurwageer	„ Talkan, ...	2
„ Talkan	„ Budukshan,.....	7
„ Kholum,	„ Sumunjan, ...	2
„ Sumunjan	„ Endurab,.....	5
„ Endurabuh	„ Jaryanuh, ...	3
„ Jaryanuh	„ Punjheer,.....	1
„ Punjheer	„ Perwan, ...	2
„ Bulkh	„ Buglan, ...	6
Two marches to Sumunjan then Bughlan, ...		2
„ Bulkh,	„ Mudur, ...	2
„ Mudur	„ Kah,.....	1
„ Kah	„ Bameyan,.....	3
„ Bulkh	„ Shuboorgan,.....	3
„ Shuboorgan	„ Faryab, ...	3
„ Faryab	„ Talkan,.....	3
„ Talkan	„ Mervrood, ...	3

KOHESTAN.

„ Kaen	„ Zoozun, ...	3
„ Kaen	„ Tubbus Meseena, ...	2
„ Kaen	„ Khoor,.....	1
„ Koor	„ Khoost, ...fursukhs	2
„ Kaen	„ Tubbus,..... marches	3

NOTES.

NEESHAPOOR.

The glory of Neeshapoor must indeed have faded away. According to Fraser, hardly a trace remains of the various neighbouring cities passing under this name, unless perhaps mounds of debris with two shrines of Mohummudan saints can be so termed. The trade has entirely vanished, and now consists in the traffic of the turquoise

found in the mines—the circuit of the present wall is 4000 paces, the population under 20,000 souls, the entire revenue being estimated at a lac of Tomans.

In the Nozhut-ul-Koloob it is stated, that Shahpoor ben Ardesheer in renovating this city carried on the ancient custom of laying out cities on the form of some animal, or visible article; in this case, the squares of the chess-board were adopted. Bulk subsequently assumed the position of capital of Khorasan, until Omur ben Lues restored this dignity to Neeshapoor. One of the numerous new cities had the name of Shadbagh—it was destroyed by an earthquake in A. H. 679, after this arose the present town which has been absorbed in the modern Mushud. Every book contains long descriptions of the beauties and delights of the springs and gardens of Neeshapoor.

Boozjan or Boochgan, on the high road to Herat at a distance of 38 fursukhs from Neeshapoor according to the Nozhut-ul-Koloob. *The Bezk* of Burne's map (?) also noted as a district of Jam. Four roads take off from this place; to Herat, Kaen, Surukhs, and Bakhurz.

Khaemund, doubtful. Burne's Map exhibits Kahmah near the required position.

Suloomul doubtful. Salama of the Maps?

Sungan. Sungoon of the Maps—mentioned by Christie, a place in Zawuh.

Zoozan is noted on Burne's Map, but too far to the north of the position required. The interpolation of places by correct European latitudes and longitudes, among locations from native authorities has this effect of transposing positions. All places connected, require to be reduced in the same ratio of the newly determined place.

Tersheez was visited by Forster, who says the old capital was called Sultan Abad, of small compass surrounded by a wall.

Dure Mushkan, a fort of this name between Neeshapoor and Subzwar is mentioned in the Nadir Namuh.

Azadwar is noted as eight fursukhs from Jajerm, the first march on the road to Neeshapoor.

Khushruogerd is noticed by Fraser, a fort of great antiquity with delapidated minars and extensive ruins.

Buhmunabad Map.

Muzneyan, Muzeenoon of Fraser, a place surrounded by extensive ruins.

Subzwar is the central town of a district known as Beehuk; found by Fraser a field of ruins, with the tombs of several saints of Eslam alone preserved, said to have been built by Sasan ben Buhman.

Rewaduh, probably the Rewat of the Maps.

Esfurayun, a district thirty or forty miles N. E. of Subzwar, both names are now used in common. The Nozhut-ul-Koloob mentions a large stone vase of four yards in diameter as a curiosity.

Khuer Khan very doubtful, unless it be Khur or Khuer Shah twenty miles from Azadwar on the road to Neeshapoor, a place of the district of Joweeruh once a portion of Beehuk.

Zurmuluh unknown and doubtful.

Toos, is recorded by Fraser as exhibiting a large area of debris surrounded by walls yet standing. The name and indeed the city are ascribed to Toos ben Nuozur. This city has been ever celebrated as the birth or resting-place of men of talents or of piety. The poet Ferdousee, and numerous Mohummudan saints are buried within its walls.

Radgan seen by Fraser about forty-three miles W. by N. of Mushud.

Taburoon, Burooghoor, Nookan, Sunabad.—The modern town of Mushud, now a place of pilgrimage, has entirely arisen on the proceeds of the shrine; it must occupy the position of the Sunabad mentioned, the little detail given by our author of the shrine with the absence of all mention of the tomb of Ferdousee at Toos, point to a date prior to which the work must have been written.

MERV.

We have some account of this place in the travels of Sir Alexander Burnes and party. They arrived at the river thirty miles below the city and found it a fine stream, eighty yards wide, five feet deep. The country between the Oxus and this point having been a dry arid plain. But round the town of Merv were scattered for miles the remains of ancient forts and villages, with the marks of extensive cultivation; when this existed, the waters of the river were nearly exhausted for irrigation. The houses of the villages and

towns were all of un-burnt bricks, the population resided chiefly in black felt tents; a few families of Jews were found in several of the larger places.

The country continued to rise in level from the Oxus until reaching Surukhs—a ruined town of mud houses under a fort on a hillock of no importance. The population had changed from the fixed habits of towns to the wandering propensities of the tents. The distance was calculated as 125 miles from the Charjoee ferry of the Oxus to Merv, and 68 thence to Surukhs. The waters of Surukhs are from a river called Tejend, rising in the hills lying to the North of Neeshapoor and hence unlikely to be joined by a river like the Hureerood coming from the opposite direction on the South side of the range. The lands about Surukhs were considered to be fertile to an extraordinary degree: the place was able to send forth 4000 horsemen. All the splendour narrated by our Arabian author had disappeared before the ravages of the contending Tatar and Tork tribes. The clay-built houses had melted away under snow and rain, the canals were choked up, the fields affording precarious subsistence to wandering hordes of Toorcomun robbers. From Surukhs to Mushud was considered 64 miles. Capt. Abbott gives to the lands of Merv 2,400 square miles, a population of 60,000 Toorkoman families, paying two lacs of rupees per annum, revenue.

Kurshee, is here distinguished from the Kurshee of Bokhara and is given in the Nozhut-ul-Koloob as four marches or twenty-five fursukhs from Merv.

Walee Maoonuh. The only point of comparison I can reach is this—on the Huj road to Mecca exists a celebrated well, called the Bere Maoonuh, on the waters of which the pilgrims much depend, hence the Meerab or Canal Master of Merv may be considered as of equal importance to the owner of this well.

Arched Room.—This place is mentioned in the Nozhut-ul-Koloob.

Mamoon.—Merv was also the capital, subsequently, of the Seljook dynasty.

Surukhs is given in the Nozhut-ol-Koloob as founded by Afraseyab, and watered by a continuation of the rivers, both of Herat and Toos. The extraordinary fecundity of the soil is extolled, that one mun would return one hundred muns, and either from the roots or

the scattered seed, thirty more could be collected in the following season.

Herat.

The city has been altered since this description was written, the names of the gates, of the canals, and of the villages given in the translation are such as I believe to be intended and to be correct, I have compared them with the names given in many books. Marabad is the Marwan of the Map.

Esfezar—Arthur Conolly mentions Kooshuk as a small fort situated in a fertile plain of twenty miles in breadth.

Subzwar is a town of one thousand houses.

Pooshung was the capital of the family of Taher, which for several generations was all-powerful in Khorasan. The Nozhut-ul-Koloob contains Kooswee, Khushruogird, and Burooh as its subdivisions, the second I adopt and the latter may have connection with Burkurduh. But Mohun Lal mentions Furuhabad to the South of Khaff, which is about the requisite position, and points to Furuhgerd as the correct reading, perhaps Ferhadgerd.

Kooswee was passed by Arthur Conolly in ruins, at seventy miles from Herat. It was once a place of importance and stood a long siege from Jungeez Khan.

Urur, one dictionary offers the Surv or cypress-tree for this word.

Hureerood, it appears to be settled, that this river does not run so far as to reach Surukhs; and its junction with the Tajend to be a misconception, or at any rate doubtful, as the country rises from Herat towards Mushud.

Badghues—the readings with the exception of Koh are nearly all confirmed by the Nozhut-ul-Koloob. The district is an extensive one to the North of Herat.

Hujestan is noted in a history of Herat.

Gunjrostak appears to form a large division of country lying between Badghues and the Moorghab river.

Bughshoor.—The Nozhut-ul-Kolook has Buhreshoor in the required position—which is about the Awsharuh of Wyld's map. Native authority is in favour of Bughshoor—I incline to Buhreshoor.

Buen and Kuef are unknown.

Mervrood appears never to have been visited, hence many of the subdivisions cannot be identified.

Ukhnuf bin Kues—a celebrated Arab leader of early period, the place is identified in the Nozhut-ul-Koloob at three fursukhs from Mervrood.

Talkan lies 18 fursukhs east of Merv, yet this meanly mentioned place took the entire army of Jungeez Khan seven months to capture.

Faryab stands at 40 fursukhs East of Merv on the Bulkh road.

Joozjan is a large district between Merv-road and Bulk round Muemoonuh as a centre.

Unbar, we have a place in Ezzut Allah, and on the maps, and constantly mentioned by horse-dealers, Ulmar, which may be the Unbar indicated by the text; and the Humber of Wyld's map.

Yahoodeyuh, a large body of Jews are known to have accompanied the armies of Seleucus, and to have been settled near Merv; this Yahoodeyuh may constitute their location.

Ghorgestan; it was a most difficult affair to reach the meaning of this sentence, but I find it mentioned in the fourth volume of the Roozut-ul-sufa that the people of Ghorgestan called their kings, Shar, even as Torks use Khan, and Hindus Rae. I can offer no confirmations of my readings, except that Wyld's map contains a place called Soormeen though not quite in the position required.

Nesa, Furawuh, are known by name but not identified.

Kohestan.—Jonabad, is the Arabised form of Goonabad, a town said to have been constructed by a son of Goodurz. It is defended by a fort on an eminence.

Tubus called Geeluk appears to be the Tubus of Wyld's map to the West of Kaen, it is said in the Nozhut-ul-Koloob to be seven days' march from Yezd, a distance which Captain Christie covered in that time, and calls about 145 miles—this traveller skirted the district of Kohestan, and indicates the want of water, the deserts of sand, but no absolute deficiency of supplies.

Kaen is put down as a large city of a warm climate, and very fruitful, in Lat. 33° 40′; the inhabitants are very warlike and possessing, each man, instruments of war.

A more modern work gives the subdivisions of Kohestan as Choon, Toon, Tubus, Dushtebeyaz, Neyarjan, Moomenabad, Shakhuen, Jonabad, Zeerkoh, Peeshawur.

This district became the centre of the noted sect or tribe of Esmaeeluh or Mulaheduh; the assassins of European story.

Bulkh.

Bulkh is considered to be the capital of the ancient Bactria. In Moslem history, this city has ever been highly celebrated, even called the Paradise of the world. The old ramparts and castle, went by the name of the Hindoo fort, it was destroyed by Ukhnuf ben Kues, a new city then arose under the order of Aboo-Moslem the governor of Khorasan. On the high road of contending armies, its vicissitudes have been numerous; it now lies under the ban of "ruin and decay with no remains of interest beyond its name." The numerous gates mentioned, will be of the fort and of the town. The designation to the hills of Koo, is a fragment probably of Hindoo Koosh—or may be Gor or Guz the last I take as the valley of the Bulkhab is called Guz.

Sumungan, according to Moorcroft is now designated Uebuk—"the first view of Uebuk was rather imposing, presenting a castle on an insulated eminence"—it proved to be in ruins, but to possess some claims indicative of its antiquity.

Wurwageer is doubtful, by the distance and bearing, it would fall near the position of the modern Kundooz in the direct line from Bulkh to Budukshan.

Shuboorgan is mentioned by Marco Polo.

Wukhsh, the arch type of Oxus is apparently beyond the river of that name, lying N. W. from the stream at no great distance.

Khotul.—The Khotlan of the maps, is a large district lying on the bend of the Oxus above Budukshan, near the spot marked Durwaz —the town of the name is mentioned in the Nozhut-ul-Koloob as an important place but in ruins.

Khuryab has a local authority attached, as Khurgeez the wandering tribes of the steppes of the Poshte Khur of the Pameer range.

Budukshan is a well understood district, the Balashan of Marco Polo.

Talkan is "a small place under a fort of no importance," perhaps four hundred houses.

Eshkemesh is probably the Scassem of Polo, but Wood places an

Eshkashem to the East of Fuezabad, which better answers the position required by the Venetian.

Budukshan town, according to Wood, "hardly a vestige remains of the modern capital, Fuezabad" which once occupied a commanding position on the left bank of the Koksha or Khur river.

Wakan is clearly the Vokan of Polo, whose description is most wonderfully authenticated at a distance of six centuries by the highly interesting narrative of Capt. Wood of the Indian Navy—a companion of Burnes.

Gharan is mentioned by Wood as the district of the ruby mines, which are located on the South face of the mountains of Shughnoon, the Sikinan of Polo who also notices the same fact.

Rubies.—Budukshan has ever been celebrated for the rubies and lapis lazuli of its mines.

Jaryanuh—I adopt in preference to Haryanuh, on the authority of Wood, who mentions the district and village of I-angheran at the South end of the Perwan and Punjheer valleys.

Punjheer, exactly as described by Wood, and has not improved since the days of our Arabian author, except perhaps in population, as the former gentleman considers the valley could turn out 10,000 armed men. The fort of Khawak captured by Timoor is situated near the top of the pass.

Bameeyan.—The reader is rather surprised to find no mention of the celebrated idols cut in the hill-side.

Kabul.—The fort with one entrance is probably that now known as the Akabeen or upper fort of Kabul, now but little used, being the enclosed summit of the range which would otherwise command the modern fort.

Lushghorkund is most likely the modern Lhoghur.

Ghor, is now occupied by Huzaruhs who speak very pure Persian.

Sar of Torkestan is doubtful.

Ghoz tribes, they were located on the sources of the Utturuk river.

Most of my readings are acknowledged by men of Bokhara to be such as they have heard mentioned, but several names are extremely doubtful as Sukulkund, Wurwageer, Undechuragh and others.

و اما خراسان

فانها يشتمل على كور وهو اسم الاقليم والذى يحيط بها من شرقيها نواحى سجستان و بلد الهند لانا ضممنا الى سجستان ما يتصل بها من ظهر الغور كله الى الهند وجعلنا ديار جالج فى حدود كابل و فرحان فى ظهر الجبل كله وغير ذلك من نواحى و غربيها مفازة غزنه و نواحى جرجان وشما ليها ما وراء النهر و شى من بلد البرل على ظهر الختل وجنوبيها مفازة فارس وقومس وضممنا قومس الى نواحى الديلم مع جرجان وطبرستان والرى و قزوين و مايتصل بها وجعلنا ذلك كله اقليما وضممنا الختل الى ما وراء النهر لانها بين نهر وخشتار و حوبار و ضممنا خوارزم الى ما وراء النهر لان مدينتها ما وراء النهر وهى اقرب الى بخارا منها الى مدن خراسان وبخراسان فيما يلى المشرق زفقة فيما بين مفازة فارس و بين هرات والغور الى غزنه و لها زفقة فى المغرب من حد قومس الى ان يتصل بنواحى فراره و فيفص هاتان الزفقتان عن تربيع سائر خراسان وفيها من حد جرجان و بحر الجرر الى خوارزم

تقويس على العمارة وهذه صورة خراسان

و اما كور خراسان التى تجمع على الاعمال وتفرق فان اعظمها نيشاپور ومرو و هرات وبلخ و بخراسان كور دونها فى الكبر فمنها قوهستان وطوس ونسا وابيورد و سرخس و اسفرار و بوسنج وباذغس وكخوساق و مروردد و جرجان والباميان وطخارستان و الزم و اميل *

و اما خوارزم فانها نذكرها فيما وراء النهر لان مدينتها وراء النهر و هى الى مدن ما وراء النهر على السمت اقرب منها الى مدن خراسان و نسانور كور لم نفردها لانها مجموعة اليها والاعمال سنذكرها فى صفة نيشاپور و افردنا طخارستان عن بلخ و انكانت مجموعة اليها لانها مفردة فى الذكر والدواوين فيقال بلخ وطخارستان وليس فى تفريقنا هذه الكور و جمعها درك اكبر من اسانها وتاليفها فى الصور و معرفة مكان كل شى منها فى صورة خراسان فاما نيشاپور فهى ابر سهر و هى مدينة فى ارض سهلة ابنيتها طين و هى مفترشة البنا و مقدار عرضها نحو فرسخ فى فرسخ ولها مدينة و قهندر وربض و قهندرها و مدينتها عامرتان و مسجد جامعها فى الربض بمكان يعرف بالمعسكر و دار الامارة بمكان يعرف بميدان الحسن والحسين عند دار الامارة وبين الحبس و دار الامارة و بين المسجد

الجامع نحو فرسخ ودارالامارة من بناء عمر بن الليث والقهندر بابان وللمدينة اربعة ابواب احدها يعرف بباب راس القنطرة والثانى بباب معقل والثالث باب القهندر والرابع قنطرة درمنكين وقهندرها خارج عن مدينتها ويحيط بالمدينة والقهندر جميعا الربض وللربض ابواب فاما الباب الذى يخرج منه الى العراق وجرجان فانه يعرف بباب القباب والباب الذى يخرج منه الى بلخ ومرو وما وراء النهر يعرف بباب حبل والثانى الذى يخرج منه الى فارس وقوهستان فانه يعرف بباب احوص اباز والباب الذى يخرج منه الى طوس ونسا عدة ابواب فمنها باب سوخته وباب يعرف بسر شيرين وغيرهما *

واما اسواقها فانها خارج من المدينة والقهندر فى الربض واعظم اسواقها سوقان احدهما يعرف بالمربعة الكبيرة والاخر بالمربعة الصغيرة واذا اخذت من المربعة الكبيرة نحو المشرق بالسوق يمتد الى ان تجاوز مسجد الجامع واذا اخذت من المربعة نحوا المغرب بالسوق يمتد الى ان تجاوز المربعة الصغيرة واذا اخذت من المربعة نحوالجنوب فالسوق يمتد الى قرب مقابرالحسنين ويمتد السوق من المربعة فى شماليها حتى ينتهى الى راس القنطرة والمربعة الصغيرة بقرب ميدان الحسنين جنب دارالامارة واكبرميا هما قنى تخرج تحت مساكنهم ويظهرخارج البلد فى ضياعهم وبها قنى يظهر فى البلد وتجرى فى دورهم وبساتينهم داخل البلد وخارجا عنه ولهم نهركبيريعرف بوادى سغادر يسقى منه بعض البلد ورساتيق كثيرة وعلى هذا الوادى توام وليس لهم فى البلد نهر اعظم منه *

وليس بخراسان مدينة هواء اولا اكبر من نيشاپور ويرتفع منها من اصناف ثياب القطن والابريسم ما ينقل الى سائر بلدان الاسلام وبعض بلاد الشرك لكثرتها وجودتها *

ولنيشاپور حدود واسعة ورساتيق عامرة وبها مدن منها النورنجان وماء ان المعروف بكراجرر وحاتمند وسلومل وسكان وزوزن وكندز وبرسير وحان را ان وازاذوار وخسروكرد ونهمناناد وسا دوار ومرسان وديواذه وسحرجان واسفراس وجنرحان ورزبله وان جمعنا طوس الى نيشاپور فمن مدنها الرابكان والطابران وبز وعور والنوفان التى بها قبر على ابن موسى الرضا عليهما السلام وقبر هارون الرشيد ومنها يرتفع البرام وقبر

الرضا من المدينة على نحو ربع فرسخ بقرية يقال لها ساباد وفى جبال نيشابور وطوس يكون الفروزج وامامر وفانها تعرف بمرو الشاهجان وهى قديمة البنا يقال ان قهندرها من بنا طهمورث وان المدينة قديمة من بناذى القرنين وهى فى ارض مستوية بعيدة عن الجبال لايرى منها جبل وليس فى شى من حدودها جبل وارضها سبخة كثيرة الرمال وابنيتها طين وفيها ثلثة مساجد الجماعات اما اول مسجد اقيمت فيه الجمعة فمسجد بنى داخل المدينة فى اول الاسلام فلما كثر الاسلام بنى المسجد المعروف بمسجد العتيق على باب المدينة ويصلى فيه اهل الحديث ونزلت الجماعات فى المسجد الاول ويعرف بمسجد بني ماهان ثم بنى بعد ذلك المسجد الذى على ماهان ويذكران ذلك المسجد والسوق ودار الامارة من بنا ابى مسلم ودار الامارة على ظهر هذا المسجد وفى هذه الدار قبة بناها ابو مسلم كان يجلس فيها والى هذه الغاية يجلس فى هذه القبة امراء مرو وهى قبة من آجر وسعة هذه القبة لم يذكر المساحة ومنص لها من داخل نيصبه السطح وللقبة اربعة ابواب كل باب الى الوان سمك كل الوان *

وبين يرى كل الوان صحن مربع والقهندر فى الكبر مثل مدينة الا انه خراب وهو مرتفع وعلى ارتفاعه قد سبقت اليه قناة ماء جار الى يومنا هذا وربما زرع عليه صاطيخ ومبا قل وغير ذلك *

واما اسواقها فانها فى القديم كانت على باب المدينة جنب المسجد العتيق فانتقلت فى ايام ابى مسلم الى ماحان واسواقها من انظف اسواق الامصار ومصلى العيد فى محلة راس الميدان فى مربعه الى الجهم ويطيف بهذا المصلى من جميع وجهاته البنيان والعمارات وهو بين نهر هرمرفوه وما حان وارباع البلد انهار معروفة فمنها نهر هرمرفوه وهو نهر عليه ابنية كثيرة من البلد وهو مما يلى سرخس فى اول ماييد خل الداخل من سرخس وهى ابنية كثيرة كان الحسين بن طاهر بنا فيها تلك الابنية وارادان ينقل اليها السوق ودار الامارة ومن هذا النهر شرب محله راس الشابای الذى فيه دور الشيخ الجليل ابى الفضل محمد بن عبيدالله ومنها نهر يعرف بالماحان وعليه دار الامارة والاسواق والمسجد الجامع المحدث والحبس وعلى هذا النهر دارال ابى النجم مولاء ال ابي معيط وهى الدار التى فيها القبة التى صنع

فيها سواد دعوة بنى العباس والقبة باقية الى اليوم ومنها نهر يعرف بالزريق و مجراه على باب المدينة ومن هذا النهر يشرب اهل المدينة سان ومن هذا النهر الى حياض فيها وعلى هذا النهر المسجد العتيق ومن اسفل هذا النهر قصورا ال خالد بن احمد بن حماد الذي كان على امارة بخارا ومنها نهر يعرف باسعدى الخراسانى واليه شرب محلة باب سحان وبرماهان وغيرها وعلى هذا النهر كانت دور مرزبان مرو فهذه انهار مرو التى عليها محال البلد و ابنيتها وعلى هذه الابنية سور يحيط بها وبهذه الاربعة الانهار ويحيط بهذه المدينة ورساتيقها سور اخر يشمل على جميع رساتيقها يعرف بالراى وترى اثار هذا السور الى هذه الغاية وللمدينة الداخلة اربعة ابواب فمنها باب يعرف مما يلى مسجد الجامع وباب حمى وباب سنجار وباب يسما باب بالين وباب درمسكان ومن هذا الباب يخرج الى ما وراء النهر وعلى هذا الباب مسكن المامون ومضربه ايام مقامه بمرو الى ان انتهت الخلافة اليه ولمرو نهر عظيم ينشعب هذه الانهار كلها وانهار الرساتيق منه ومبتداؤه وراء البا ميان ويعرف هذا النهر بمرعاب اى بامر ومن الناس من يزعم ان النهر منسوب الى مكان يخرج منه الماء يسمى بمرعاب ومنه من يقول بزعم تفسير مرغ اجمه ومجرا هذا النهر على مرورود وعليه ضياعهم واول حد هذا النهر من عمل مروكوكين بين حوران من مرو والفرسى من مرو ومقاسم هذا الماء من رزق قرية بها مقسم ماء مرو وقد جعل لكل محلة ومنكة من هذا النهر نهر صغير عليه الواح خشب فيها سقب يتساوى بها الناس فى تناول حصصهم من لماء فان زاد احد كل شرب نصيبه من الرمادة وكذالك اذا نقص وهولا هذا الماء امير على حدة وهوا جل من والى المعونه بلغنى انه بربزق على هذا الماء زيادة على عشرة الاف رجل لكل واحد منهم على هذا الماء عمل وكانت مرو معسكر الاسلام فى اول الاسلام وفيها استقامت مملكة فارس للمسلمين لان يزد جرد ملك الفرس قتل بها فى طاحونة رزق ومنها ظهرت دعوة بنى العباس وفى دار ال ابى النجم المعنطى صبع سواد ليس المسودة وفيها جاءت المامون الخلافة وظهر على اخيه محمد بن زبيدة ومنها عامة قواد الخلافة وكتابها بالعراق ولولاه خراسان ومنها ائمة من الفقهاء واهل الادب معروفون ولولا انا بينا كتابنا على التجوز وان الذى تركنا شرحه هو معروف

فى الاخبار والكتب المولفة لشرحنا من طبقات الناس و سائر ما احملنا ذكره و فى ايام العجم كانوا مقدمين من بين نواحى ابرشهر فى الطبع و التادب حتى كان طبيبهم سرز و يه مقدما على سائر اطباً العجم و ملهنهم المعروف بالبازيد مقدم على سائر من ضلع الالحان و تعاطا الملاهى ثم هى من اطيب بلاد خراسان اطعمة اما خبزهم فليس بخراسان انظف خبزا و الذطعما منه حتى ان اليابس من فواكها من الزبيب وغير ذلك متصل على سائر الاماكن و انما يذكر من هراة اكثرة و انه يكثر فى الافاق فاما الطعم و الجودة فان المروزى بفضله و من صحة فواكههم ان البطيخ يقدد وتحمل الى العراق و لم اعلم هذا يمكن ببلد غيرة و بلدهم من النظافة و حسن الترصيف و تقسم الابينة والمحال فى خلال الانهار و الغروس و تمييز اهل كل سوق عن غيرة بحيث يفضل سائر مدن خراسان فى حسنه و فى مفازتها يكون الاستوغار الذى يحمل الى سائر الدنيا و يرتفع من مرو الابريشم و القز الكثير وبلغنى ان اصل الابريشم بجرجان و طبرستان انما نقل فى القديم من مرو و ربما حمل من يزدود القز منها الى طبرستان ومنها يرتفع القطن الذى ينسب اليه القطن اللين و الثياب التى يجهز الى الافاق وبها منابر قديمة و حديثة فبمرو منبران ويلثمهن منبر و نهر مرفوة منبر وسخ منبرو بحرنج منبرو بحرق منبرو بالسوسفان منبر فهذة منابر مرو التى اعرفها *

اما هراة فانها اسم المدينة ولها اعمال ومن مدنها مالق و حسان واستربيان و اوفه و ماراباذ وباسان وكروج وحشب و باستراد ادرسلن وبواران وكوسندو خراسان و اسراد اسم الكورة لا اسم المدينة و مدنها هذه الاربعة التى ذكرناها واما هراة فانها مدينة عليها سور وحواليها ماء و داخلها مدينة عامرة و لهاربض و فى مدينتها قلعة ومسجد الجامع ودارالامارة خارج الحصن مكان تعرف بخراسان اباذ منقطع عن المدينة بينه و بين المدينة اقل من ثلث فرسخ على طريق سح على غربي هراة و بناؤها من طين و هى مقدار نصف فرسخ فى نحوة و لمدينتها الداخلة اربعة ابواب الباب الذى يخرج منه الى نيشاپور مما يلى الشمال يسمى باب سراى والباب الثانى الذى يخرج منه الى بلخ غربى يسمى باب سراى والباب الثالث الذى يخرج منه الى سجستان يسمي باب فيروز اباد و الباب الذى يخرج منه الى الغور شرقى يسمى باب حسك

وابوابها من خشب غير باب سراى فانه حديد وعلى كل باب سوق يشمل مما يليه من المحال وفى داخل المدينة والربض مياه جارية وللحصن اربعة ابواب بحذاء كل باب من ابواب المدينة باب لهذا الحصن ويسمى باسم ذلك الباب وخارج الحصن جدار يطوف بالحصن كله اطول من قامة وبينهما مقدار ثلثين خطوة والمسجد الجامع من المدينة فى وسطها وحواليها اسواق والسجن على ظهر قبلة مسجد الجامع وليس بخراسان وما وراء النهر وسجستان والجبال مسجد اعمر بالناس على دوام الايام من مسجد هراة ثم مسجد بلخ ثم مسجد سجستان فان بهذه المساجد حلق الفقهاى والناس يتزاحمون على رسم الشام والثغور وسائر المساجد بهذه الاماكن اينما ينتابها الناس فى الجمعات وهراة مطرح الحمولات من فارس الى خراسان وهى فرضة لخراسان وسجستان وفارس *

والجبل من هراة على نصف فرسخ على طريق بلخ ومحتطبهم من مفازة بينها وبين اسفرار وليس بهذا الجبل محتطب ولا مرعا وانما يرتفقون منه بالحجارة للارحنة والفرس وغير ذلك *

وعلى راس هذا الجبل بيت ناريسمى سرسك وهو معمور وبينها وبين المدينة كنيسة النصارى وليس بينها وبين المدينة مياه ولا بساتين الا نهر المدينة على باب المدينة يعبر بالقنطرة ثم لايكون بعده ماء ولا خضرة وعلى سائر الابواب مياه وبساتين اعمرها باب فيروز اباد ومخرج مائهم من قرب رباط كروان فاذا خرج عن الغور الى هراة ينشعب منه انهار فمنها نهر يسمى برحوى يسمى رستاق سداسنك ونهر يسمى بارست سقى رستاق كواسان وساوسان وما كن وميزان وروابر ونهر يسمى اذر بيجان يسقى رستاق سوسان ونهر يسمى سكوكان يسقى رستاق سله ونهر يسمى كراغ يسقى رستاق كوكان ونهر يسمى غوسمان يسقى رستاق كرك ونهر يسمى كفل يسقى رستاق عوبان وكربكرد ونهر يسمى فغو يسقى رستاق بغاوردان وفيرد ونهر يسمى الجيز يسقى مدينة هراة *

والبساتين متصلة على طريق سجستان مقدار مرحلة واكبر مدينة بهراة بعد هراة كروح واوفه ويرتفع من كروح الكشمش الذى يجلب الى الافاق والزبيب الطايفى الذى يحمل الى الافاق معظمه يرتفع من مالن وكروح مدينة صغيرة واهلها شراة ومسجد الجامع بمحلة منها يسمى بسيدان وبناؤها طين وهى فى شعب بين جبال وحدها مقدار فرسخ كلها مشتبكة البساتين والمياه

والاشجار والقرى العامرة و اوفه اهل جماعة وهى بحركروج ولها بساتين ومياه ربناؤها من طين وما بين اصغر من كروج وهى مشتبكة البساتين والمياه والكروم عامرة جدا وحسان قليلة الاشجار وهى اصغر من مالن واهلها اهل جماعة واسرمان اهلها الخوارج وهى اصغر من مالن ولها مياه وبساتينهم قليلة والغالب عليهم الزرع دون الكروم وهى فى الجبال وما را باد كثيرة البساتين والمياه وهى مدينة اصغر من مالن يرفع منها ارز كثير يجلب الى النواحى *

و نا سار مدينة اصغر من مالن ولهم زرع وهى قليلة البساتين على كثرة مياهها وباسفرار اربعة من المدن واكبرها كواسان وهى مدينة اصغر من كروج ولها ماء وبساتين كثيرة وكران وكوسك وادر *

سلر هى متقاربة فى الكبر ولها مياه وبساتين واسفرار مقدارها ثلث مراحل فى مرحلة وهى كلها عامرة ليس فى طهرانيها مفازة وباسفرار شعب يسمى كاشكان وفيها قرا عامرة كلهم شراة فاما مدن اسفرار فان اهلها اهل جماعة واما بوشنج فان بها من المدن حوكرد وفزكرد وكوس وكرة واكثرها بوشنج وهى مدينة نحوالنصف من هراة وهى وهراة فى مستو ومن بوشينج الى الجبل نحو فرسخين وهى هذا الجبل الذى من هراة اليه نصف فرسخ وبناؤه من جنس بناء هراة ولهم مياه واشجار كثيرة وبها من اشجار العرعرما ليس بجميع خراسان فى بلد ويحمل هذا الخشب الى سائر النواحى وماؤهم من نهر هراة وهو النهرلذى يخرج الى سرخس غير انه ينقطع الماء دون سرخس ويستعمل الا فى بعض السنة ولبوشينج سور وخندق وثلثة ابواب باب يسمى باب على نيسا بور وباب هراة الى هراة وباب قوهستان الى قوهستان واكبر المدن بها بعد بوشينج كوسرى وهى مدينة لها ماء وبساتين قليلة وهى نحوالثلث من بوشينج وبناؤها من طين وحوكرد لها ماء وبساتين كثيرة وهى اصغر من كوسرى وفركرد اصغر من حوكرد ولها ماء جار وهم اصحاب سوائم وليس لهم بساتين كثيرة ولهم ماء جار قليل وكرة لها بساتين ومياه كثيرة وهى نحو من فزكرد فى الكبر واما باذ غيس فان بها من مدنها جبل الفضة وكوه وكوعناباد وبست وجازو وبحايرون وكالوون ودهستان والسلطان يكون مقامه بكوعناباد واعمرها واكبرها دهستان ويكون نحوالنصف من قوشينج وبناؤها من طين

ولهم اسراب كثيرة فى الارض وهى على جبل ولهم ماء جار قليل وليست لهم بساتين ولا كروم وانما هى مناحس وكذلك كو وجبل الفضة وكو اكبر من جبل الفضة وجبل الفضة على جبل كان فيه معدن الفضة وتعطل لقناء الحطب *

واما كرفانها فى صحرا ويلوعناناد وبست وحاذوى بساتين ومياه ولهم بساحس كثيرة وكالزون وكافورن ليس لهم بساتين ولا مياه جارية وانما مياههم من الامطار والابار وهم اصحاب زروع مياحس اصحاب اغنام وجبل الفضة على طريق سرخس من هراة وناد عبس اهل جماعة الاحسان وقربة احمد بن عبد الله فان اهلها شراة *

واما كج رستاق فان مدينتها بين ولها كيف *

وبغ شور والسلطان منها بين وهى اكبر هذه المدن وبين اكبر من بوشيخ وبغشور نحو فرسخ فى الكبر *

وكيف نحو نصف بغشور وبين وكيف لهما مياه كثيرة جارية وبساتين وكروم وبناؤها من طين واما بغشور فانها فى مفازة وهى عذى وزروعهم كلها مباخس وماؤهم من الابار وهى اخصب زروع وهى مدن صحيحة التربة والهواء وهذه المدن كلها على طريق من ورزو من ورزو بها من المدن قصر احنف ودره من ورزو اكبرها من ورزو وهى اصغر من بوشيخ ولها نهر كبير وهذا النهر الجارى من الى مرو ولهم عليه بساتين وكروم كثيرة وهى طيبة التربة والهواء *

وقصر احنف على مرحلة منها على طريق بلخ ودره على طريق اسار على اربعة فراسخ وقصر احنف لهاماء جار ولها بساتين وكروم وفواكه حسنة ودره يشق نهر من ورزو وسطها وهى نصفان وبينهما قنطرة ولها بساتين وكروم وفواكه حسنة ومن مرورزو الى النهر غلوة *

والطالقان مدينة نحو من مرورزو فى الكبر ولها مياه جارية وبساتين قليلة وبناؤها وبناء مرورزو من طين وهى اصح هواء من مرورزو من مرورزو الى الجبل ثلاثة فراسخ فمايلى المغرب ومن جانب الجبل منه على فرسخين ممايلى المشرق *

والطالقان فى جبل ولها رساتيق فى الجبل *

و القارنان مدينة اصغر من الطالقان الا انها اكثر بساتين و مياها من الطالقان و بناؤها من طين و الجور جان اسم للناحية و مدينتها اليهودية *

و شبورقان و انجدرستاق و مدينتها اسلح و كندرم و انبار رسار و اكدرها انبار و بها مقام السلطان و هى مدينة على الجبل و هى اكبر من مرورود و لها مياه و كروم و بساتين كثيرة و بناؤها طين *

و سان مدينة صغيرة لها مياه و بساتين و الغالب على ثمارها الجوز و هى فى الجبل و اليهودية اكبر من سان و لها مياه و بساتين و هى فى الجبل و كندرم فى الجبل و هى مدينة كثيرة الكروم و الجوز و لها مياه كثيرة *

و سورفان لها ماء جار و الغالب عليهم الزروع و بساتينهم قليلة و هى اكبر من كندرم و فرسان و هى نحو من اليهودية فى الكبر و سيرح مدينة و انجد مدينة صغيرة فى مفازة لها سبع قرا و بيوت لا اكراد اصحاب اغنام و ابل *

منها اسعرمدد و يرتفع من ناحية الجورجان الجلود التى تحمل الى سائر خراسان و هى عامة الخصب فمن سورفان الى انبار مرحلة فى ناحية الجنوب و من سورفان الى اليهودية يحتاج ان يرجع الى مارناد من حبس ثم منها الى اليهودية مرحلة و من سورفان الى انجد مرحلتان فى الشمال و من سورفان الى كندرم اربع مراحل ثلثة مراحل الى النهر و مرحلة اليها *

و عرج السار لها مدينتان احديهما تسمى بسير و الاخر اسورمين و هما متقاربتان فى الكبر و ليس بهما مقام للسلطان و السار الذى ينسب اليه المملكة مقيم بقرية فى الجبل تسمى بكنكان *

و هابان المدينتان لهما مياه و بساتين و يرتفع من سيرار زكثير يحمل الى البلدان و يرتفع من سورمين زبيب كثير يسا فربه و بين سورمين دره مرورود مرحلة و المطلع و هو من نهر مرورود على غلوة عن شرقية و من سير الى سورمين مرحلة مماىلى الجنوب و هى فى الجبل *

و اما الغور فانها دار كفر و انما ذكرناه فى الاسلام لان به مسلمين و هى جبال عامرة ذات عيون و بساتين و انهار و هى خصبة منيعة و فى اوائلهم مماىلى المشرق قوم يظهرون الاسلام و ليسوا بالمسلمين و يحنف بالغور عمل هراة الى فرة و من فرة الى بلدى داور و من بلدى داور الى رباط كروان

من عمل ابن قريغون ومن رباط كروان الى حسان السار ومنها الى هراة فهذا الذى يطوف بالغور كلها مسلمون وانما ذكرناها لانها فى وسط الاسلام *

واما سرخس فانها مدينة بين نيشاپور ومرو وهى فى ارض سهلة وليس لها ماء جار الا فى بعض السنة ولا يدوم ماؤه وهو فضل مياه هراة وزروعهم مباخس وهى مدينة على نحو النصف من مرو وهى عامرة صحيحة التربة والغالب على نواحيها المراعى وهى قليلة القرا ومعظم املاكهم الجمال وهى مطرح لحمولات ما يحبط بها من مدن خراسان وماؤهم ابار وارحيتهم على الدواب وابنيتها طين *

واما نسا فانه اسم المدينة وهى خصبة كثيرة المياة والبساتين وهى فى الكبر نحو سرخس ولهم مياه جارية فى دورهم وسككهم نزهة جدا ولهم رساتيق واسعة خصبة وهى فى اضعاف الجبال *

وفراوة ثغر فى وجه البرية على الغزية وهى منقطعة عن القرا وفيها منبر يقيم بها المرابطون وهى عدد يسير الا انهم يرجعون الى عدة وافرة ينقا بها الناس وهى رباط اسمها فراوة ليس بها قرية ولا تتصل بها عمارة ولهم عين ماء تجرى للشرب فى وسط القرية وليست لهم بساتين ولا زروع الا ميا قل على هذا الماء واهلها دون الف رجل *

وقوهستان من خراسان على مفازة فارس وليست بها مدينة بهذا الاسم وقصبتها قاين ولها من المدن ديناذد والطسين ويعرف بكر وكرند وحور وطبس ويعرف بطس مسارفا ما قاين فهى من الكبر نحو سرخس وبناؤها من طين وبها قهندر وعليه خندق ومسجد الجامع ودار الامارة فى القهندر وماؤهم من العين وبساتينهم قليلة وقراها متفرقة وهى من الصرود *

واما الطس فانها مدينة اصغر من قاين وهى من الجروم وبها نخيل وعليه حصن ولا قلعة لها وبناؤها طين وماؤها من القني ونخيلها اكبر من بساتين قاين *

واما جوز فانها اصغر من الطس وهى بقرب حوست وليس بحوست منبر وانما المنبر بجوار وبناؤها من طين وليس لها حصن ولا قلعة ولها بساتين قليلة وماؤهم من القنى وبها ضيق فى الماء واهلها اهل سوائم وهى على طرف المفازة وليس لهم بساتين *

واما ساند فانها اكبر من حوز وبناؤها من طين ولها قرا ورساتيق وماؤها من قني والطسن اكبر من ساند وماؤها من القني وبناؤها طين ولها حصن خراب وليس بها قلعة والنخيل بقوهستان بالطسن وسائر ما ذكرناه من الصرود وهذه المدن والقرا التي بقوهستان هي مشاهدة قي اعراضها مفاوز وليس العمارة بقوهستان مشتبكة اشتباكها بسائرنواحي خراسان وفي اضعاف هذه المدن مفاوز يسكنها الاكراد واصحاب السوائم من الابل والغنم وفي حد قاين منها على يومين مما يلى نيشاپور هذا الطين الحامى الذي عمل الى الافاق لا اكل وليس بقوهستان فيما علمته نهر جار الا القني والابار ويرتفع منها شى من الكرابيس يحمل الى الافاق ومسوح وتحاخ وليس بها امتعة مرتفعة *

واما بلخ فان الذي يتصل به طخيرستان والختل تجهيز وبدخشان وعمل باسار وما يتصل بها فاما مدن طخيرستان فانها حلم وسمحيان وبغلان وسكلكند وورو اكبر وارهن وراون والطالقان وسكمست وورا وسراى عاصم وحسب اندراب ومدروكاه واما الختل فان مدنها هلاورد ولا وكند وهما مدينتا الوحش ولحاويل ويلتاب وهلتك وسلندره وقبل ومحاواغ *

وباورستان نيك وقد جعلت الجبل فى ماوراء النهر واما عمل الفا ميان وما يتصل بها فان مدنها البا منان ويسعورفندو سكاوند وكابل ولجوا وفروان وغزنه وتجهيز هى مدينة واحدة تسمى تجهيز وبدخشان اقليم له رساتيق ومدينتها بدخشان وهى مملكة ابى الفتح *

فاما بلخ فانها مدينة فى مستو وبينها وبين اقرب الجبال اليها نحو اربعة فراسخ ويسمى جبل كرو عليها سور وعليها ربض ومسجد الجامع فى المدينة فى وسطها واسواقها حوالى المسجد الجامع بينها وبين مسجدها معمور بالناس على دوام الايام كلها وهى نحو من نصف فرسخ فى مثله وبناؤها الطين وبها ابواب منها باب النوبهار وباب رخنه وباب حديد وباب الهندوان وباب اليهود وباب ست هن وباب لحير ولهانهر يسمى دها بين يجري فى ربضها على باب النوبهار وهونهر يدير عشرة ارحية ويسقى رساتيق الى سياه جرد ويجف بابوابها كلها البساتين والكروم وليس على سور المدينة خندق وسور من طين واما طخرستان فان اكبر مدينة بها الطالقان وهى مدينة فى مستو وبينها وبين الجبل غلوة ولهانهر كبير وبساتين وكروم ومقدار

الطالقان نحو الثلث من بلخ ثم يليها فى الكبرور واكبر ويلى وروا كبر فى اكبر اندرانه و هى مدينة فى شعب جبال و بها تجمع الفضة التي تقع من حاربابة وتجهيزو بها نهران احدهما يسمى نهر اندراب و الاخر نهركاسار وبها كروم و اشجار كثيرة و جميع ما بقى من مدن طخرستان متقارب فى الكبر و هي كلها دون الطالقان وورو اكبرو اندرابه و هي ذات انهار و اشجار و زروع كثيرة عامرة خصبة و اما مدن الختل فانها كلها ذوات انهار و اشجار و هي على غاية و كلها في مستو الاسكرده فانها في جبال على ان الختل كلها جبال الا الوحس و اكبر مدينة بالختل ميل يليها هلتك و السلطان بهليل و الختل بين نهرو حساب و بين نهر و بدخشان و يسمى حريك و فى اضعافها انهار كثيرة يجتمع كلها قبل الترمذ بقرب القواربان فيصير كلها جيحون و ميل يكون نحوا من اندرابه و هليل اصغر منها وابنية هذه المدن من طين و سور ميل من جص و حجارة يليها من دور الكفر وحان و كران *

و بدخشان مدينة اصغر من ميل و لها رستاق كبيرة عامرة جدا خصب و بها كروم و انهار و هى على نهر حوبان من غربية و يكون بالختل دواب لذيذة تجلب الى الافاق و يرتفع من بلخشان النحازى و الارزورد و لها معادن فى الجبال و يقع اليها مسك من طريق دخان من تبت *

و اما تجهيز فانها مدينة على جبل يشتمل على نحو عشرة الاف رجل و الغالب على اهلها العيث و الفساد و لهم نهر و بساتين و ليست لهم مزارع *

و اما جاريانه فانها مدينة اصغر من تجهيز وكلاهما معدن الفضة و مقابر اهلها على تلك المعادن و ليس بجاريانه بساتين ولا زروع و يشق وسط المدينة نهر تجهيز و هو نهر تجهيز و جاريانه جميعا و ينتهى الى فروار حتى يقع فى ارض الهند و اما عمل الذا ميان فان اكبر مدنها الباسان و يكون نحوا من نصف بلخ و تنسب تلك المملكة الى شير باميان و ليس بها سورو هو على جبل و بين مدنها نهر كبير يقع الى غرجستان و فواكههم يجتلب اليهم و ليس بها بساتين و ليس بنواحى الباميان مدينة على جبل سوى الباميان و كلها ذوات انهار و اشجار و ثمار الاغزنه فانه لابساتين لها ولهانهر و ليس فى هذه المدن التى فى نواحى بلخ اكثر مالا و تجارة من غزنه فانها قرضة الهند و كابل لها قلعة حصينة و اليه طريق واحد و فيها المسلمون و لها ربض به

الكفار من الهنود و يزعمون ان الشاه لا تستحق الملك الابان يعقدله الملك بكابل و انكان منها على بعد ولا يستحقه حتى يصل اليه فيعقد الشاهية له هناك وهى قرضة الهند ايضا و يرتفع من بلخ الذوق من البخاتى المقدمة على سائر البخت بالنواحى و بها الا ترج و النيلوفر و قصب السكر وما لايكون الا بالبلدان الحارة الا انه لا نخيل بها و يقع فيها و فى نواحيها الثلوج و لحرا وسكاوند و كابل حروم حارة غيرانه لانخيل بها *

و اما الغور فانها جبال محيط بها من كل جانب دار الاسلام و اهلها كفار الا نفر يسير مسلمون و هى جبال منيعة و لسانهم غير لسان اهل خراسان و و جبالهم خصبة كثيرة الزروع و المواشى و المراعى وادخلناها فى جملة خراسان لان ثلاثة من حدودها يحيط بها خراسان و حدلها يلى نواحى سجستان و اكثر رقيق الغور يقع الى هراة و سجستان و نواحيها ويمتد من ظهر الغور جبال فى حد خراسان على حدود الباميان على التجهيز حتى يدخل بلاد وحار و يفترق فى ماوراء النهر الى داخل النزل على حدود لنار و السوس الى قرب خرخير و فى هذا الجبل من اوله الى اخره معادن الفضة والذهب و اعزرها ماقرب من بلاد خرخير حتي ينتهى الى ماوراء النهر من فرغانه و الشاش و اعزر هذه المعادن فى دار الاسلام فى ناحية تجهيز وما والاها *

و اما سواحل جيحون وخوارزم فانا نذكره فى صفة ماوراء النهر و اعمل وزم هما مدينتان متقاربتان فى الكبر على شط جيحون و لهما ماء جار و بساتين و زروع و اعمل مجمع طريق خراسان الى ماوراء النهر و خوارزم على الساحل و زم دون امل فى العمارة الا ان معبر ماوراء النهر الى خراسان و يحيط بهما جميعا مفازة تصل من حدود بلخ الى بحر خوارزم و الغالب على هذه المفازة الرمال و ليس بها عيون انهار الا ابار و سراع الى ان ينتهى الى طريق مرو على امل ثم يصير بينها و بين خوارزم و بلاد الغزنه مفاوز يقل ابارها و السوائم بها و اكثر السوائم بخراسان من الابل بناحية سرخس و بلخ فاما الغنم فان اكبرها يجلب اليهم من بلاد الغزنه و من الغور و الخلج و بخراسان من الدواب و الرقيق و الاطعمة و الملبوس و سائر ما يحتاج اليه ما يسعهم *

فمن اول عمل نيشاپور مما يلى قومس الى وادى جيحون على السمت

ثلاث وعشرون مرحلة من نيشاپور الى اسفراس و هواخر عمل نيشاپور الى نيشاپور خمس مراحل و من نيشاپور الى نورجان اربع مراحل و من نورجان الى بوشيخ اربع مراحل و من بوشيخ الى هراة مرحلة و من هراة الى اسفرار ثلاث مراحل و من اسفرار الى درة و هواخر عمل هراة مرحلتان و من درة الى سجستان سبعة ايام فمن اسفراس الى درة تسع عشرة مرحلة و من نيشاپور الى طوس ثلاث مراحل و من نيشاپور الى نساست مراحل و من نسا الى فراوة اربع مراحل و من نيشاپور الى قاين قصبة قوهستان نحو تسع مراحل و من قاين الى هراة نحو ثماني مراحل و من مرو الى مرو الرودست مراحل و من مرو الى هراة اثنتا عشرة مرحلة و من هرمز الى اسوردست مراحل و منها الى نسا اربع مراحل و قد ذكرنا ما بين مرو و امل و مرو و سرخس *

و من هراة على مرو الرود و هو طريق بلخ ست مراحل و من هراة الى سرخس خمس مراحل و قد ذكرنا الطريق من هراة الى نيشاپور والى اخر جدها مما يلى سجستان و الى قصبة قوهستان و الطريق من بلخ الى مرو الرود اثنا عشر يوما و من بلخ الى شط الوادي طريق الترمذ يومان و من بلخ الى اندرا به تسع مراحل و من بلخ الى الباميان عشر مراحل و من الباميان الى غزنه نحو ثماني مراحل و من بلخ الى بدخشان نحو ثلث عشرة مرحلة و من بلخ الى شط الوادي على طريق الجبل بمكان يعرف بمثلة ثلاث مراحل *

و اما عرض خراسان من بدخشان على بدخشان على شط وادي جيحون الى بحيرة خوارزم فمن بدخشان الى الترمذ على سمت النهر نحو ثلث عشرة مرحلة و من مدينة خوارزم الى بحيرة خوارزم ست مراحل قد ذكرنا المسافات التي بين المدن المشهورة بخراسان و سنذكر لكل مدينة مشهورة جوامع من المسافات بين المدن التي في عملها فاما نيشاپور فان منها الى نورجان اربع مراحل و من نورجان عن يسار الجائي من هراة الى نيشاپور على رحلة ما لن و يعرف بمالن لواخرر و ليس بمالن هراة و من مالن الى حوا عن مرحلة و من حوا من الى سكان يوم و من سكان الى ساند يومان و من ساند الى قاين يومان و سكومل اذا عدلت عن يسار سكان على يومين و من سكومل الى زوزن يوم و من زوزن الى قاين ثلثة ايام *

و من نيشاپور الى برشير اربع مراحل و من برشير الى كندر يوم و من كندر الى ساند يومان و من ساند الى قاين يومان *

و من نيشاپور الى خسرو خرد اربع مراحل و سار و ارمل خسرو وجود بنحو فرسخين و من خسرو خرد الى بهمناباد مرحلة كثيرة و من بهمناباد الى موربان على طريق قومس نحو فرسخ *

و من نيشاپور الى خان روان مرحلة و من خان روان الى مهرجان يومين و من مهرجان الى اسفراس يومان و اذا خرجت من بهمنا باد الى مهرجان فالى ازاز و اريوم و من ازاز وار الى ربواذه يوم و من ربواذه الى مهرجان يومان *

و اما مسافات مدن مرو فان من مرو الى كشيمهن منزل وهو مرفرة بحذاء كشيمهن على مقدار فرسخ عن يسارها و عليها طريق سكانة التي توزي الى خوارزم و باسان قبل مرمرفرة بفرسخ على طريقها و شيخ على مرحلة من المدينة فيما بين طريق سرخس وطريق مرو وحريج على ست فراسخ من المدينة قبل زرق بفرسخ على الوادي و مرورم على هذا الطريق على اربع فراسخ من مرو على الوادى و الذيل افغان على مرحلة من مرو على طريق سرخس و الفرس على اربع مراحل من مرو على وادي مرو وحرق على نحو ثلث فراسخ من المدينة بين طريق سرخس و اسورد رسوسان على نسق حرف الا انه ابعد منها بنحو فرسخ *

و اما مسافات مدن هراة وما يتصل بها من بوشيخ و بادغس و كخرساق فان من هراة الى اسفرار ثلاث مراحل و مدن اسفرار هى اربعة سميناها وهى كلها في اقل من مرحلة و من هراة و ما لن هراة نصف يوم و بين هراة و كروح ثلاثة ايام و بين هراة و بوشيخ يوم و بين بوشيخ و كوه اربع فراسخ عن يسار الذاهب الى نيشاپور و بينها و بين الطريق نحو فرسخين و من بوشيخ الى فركرده يومان و من فركرده الى جوكرده يومان و من جوكرده الى زوزن يوم و من هراة الى باسان هراة نصف مرحلة و من باسان الى حسيان مرحلة خفيفة و من حسيان الى اسرسان مرحلة و من اسرسان الى ماراباد مرحلة خفيفة و من مار اباد الى اوفه مرحلة خفيفة و من اوفه الى حسب يومان و يدخل من حسب في حد الغور و من هراة الى بنه مرحلتان و من بنه الى كيف مرحلة و من كيف الى مغشور يوم *

T. BLACK, ASIATIC LITHO: PRESS. CALCUTTA.

و اما مسافات مدن بلخ فمن بلخ الى حلم يومان و من حلم الى ورو اكبر يومان و من ورو اكبر الى الطالقان يومان و من الطالقان الى بدخشان سبعة ايام و من حلم الى سمنخان يومان و من سمنخان الي اندرا به خمسة ايام و من اندرا به الى حاربانه ثلاث مراحل و من حاربانه الى تجهيز يوم و من عسكر تجهيز الى فروان مرحلتان *

و من بلخ الى بغلان ست مراحل منها الي سمنخان اربع مراحل و الى بغلان مرحلتان و من بلخ الى مدرست مراحل و من مدر الى كه منزل و من كه الى الباميان ثلاث مراحل و من بلخ الى اسورفان ثلاث مراحل و من اسورفان الى الفارياب ثلاث مراحل و من الفارياب الى الطالقان ثلاث مراحل و من الطالقان الى مرو روز ثلاث مراحل و المسافة بين مدن قوهستان فمن قاين الي زوزن ثلاث مراحل و من قاين الى طبس مسان يومان و من قاين الى حور يوم و من حور الى حوست فرسخان و من قاين الى الطبسن ثلاث مراحل فقط

Note on the Sculpture in alto-relievo sent by the Governor-General to the Asiatic Society.—With a drawing. By Welby Jackson, *Esq. Vice-President, Asiatic Society.*

This plate represents a very curious piece of sculpture in high relief which was laid before the Asiatic Society by order of the Governor General; the size is 6 inches by 6½ inches; and the material, a dark Pot-Stone containing mica. The subject of the piece is a "Warrior King on horseback:" under the forefeet of his horse is apparently one of the conquered, holding and supporting the horse's forefeet in his hands: the horseman wears a close tunic with sleeves, and a scarf hangs loosely across him and over his left arm: his legs are covered with drapery which, from the position of the folds, seems to resemble the *dhoti* of India: he raises his right hand held open to a level with his head, the thumb upwards; an attitude common in ancient Bactrian coins, and in Greek and Etruscan figures: the horse is caparisoned, with a plume on his front, which seems to wave backwards as he advances; a circular disk behind the head of the horseman has the appearance of a shield;—and over his head is

a Chhattra or umbrella, the emblem of royalty in the east;—three attendants accompany him; one preceding him dressed in scale armour, which was common among the Persians, a kilt or continuation of the θωραξ or lorica in the Greek fashion, and a sword held under his left arm; he wears the same lower drapery, as the horseman: behind this foot soldier is another, whose action cannot be made out, though they both look towards the principal figure; another attendant behind seems to hold Chhattra over the horseman:—the whole is executed with much spirit and effect; the heads are of a Greek form, and resemble in character that represented in Plate 20, No. 230 of this Journal: the head-dress is precisely the same, as regards the horseman and the principal attendant who precedes him, that is, an ornamental cap, which allows the hair to appear in curls over the ears;—the heads of the other attendants differ slightly; and that of the figure under the horse's feet, is without covering; it has also a beard, while the other four have only moustaches. This relief is probably of the same period as the head represented in No. 230 of this Journal; and was found in the same vicinity; but this is a work chiselled in stone, while the other was merely of stucco. It is perhaps part of a long frieze representing a triumphal procession. On the upper part there is a projection by which it has been fastened into its place on a wall, and a similar projection, a tenon, has been broken off below.

There are several coins of Azes and Undopherres and other kings of the Arian and Bactrian races, bearing the representation of a horseman holding out the right hand in the position of the principal figure in this relief; which is no doubt intended to represent a victory or perhaps rather a conquest, as the vanquished is unarmed; and if so, probably there would be an inscription or some distinctive mark or monogram on some part of the building to which it belongs, indicative of the time and the king to whom it refers; it is a subject of the greatest interest, and well deserves the attention of those who have an opportunity of carefully examining the site where it was found and the vicinity of it: all the information hitherto obtained on this point is, that it was found near Kohat.

The first volume of the original text of Tabary.—*By* Dr. A. Sprenger.

In the library of the Asiatic Society of Bengal, No. 443 is an old MS. on the margin of the first page of which the words قطعة من تاريخ العلوى are written in an old hand, but not in the hand of the copyist, and it has consequently been entered in the Society's catalogue under this title. On examination it turns out to be a very considerable portion of the first volume of the original text of *T*abary. This is proved by the fact that Ibn *H*omayd is constantly quoted, as the informant of the author, and observations on the original traditions, which compose the body of the works, are in the fashion of *T*abary preceded by the words قال ابو جعفر ابن جرير الطبرى. To these words, the formula رحمة الله عليه are added, which might shake our faith in the identity of the work, but it is clear they are the additions of the pious copyist.

The volume is not only incomplete (there are six or fourteen leaves wanting in the commencement) but the book-binder has displaced the leaves. It is in small 4to., 216 pp. of 17 lines, written in a clear, old and correct hand. The contents do not appear sufficiently important to deserve more than a summary notice. The author treats of the creation, of time, of the eternity of God, of the first thing created, of the day on which the creation was begun, of the order in which day and night, sun and moon were created, of Iblys and the fallen angels, of the history of Adam. He gives a short account of Kayúmarth جيومرث (the end of this Chapter is wanting, or displaced by the book-binder) the death of Adam, the history of Seth and his times, a few words on Tahmírath the successor of Hushang, Idrys, Noah and the flood, Bayúrásb that is to say al-Azdaháq الازدهاق, whom the Arabs call Dha*hh*áq, the history of Noah continued, the times from Noah to Abraham. This is the last chapter of the book. It would perhaps be worth while to extract from it the legends of the Persians contained in it.

A few Remarks on the subject of the Laterite found near Rangoon.—*By Capt.* C. B. Young. *Bengal Engineers.*

Sir,—I take the liberty of troubling you with a few remarks on the subject of the Laterite which abounds in the neighbourhood of Rangoon.

The hilly country of upper Ava ceases with the promontory of Kyouktaran near Lunzay below Prome, and from that to the sea, the Irrawaddy flows through a rich alluvial Delta.

Unlike that of the Ganges, however, this is varied by occasional rising eminences and ridges, and upon one of these the great Pagoda of Rangoon is situated, the platform of which is 160 feet above the river, the Pagoda itself rising 320 feet above that again.

These eminences are chiefly, if not entirely, composed of Laterite. The lower plain country consists of clay and sand; each occasionally predominating, and the former sometimes of a very rich aluminous kind like pipe-clay. (Vide specimens.) The surface soil is always clayey or alluvial, but in making cuttings, as in digging tanks or for roads, it is usual to find the soil at a small depth becoming gritty or gravelly. On examination, this is found to arise from numerous concretions, similar to kunkur, some of a brick-red, some of a black, colour. In some places the red predominate, in others the black, forming strata running in waving directions though the soil; and the colours are exhibited owing to the nodules being cut through by the tool in the act of digging.

The nodules themselves when picked out of the earth are aggregations of the local coloured clay, round nuclei of the black matter in the centre, and around that the redder material; both having strongly the appearance of owing their origin to an infusion of iron in the soil.

Deeper down the nodules speedily become more numerous, until at last the whole, from the nodules joining and adhering tolerably firmly together, leaving at the same time numerous interstices irregularly shaped between them, assumes the appearance of a nodular clay iron-stone, ætites, or, as it has been called, an iron bound breccia. In this shape it may be dug out and handled in lumps or masses, but these may be readily broken with the hammer, or even by hand. In a more advanced state, it becomes still more compact

and rock-like, tougher and heavier, and in short has all the characteristics and appearances of the more vesicular or spongiform species of Laterite. In other places and under other circumstances, its structure becomes more uniform and compact, and of this kind is that of the hill on which the Rangoon Great Pagoda itself stands, and that from Bassein, where also it appears to be generally redder in colour.

Specimens of all these, I have the pleasure to send you. Under all these forms, as may be imagined, this stone is very useful. In its early nodular state, it is thrown out together with the clay of the bed or matrix in which it is found, on to the surface of our roads, and when the latter is washed away by the rains, the nodules remain like kunkur, forming an excellent firm road. In its more advanced and perfect form, it is quarried in blocks, and hardening with the characteristic quality of Laterite, it is used as in the flight of steps to the Great Pagoda, where, although frequently more than usually spongiform, it withstands admirably the unceasing tread of thousands passing over it.

It must no doubt have been among the specimens sent home by Mr. Crawford in 1826, and is, I suppose, that which is called by Dr. Buckland in his most interesting paper on Mr. Crawford's Fossils and specimens, breccia; as he writes of this, that it is cemented sometimes by carbonate of lime, sometimes by hydrate of iron, and "where this iron is very abundant, it affords concentric ochreous concretions resembling ætites, dispersed irregularly through the breccia."

Although the stone certainly gains greatly in weight in its progressive states and also in hardness, yet this latter quality appears to arise almost wholly from exposure to the air; and its intrinsic toughness is by no means, that which an ore of iron should have. Nor does it affect the magnetic needle in any way after exposure to the blowpipe.

Its specific gravity, taking pieces of medium formation, and the mean of three experiments, gives 2.858, which is not great.

The red and black small masses or concretions are, at all times readily scratched with the nail. It cannot be called ætites; there are no looser particles in it: and scarcely with truth I think breccia, for that is a compound stone, consisting of agglutinated fragments.

The fragments of this are neither, irregular masses of *two or more minerals* intimately blended, nor, secondly, are they fragments of *pre-existing rocks* united by a cement. These are generally considered, as the only two classes, I believe, of breccias.

Analyses of the various parts of this rock and of the soils about it, give the following results.

The aluminous soil generally contains 50 per cent. of clay, the richer kinds as much as 65 to 70.

A detailed analysis of specimens of the rock made by Captain James. 32nd N. I.* of the Museum of Economic Geology gives the following result.

Mean Result of three Analyses of Laterite from Burmah.

SOLUBLE IN ACIDS.	
Peroxide of Iron,	46.279
Alumina,	5.783
Lime,	.742
Magnesia,	.090
Silica,	.120
INSOLUBLE IN ACIDS.	
Silica (dissolved by Potash,)	6.728
Silica (by fusion,)	30.728
Lime, Iron and Alumina,	2.728
Combined Water Alkalies and Loss,	6.802
	100.000

* The following is an extract from Capt. James' letter :—

"I send you an analysis of the Laterite which I have made very carefully.

"It is the mean result of three analyses, all of which came within a fraction one of the other. You will perceive by the quantity of iron it contains, that it would be well worth smelting if coal and limestone could be obtained in its vicinity.

"It yields about 32 per cent. of metallic iron, and I shall smelt a small piece I have remaining to see what quality of iron it is.

"The quality of hardening by exposure which the laterite possesses, is doubtless due to the silica which exists in a soluble state by potash, and to which the same property is due in all hydraulic limes. Iron also when it exists in such quantities has the power of hardening.

"I have shown the analysis to Sir Henry de la Becke who considers it very interesting, and I think I shall publish it in the Chemical Journal.

"Water also exists in it chemically combined, and which I was unable to drive off at 212°. This would also assist it in hardening.

"I have been assisted in my analysis by an assistant of Lyon Playfair's who is a very clever chemist, so you may depend upon the result being quite correct.

"I have sent the analysis of the laterite to Col. Sykes, requesting him to let me have one that was made for him some time ago."

The analysis of a proportion of a black stratum in its neighbourhood bearing quite the appearance of a carbonaceous or vegetable mould, gave moisture 13.3 in 100 parts, and on being calcined to a red heat, animal or organic matter 1.6 only, the remainder having the colour and appearance of powdered brick.

Particles taken carefully out, having more than usual the appearance of concretions of lime, gave however on trial with sulphuric-acid no indication of it.

From the foregoing, this rock appears to be chiefly silica and iron bound together, by some agent acting chemically on it, although at the same time, there can be no doubt that the clay of the rich aluminous soil, in which it rests and is formed, is in some way necessary to the process. In some of the rising grounds near the Rangoon stockade, I have found a plain soft clay-slate which gathering the ochreous tint or infusion, seems to swell into lumps or small masses, and from that to pass into the regular concretionary or gravelly form in which I have described the stone itself as being found in its first stages, and which we use for roads, and in this pebbly form it may be found covering the surface of most of the hillocks and mounds about Rangoon. What the infused agent may be I am unable at present with my imperfect means to ascertain. If this rock be then, as it has all the appearance of being, true laterite, we have it here forming under our feet, and laterite cannot be supposed to be igneous, but is evidently, like other rocks which have been erroneously attributed to volcanic sources, of chemical origin.

I have found in it myself small shells, but no sufficiently decided specimen as yet to pronounce confidently on, and the superintending Surgeon here informed me that he had seen at Moulmain, in the side of an excavation for a dry dock, pieces of pottery imbedded in it. Quartz and other pebbles are common in it. It may be perhaps that as the flints in chalk and our kunkur are nodular formations of silica and of lime, so this represents a similar nucleous concretionary form of a richly aluminous soil, and that flints, kunkur and laterite are the results of a similar chemical process acting respectively upon calcareo-silicious, silicio-calcareous and alumino-silicious earths.

Specimens of rocks of various kinds are found at Rangoon, but the only one in situ is the plastic clay-like pipe-clay which occurs to the

north of the pagoda mixed with strata of a rough silicious sand, inclined at an angle of 15° to the N. E.

Marble and alabaster from the Ava (Sagaing) quarries are plentiful, the former, which Chantrey pronounced to be equal to the finest Carrara, particularly so; the latter which is equally beautiful and pure, is less plentiful.

Limestone is not found nearer to Rangoon than the Martaban district, and the mountains in the neighbourhood of Pegu whence it is imported, and used in great quantities for the temples. It is also found about Prome.

From the same part of the country (Prome) come a variety of sandstones which are used for domestic purposes by the Burmese. Some are freestones of a fine clear even colour and very easily cut.

I have also found boulder specimens of travertine and a roofing clay-slate, but whether these will be found hereafter up the country or not, I cannot say.

One specimen only but a good one of petrified wood has been found. It was presented by Major Fraser to the Governor-General. Doubtless we shall find more of these hereafter.

Chlorite used as slate-pencil by the Burmese is found near Prome.

A handsome syenite also occurs, which will, I believe, be met with near Ava; and what appears to be a decomposed granite which comes, I am told, from Shoegeen and Lao country. This I have found but one specimen of. It contains much felspar and at one time I thought I detected grains of gold in it, which seemed a not improbable occurrence.

I have little doubt that when we get better acquainted with the northern districts, coal which belongs to the formation will be found, and added to the already large mineral wealth of the country, which including Lao and the Tenasserim provinces, supplies gold, silver, rubies, sapphires, copper, zinc, tin, lead, iron, petroleum, antimony, marble, alabaster, &c. &c. If to these be added its teak, cotton and indigo, it should, with the aid of such a water carriage be a profitable and valuable acquisition to the Indian empire.

I remain,

Yours very faithfully,

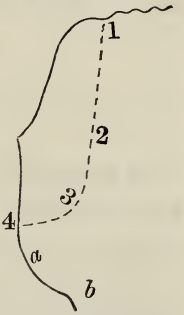
C. B. Young,

Rangoon, September 10th, 1852. *Captain, Bengal Engineers.*

List of Specimens of soils from Rangoon.

Nos. 1, 2, 3, and 4. Specimens of Laterite taken from a quarry or ditch excavation at the S. E. corner of the stockade, as numbered in the section, No. 1 being the surface soil, and No. 4 the exterior surface of the excavation hardened by exposure.

Section of Quarry.



I observed at this quarry that under a projection (a) where much moisture must have collected and but little sun reached (as b) the surface was much less hard than at (a) where it was perfectly rock-like, and could be cut to quite a smooth face if wished.

No. 5. Laterite specimens from other spots about Rangoon with pebbles, &c. imbedded.

6. Ditto ditto.

7. A smoother and more even textured specimen, approaching sandstone. Taken from a block, said to be similar to that on which the Great Pagoda is situated.

8. Nodules picked from the gravelly soil.

9. Earth from a black stratum in the neighbourhood of the same gravelly soil.

10. Gritty sand from near Scotch Tank, in which plastic clay occurs.

11. Lump or nodule of plastic clay.

12. Part of a thin stratum of ditto. These can be, and are used as chalk, although steatite is preferred by the Burmans for writing with, on prepared black tablets.

13. Disintegrated granite (?) with much felspar—said to come from near Shoe-geen on the Sitang river.

14. Syenite, found near Ava I am told.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL,

For February, 1853.

At a meeting of the Society held on the 2nd instant at the usual hour and place

Sir James Colvile, Kt., President, in the Chair.

The following gentlemen were introduced as visitors :—

Captain Crawford, R. N. } by the President.
Mr. Hillersdon, B. C. S. }

Captain Brereton, by Major Kittoe.

Bábu Rádhánáth Sikdár, by Captain Thuillier.

The following presents were laid on the table :—

1st. From Professor Oldham. A Sonthal drum, and two boxes of geological specimens from Cherra Punjee and its neighbourhood.

2nd. From Capt. C. B. Young. Specimens of shells, coprolites, &c., imbedded in the calcareous sandstone formation in the neighbourhood of Prome.

Ditto of fossils from Rangoon.

16 Burman MSS.

3rd. From C. Gubbins, Esq. 6 Hindu copper coins from near Mahábálipuram.

4th. From Dr. Campbell, through Captain Sherwill. Skin of a female Shou Deer.

5th. From Fred. Gubbins, Esq., Collector of Benares, through Col. Forbes, Mint Master. 68 old silver coins. "These coins," says Mr. G. "are of the reign of Shah Jehan and other Delhi Emperors; three of them are Noor-Jehanny."

6th. From Captain Layard in his own name and in that of Mr. C. T. Carnac. Four small gold coins found under the old temple of

Tribeni at Ghorabad. Some black sculptured stones from these ruins, were sent to the Society last year, by Mr. D. Money, and Captain L. offers to try and procure some of them if the Society wish it: some of them bear inscriptions.

7th. From the Academy of Sciences, Belles Lettres and Arts of Bordeaux, through Captain Bolibo. Transactions of the Academy, Parts 2, 3 and 4 of 1851.

E. Thomas, Esq., C. S. was named for re-election by Mr. Grote, seconded by Dr. Falconer.

Read a letter from Lieut. Faithfull, wishing to withdraw his name from the list of members of the Society.

The President called the attention of the meeting to an interesting piece of sculpture kindly placed at his disposal, for exhibition to the Society, by Lord Dalhousie, together with a drawing of the same, by Welby Jackson, Esq.

With reference to a proposal of Dr. Röer, the Council recommended that the Sáririka Sutras of Vyása be published in the Bibliotheca Indica, and that the publication of the Sañkhya Pravachana Bháshya, on the terms proposed by Mr. Hall and Dr. Ballantyne, be also undertaken.

Resolved that the recommendation of the Council be adopted.

The Council reported their having formed the following sub-Committees.

Sub-Committee of Finance.

C. Allen, Esq. and Dr. Falconer.

Sub-Committee of Oriental Philology.

J. R. Colvin, Esq., Welby Jackson, Esq., Major J. S. Banks, Rev. W. Kay, Dr. E. Röer and Rev. J. Long.

Sub-Committee of Natural History.

H. Walker Esq., Major W. E. Baker, and Dr. Falconer.

Sub-Committee of Library and Journal.

J. R. Colvin, Esq., Captain Thuillier, H. Walker Esq., Rev. W. Kay, and H. Woodrow, Esq.

They further reported the removal from the list of members of the name of Mr. C. T. Watkins under Rule 13.

The following communications were read—

From Major Anderson, enclosing an English translation of Ibn Huokul's account of Khorasan.

From W. Muir, Esq., forwarding a Meteorological Register kept at the Secretariat office at Agra, for the month of December, 1852.

From L. Bowring, Esq., sending a fac-simile of a Sanscrita Inscription, found near Thánesar.

The following is Mr. B.'s account of the way in which he discovered the inscription.

"I have the pleasure to send you a copy of an inscription which I saw recently on a tablet of red sandstone in the temple of a follower of the Goraknáth persuasion, in the town of Pehewa, which is about 15 miles west of Thánesar. I was marching from Patiala toward Thanesar, and halted at Pehewa which is on the banks of the Saraswati river and is a place of pilgrimage of some note, having been formerly known under the name of Prithúdak. It is included in the limit of the sacred territory known as the 40 kos, that is, the distance between certain places, or the four points of the compass, within which the skirmishes of the Pándavas were carried on. The inscription was copied after my departure by the Thánádár of Pehewa, and is, as you will observe, reversed. I am not sure whether it will prove to be legible, as a part of the inscription is effaced. It is possible, however, that there may be interesting matter in it.

"I am not aware whether the Society has ever been furnished with an account of Thánesar, which bears marks of great antiquity, and is considered particularly sacred on account of the celebrated tank of Kurukshetra. I obtained an interesting notice of it from one of the Brahmans of the place.

"The old town of Samana, of which the ruins are very extensive, is another very remarkable spot, in which many coins and traces of ancient buildings are found. It is about 30 miles W. N. W. of Pehewa, and in the Patiala territory."

From E. C. Bayley, Esq., announcing that he has heard of an ancient inscription at a place called Khunniarah, and is trying to get a fac-simile of the same for the Society. With reference to the paper on the Kotuch Kings of Kangra, which he alluded to in a former letter, he states—

"I am working at the Kotuch Kings, but find the Bansávalis so manifestly fictitious, or at least so incorrect, that it will take me much time and trouble to reconcile discrepancies; meanwhile, I have from coins the following names, Rupchand, Prithichand, Harichand, Sringarchand, Trilokchand, Avatárchand, and at least two others not yet quite decyphered.

"I am not quite certain yet as to their actual period, but they range from 1100 to 1400 or 1450, A. D. I think;—probably from 1200 or 1250 to 1400.

"From Dhurmchand, who was contemporary with Akbar, the native histories are pretty accurate and detailed, but they admit every thing earlier to be uncertain. Even the present representative of the Kotuch race told me, I probably knew more than he did, but pointed out one old purohit who, he thought, might know something if he could be persuaded to shew his documents.

"The history of the Pathania Rajpoot, the family of the Noorpoor Rajahs, is also curious, and I will endeavour a sketch of it with that of the Kotuches. They claim descent from the old Tuars of Delhi, and are said to have got their present appellation because three of their kings in succession were employed by the Mogul emperors in subduing the "Pathans" of Affghanistan. Of one of these I have contemporary Hindu history. By the way, his death is said to have given rise to the name of the 'Hindu kosh.' I don't know if the story has been published before; if not, it may be worth the Society's notice.

"It is said this Rajah was ordered to march in winter by some very dangerous pass in the range to effect a surprise of some enemy on the other side.

"On entering the pass with his army (of his own Rajpoot clans) he was told that there is such danger of avalanches, that it was absolutely necessary to enjoin strict silence throughout his ranks.

"He is said to have replied to the effect that he was a Rajpoot and himself a deöta, and would shew fear of neither man nor spirit, and so far from enjoining silence on his men, directed that they should march with every trumpet sounding and every drum beating.

"They proceeded accordingly, and as the sun rose the avalanches descended, and overwhelmed the Rajah and five thousand of his devoted host.

"From this the pass originally, and subsequently the range, is reported to have received the name of 'Hindu kosh,' the Hindu slayer: as good a derivation at least as any I have heard before."

From Captain Layard, forwarding a notice of an ancient city Kurnsonapuri, now called Rángámáti. The notice merely gives the traditions handed down regarding this city.

The Curator of the Museum of Economic Geology and the Librarian submitted their usual monthly reports; the former also read a supplementary note on the new Mineral Resin Hircine.

On the termination of the proceedings of the evening, Major Kittoe delivered a lecture on the antiquities of Sarnath, and exhibited a series of drawings of ancient sculptures from that neighbourhood and from other parts of the Benares and Behar districts.

The President in the name of the Society thanked Major Kittoe for his highly interesting lecture, when the meeting adjourned.

Read and confirmed, *March 2nd*, 1853.

(Signed) J. W. Colvile.

Report by the Curator of the Museum, Economic Geology.

Minerological and Geological. Our Secretary has sent me for examination some specimens mostly of laterite and lateritous clays and conglomerates, from Rangoon, forwarded by Captain C. B. Young, B. E. My catalogue of them is as follows.

Specimens of *Soils, &c.* from Rangoon.

Nos. 1, 2, 3, and 4. Lateritous clay, probably the *debris* of laterite becoming again consistent by the solution of the ferruginous part.

5 and 6. There is but one piece of these specimens, which I should allow to be true laterite, and this I find to contain

Peroxide of Iron,	47.50
Siliceous and Aluminous residuum,	52.50
No trace of Manganese or Lime,	100.00

The other specimens of these two numbers are clearly the *debris* of laterite cohering again as above, and in this case becoming conglomerates by the mixture of quartzose pebbles; they should be styled lateritous conglomerates.

7. Coarse-grained, highly ferruginous, sandstone; almost a siliceous iron ore in appearance.

8. Ferruginous nodules probably from the laterite.

9. Dark earthy soil coloured by a mixture of deutoxide and peroxide of iron.

10. Sandstone grit coloured by iron.

11. Plastic clay, contains protoxide of iron.

12. Same as No. 11 in thin laminæ.

13. A coarse-grained pegmatite, (i. e. quartz and felspar) decomposing.

N. B. There is a very singular-looking cellular, brittle, black substance in very small quantity adhering firmly to the outer part of this specimen. There is too little of it to sacrifice except for minute assays: I should like to have more of this.

14. Granite and not a Syenite: the black mineral being black mica and not hornblende; there is, however, embedded in this specimen some minute nests of Actinolite or pumice. They are too small to admit of examination, but I should like to have a larger specimen or two of this granite if procurable.

Museum of Economic Geology.

I received from Major Baker, with the following, the specimen of iron ore now on the table to which it alludes.

September 20th, 1852.

H. Piddington, Esq.

My dear Sir,—May I request the favour of your furnishing me at your convenience with an analysis of the accompanying specimen of ore, and with your opinion of its economical value under the following circumstances. The deposit of which this is a specimen is from the Hill of Karana, about ten miles from Lahore and not far removed from extensive jungle of firewood; coal in limited quantities is believed to exist in two localities of which one is hundred miles, and the other fifty miles distant from the site of the ore. Will you do me the favour to return the specimens when you have taken off what you require for the purpose of analysis.

Your's faithfully,

(Signed) W. E. Baker.

And having sent him an analysis and reply to his queries. I have subsequently received the following memorandum, by Mr. Purdon, from Colonel Napier.

Memorandum to accompany some specimens of iron ore forwarded to Lieut.-Col. R. Napier, Civil Engineer, Punjab.

About the centre of the Siteh Chuj Doab, twenty-three miles South-East of Shahpore, rise abruptly a number of conical-shaped knolls; the highest, and principal, called Karana, attains an elevation of about 1200 feet above the plain. This hill occupies an area from West to East in

length about three miles, in breadth scarcely one. None of the other knolls are near so extensive, nor do they attain one half the height. The dip of Karana is North to North-West, under an angle of about 35°, that of the salt range being about 15° locally higher,* the strike of both is the same, the distance between forty miles.

The rock of which these knolls are composed is a compact schistose sandstone, passing into clay-slate or argillaceous schist, of a varying yellowish leaden colour, it has somewhat the appearance of Grauwacke, and bears occasional marks.*

The Hill is intersected by veins of Quartz with Iron ore (Hæmatite), the thickness of the vein seldom exceeds six inches of which about 2½ inches are iron ore.

Without a thorough examination of the Hill, it is not possible to state in what quantity the ore occurs, though it appears abundant.

It is difficult to determine at present, the exact age of this formation, whether it belongs to the old red or a still more ancient group, but, that it is of older date than the rocks of the salt-range there can be little doubt, as in this latter no rock of a metamorphic character is found.

Pind Dadun Khan, (Signed) W. Purdon,
The 11*th Nov.* 1852. *On special Duty.*

(True Copy.)
(Signed.) T. G. Glover, *Lt., Engr.*
Assistant to the Civil Engineer.

The following is my report on this remarkable ore and my replies to his queries, sent to Major Baker for transmission to Col. Napier.

To Major Baker, B. E.

Dear Sir,—I have carefully examined the Iron ore from Karana accompanying your letter of 20th September. Indisposition has prevented my completing my analysis of it so perfectly as I could desire, and this and your early departure prevents me from being quite so precise as to the minor constituents as I could have wished.

Its composition in 100 parts taken as fairly as possible from the specimen of ore, to avoid the quartz with which it is mixed, I find to be as follows:

Water and Carb. Acid, ...	3.50
Silex, ...	11.22
Alumina, ...	none
Magnesia, ...	0.50
Carbonate of Lime, ...	65.14

* So in MSS. H. P.

Iron Peroxide, ...21.85 Or Protoxide, ...	19.66	Metallic Iron. 15.29.
Manganese (?)	0.10	
	100.12	

You will thus perceive that this ore is a remarkable instance of what is termed in Minerology Isomorphism; i. e. an ore with all the appearances of one kind of Mineral (in this case of a rich carbonate of iron) but in which it is found upon analysis that one of the constituents has been partly or wholly replaced by some other mineral. The proportions of iron and lime here are exactly changed, i. e. we should look to find the main ingredient to be about the 65 per cent. of protoxide of iron, instead of that amount of lime which now takes its place, leaving us 20 per cent. of protoxide of iron representing 15.3 per cent. of Metallic iron only!

The ore then proves to be almost a ferruginous carbonate of lime, but as it is only a surface specimen, one part being evidently weathered, it may become richer at a moderate depth, if a vein, or in a lower bed, if in beds; for this, the first question as to iron ores in a mining point of view, is not stated.

As to its produce; at present it is clearly too poor an ore to be smelted, though it would probably yield iron of the very finest description but if a richer ore is found near the spot, it will then be of great value to smelt with it, the lime and the small portion of Magnesia being the best fluxes and the Manganese improving the quality of the produce.

With regard to the yield of any Indian iron ore the first question is always, "What is to be the process and furnace adopted? and who are to be the workmen?" for from the complex and expensive English blast works, to the plain but simple Catalan and French Pyrannean forges, which produce some of the finest iron and steel in the world with the simplest means, every thing depends, as you know, on the furnace and the workman. If Major Napier sends us a promising ore he will perhaps also say by what process he thinks of working it.

I return your specimen as you desire, but it would be an acquisition for the Museum.*

H. Piddington,

Museum, 26th October, 1852. *Cur. Mus. Eco. Geology.*

I have received from Captain Ramsay, Acting Resident at Nepaul, a small collection of the woods of Nepaul, presented by General Jung Bahadur, who has also sent a large collection (96 specimens) of rocks and minerals

* Major Baker has presented it to the Museum.

which will be farther noticed when examined. I may mention here however that there is certainly one new metalic mineral amongst them.

From Dr. Martin of the Eye Infirmary, we have received three very fine specimens of marble and magnesian limestone from Assam, but the locality is not given.

I have embodied in a supplementary notice to my paper on *Hircine* a very interesting account of that substance from the Rev. Mr. Dawson of Rangoon, which, as will be seen, proves my conjecture, that it was a mineral resin, to be correct, and it is certainly a new one.

Library.

The following books have been added to the Library since December last.

Presented.

Anglo-Burmese Hand-Book, or Guide to a practical knowledge of the Burmese language, compiled by Dormor Augustus Chase. Maulmein, 1852.—By the Author.

Selections from the Records of the Bengal Government. No. IX. Report on the Teak Forests of the Tenasserim Provinces. By H. Falconer, M. D. (3 copies).—By the Government of Bengal.

Recueil des Actes de l'Academie des Sciences, Belles Lettres et Arts de Bordeaux, Parts II. III. and IV. of 1851.—By the Academy.

Bulletin de la Société de Geographie, Tome III.—By the Society.

Vergleichende Grammatik des Sanskrit, Zend, Griechischen, Lateinischen, Lithuanischen, Altolowischen, Gothischen und Deutschen, von F. Bopp. Sechste Abtheilung, Berlin, 1852, 8vo.—By the Author.

Transactions of the Royal Society of Edinburgh, Vol. XX. Part III.—By the Society.

Proceedings of the Royal Society of Edinburgh, Sessions 1851-2.—By the same.

Quarterly Journal of the Geological Society, No. 32.—By the Society.

Notes Introductory to Sassanian Mint Monograms and Gems. By Edward Thomas, Esq. (Extract from the Journal of the Rl. As. Soc.) London 1852.—By the Author.

Notice of certain unpublished coins of the Sassanidæ.—By E. Thomas, Esq.

Full Exposure of Dr. Chas. T. Jackson's Pretensions to the Invention of the American Electro-Magnetic Telegraph. By Hon. A. Kendall.—Washington 52 pp. 8vo.—By the Author.

Report of the Hospital at Ningpo for 1852, under the Medical Missionary Society in China, by D. J. MacGowan, Esq. M. D. Canton, 1852. Pamphlet.—By the author.

The Bibidhártha Sangraha No. 13.—By the Editor.

The Táttwábodhiní Patriká, Nos. 113,114.—By the Tattwabodhini' Sabha',

The Missionary, Nos. I.—II. of 53.—By the Editor.

The Upadeshak, Nos. 72—74.—By the same.

The Calcutta Christian Observer, for Dec. 1852, and Jan. and Feb. 1853.—By the Editors.

The Oriental Baptist, Nos. 72—74.—By the Editor.

The Oriental Christian Spectator, Nos. for Nov. and Dec. 1852.—By the same.

Exchanged.

The London, Edinburgh and Dublin Philosophical Journal, Nos. 25,26.

The Athenæum, for September and October, 1853.

Purchased.

The Annals and Magazines of Natural History, for Nov. 1852.

Comptes Rendus, Nos. 11 to 18.

February 2nd, 1853. Ra'jendrala'l Mittra.

For March, 1853.

The Society met on the 2nd instant at the usual hour and place.

Sir James Colvile, Kt. President, in the Chair.

The following gentlemen were introduced as visitors.

G. Batten, Esq. C. S. by Mr. C. Allen.

J. Maltby, Esq. by Mr. H. Woodrow.

The minutes of the last month's proceedings were read and confirmed.

The following presents were laid on the table:—

1st. From Dadoba Pandurang, Esq. of Ahmednagur. A copy of the 2nd edition of his Mahratta Grammar.

2nd. From J. W. Sherer, Esq. Assistant Secretary to the Government of the N. W. Provinces. Selections from Public Correspondence, Parts III. to XII.

(The letter intimates that the future Nos. will be regularly supplied as they issue.)

Shakespear's Statistical Memoirs.
Montgomery's Statistics of Cawnpore.
Fraser's do. Gourgaon.
Kinlock's do. Futtehpore.
Batten's do. Almorah.
Educational Memoirs of the N. W. P.
Reid's Report on Indigenous Education.

3rd. From Captain Haughton, Singbhoom. Geological Specimens collected by himself and Mr. Campbell in the South Western Frontier of Bengal.

4th. From Lieut.-Col. R. J. H. Birch, Officiating Secretary to the Government of India in the Military Department. 3 Sheets of the Indian Atlas.

5th. From Dr. Gerhard von dem Busch. His translations of the following Swedish Medical Treatises.

Ueber die Bright'sche Nierenkrankheit. Eine Akademische Abhandlung von Peter H. Malmsten.

Ueber die Schwämmchen bei Kindern von Dr. F. Th. Berg.

Chronische Alkoholskrankeit oder Alcoholismus chronicus, Dr. Magnus Huss.

E. Thomas, Esq. duly proposed and seconded at the last meeting, was balloted for, and re-elected an ordinary member.

The following gentlemen were named for ballot at the next meeting.

Bábu Rádhánáth Sikdár, proposed by Sir James Colvile, and seconded by Captain Thuillier.

Dr. Macrae, (for re-election) proposed by Mr. Grote, and seconded by Dr. Walker.

J. E. Medlicott, Esq. Assistant Geological Survey of India, proposed by Dr. Falconer and seconded by Professor Oldham.

The Council submitted the following reports.

1st. Recommending at the suggestion of the Philological Committee that the Bháshya Ratna Prabhá of Govindánanda be included in the Society's edition of the Vedánta Sutras.

2nd. Recommending that the sum of Rs. 800 (chargeable to the Oriental Fund), be placed at their disposal, to provide glazed-cases for the Oriental MSS. in the Society's Library.

3rd. Proposing for election at the next meeting as an Honorary

member of the Society, Lieut.-Col. H. C. Rawlinson, C. B. of the Hon'ble East India Company's Bombay Service.

Their report briefly noticed the eminent services rendered by Col. Rawlinson to Oriental Archæology.

The several recommendations, on being put to the meeting by the President, were unanimously adopted.

Read letters—

1st. From L. Bowring, Esq., enclosing a Vocabulary of the Cashmiri language.

Referred to the Journal Committee.

2nd. From Professor Fleischer, acknowledging the receipt of the Society's Journal, No. III.

3rd. From W. Muir, Esq. Secretary, Government N. W. Provinces, forwarding Meteorological Registers kept at the Secretariat Office, Agra, for the month of December 1852, and January 1853.

4th. From M. P. Edgeworth, Esq. of Mooltan, forwarding a paper being an abstract of some curious Journals of a Mr. Gardener, an adventurer in the Punjab, who has travelled much in Central Asia.

The following is an abstract from his letter:

"How far we can implicitly rely on the correctness of his descriptions, I am not prepared to say; but there is a connectedness in his original Journals which makes me think that the main facts are correct. The traditions are doubtless as he heard them, and very curious from the jumble of old paganism and names from the Koran. I have given a slight sketch of his previous wanderings as he informed me, an abstract of his Journal, a more detailed extract of one passage, and his geographical notes, &c. with a rude map traced from his own sketch."

Referred to the Journal Committee.

5th. From C. Allen, Esq., Officiating Secretary to the Government of India, forwarding a report on the geological structure and mineral wealth of the Salt Range in the Punjab, with maps, sections, &c. by Dr. A. Fleming.

6th. From L. Bowring, Esq. promising to send a more accurate copy of the Inscription lately sent by him from Thâneswar.

The following is an extract from his letter.

"I have made various enquiries regarding old inscriptions in this

part of the country, but the only two which I have heard of besides the Pehewa inscription, are at Pinjore and Kalka. Of these I have obtained copies, but there is nothing of peculiar interest, I believe, in them. The Pinjore inscription is apparently of Sumbat 592, and is cut on a stone in the Dhara Khshetra Tirth.

"I am preparing an account of several old towns in the Umballa and Thaneswar districts.

"The invasion of this part of the country by the Rajpoot tribes, some 1,000 years ago is most interesting, but the information I can obtain on the subject is rather vague, the conquest of the C. S. states by the Sikhs having brought about with it the destruction of all old records."

The Curator of the Zoological Museum and the Librarian submitted reports of additions made to their departments during the last month.

Read and confirmed, April 6th, 1853.

(Signed) J. W. Colvile.

Library.

The following additions have been made to the Library since the last meeting.

Presented.

Jahrbücher der Literatur, Nos. 25, 80, 91—97, 98, 99 and 100.—By the Baron von Hammer-Purgstall.

Journal of the Royal Asiatic Society of Great Britain and Ireland. Vol. XIII. p. 2.—By the Society.

Second Report of the Commissioners for the great Exhibition of 1851, Royal 8vo. London 1852.—By A. Grote, Esq.

Tibet, Tartary and Mongolia; their social and political condition, and the Religion of Boodh, as there existing—by H. T. Prinsep, Esq. London, 1851, 12mo.—By A. Grote, Esq.

On the Relation of the Mind to external objects, Part II. by Bábu Akshaya Kumára Datta, 1852, 8vo.—By the Author.

A Grammar of the Marathi Language for the use of Students, by Dadoba Pandurang, 2nd Edition, Revised and Enlarged, Bombay 1850, 8vo.—By the Author.

Selections from the Records of the Bengal Government, No. X. Report

on the Establishment of Water-works to supply the City of Calcutta. By F. W. Simms, Esq., Two copies.—By the Government of Bengal.

Selections from Public correspondence published by authority N. W. P. Nos. IV. to XII.—By the Government of the North Western Provinces.

Statistical Report on Goorgaon, by A. Fraser, Esq. Agra, 1849, 12mo.—By the same.

Official Reports on the Province of Kumaon and Gurhwal, by J. H. Batten, Esq. Agra, 1851, 8vo.—By the same.

Memoirs on the Statistics of Indigenous Education within the North Western Provinces of the Bengal Presidency. By R. Thornton, Esq. Calcutta, 1850, 8vo.—By the same.

Memoir on the Statistics of the North Western Provinces of the Bengal Presidency, by A. Shakespear, Esq. Calcutta, 1848, 8vo.—By the same.

Statistical Report of the District of Cawnpore. By R. Montgomery, Esq. Calcutta, 1849, 4to.—By the same.

Statistical Report of the District of Futtehpore, by C. W. Kinlock, Esq. Calcutta, 1852, 4to.—By the same.

Chronische Alkoholskrankheit oder Alcoholismus Chronicus. Von Dr. Magnus Huss. Translated from the Swedish by Gerhard von dem Busch. —By the Translator.

Ueber die Bright'sche Nierenkrankheit. Eine akademische Abhandlung von Peter H. Malmsten. Aus dem Schwedischen übersetzt und mit einigen Anmerkungen versehen von dem Busch, Bremen, 1846, 8vo.—By the same.

Ueber die Schwämmchen die kindern. Aus dem Schewdischen übersetzt von Dr. Gerhard von dem Busch, Breman, 1848.—By the same.

Papers and Proceedings of the Royal Society of Van Diemen's Land. Vol. II. p. I.—By the Society.

Results of a series of experiments for determining the relative value of specimens of native gold from the different countries whence it is brought to market in these colonies. By his Excellency, Sir W. T. Denison, Tasmania, 1852, 12mo. pamphlet.—By the same.

Journal Asiatique No. 9. By the Societé Asiatique.

Notices of the Meetings of the Royal Institution, Part II. July 1851 to July 1852.—By the Institution.

Zeitschrift der Deutschen Morgenländischen Gessellschaft, vol. VI. p. IV.—By the Society.

Journal of the Indian Archipelago and Eastern Asia, for October 1852. —By the Editor.

The Oriental Christian Spectator, for January 1853.—By the same.

Report of the Calcutta Public Library, for 1852.—By the Curators of the Library.

Report of the Kew Committee of the British Association for the advancement of Science, for 1851-52.—By Col. W. H. Sykes.

On the census of the Islands of Bombay and Colaba, by Col. Sykes. —By the Author.

Tattwabodhiní Patriká, No. 115.—By the Tattwabodhini' Sabha'.

Vedánta Darsana and Adhikarana Málá, Nos. 1 to 4.—By Pandita A'nandachandra Veda'ntavagi's.

Bibidhártha Sangraha No. 14.—By the Editor.

Indian Atlas, Nos. 26, 40, 41.—By the Government of India.

Exchanged.

The Athenæum, for November 1852.

The London, Edinburgh and Dublin Philosophical Magazine, Nos 27-8.

Purchased.

Comptes Rendus, No. 19.

Annals and Magazines of Natural History, No. 60.

Haji Khalf Lexicon. Vol. VI.

March 2nd, 1853. Ra'jendrala'l Mittra.

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of July, 1852.

Maximum pressure observed at 9-50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.	
12	28.943	89.6	89.5	85.2	..	..	..	Hazy over head.
13	29.002	87.0	89.0	79.4	..	..	..	Ditto ditto.
14	29.049	87.8	86.75	80.0	..	..	..	⌇ all over heavens.
15	28.990	87.5	89.5	81.0	..	..	..	⌒ clouds.
16	29.026	88.25	98.5	80.3	..	..	..	\ along horizon.
17	28.911	89.5	91.0	82.8	..	..	..	Hazy.
18	28.920	88.5	91.0	81.0	..	..	..	Hazy.
19	29.052	90.0	91.6	81.6	..	..	..	⌒ all over heavens.
20	29.067	89.0	91.0	83.0	..	..	..	⌣ ½ heavens.
21	29.104	89.0	89.5	80.3	..	..	..	⌒ all over heavens.
22	29.074	89.0	91.4	80.3	..	..	..	⌒ all over heavens. ⌇ along horizon.
23	29.125	86.3	89.6	82 75	..	..	..	⌒ over head.
24	29.194	85.5	84.5	80.1	..	..	..	⌇ all over heavens.
26	29.051	89.0	89.0	82.9	..	..	..	∩ ⅔ of heavens.
27	28.949	89.8	91.4	84.0	..	..	..	∩ along horizon.
28	29.010	88.5	88.2	82.8	..	..	..	⌇ all over heavens.
29	29.040	87.6	86.0	81.5	..	..	..	⌇ all over heavens. ⌇ to N.
30	29.073	88.0	88.0	81.5	..	..	..	∩ to S. ∩ in horizon.
31	29.084	89.0	90.0	82.0	..	..	..	⌇ over head.
	29.034	88.36	89 76	81.71				

Note. The symbols used for Aspect of the sky are

\ for Cirri. — for strata.

∩ for Cumuli. ⌣ for Cirro-strata.

⌇ for Cumulo-strata. ⌒ for Nimbi.

The Barometer readings have all been reduced to 32° Far. and corrected for Capillary Action.

W. Muir, *Secy. to Govt. N. W. P.*

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of July, 1852. LATITUDE.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.	
12	28.932	86.0	91.2	83.75	..	..	..	Hazy over head.
13	28.984	88.25	90.5	80.0	..	..	..	Ditto ditto.
14	29.036	86.0	85.75	80.0	..	..	..	⌇ all over heavens.
15	28.969	89.5	92.0	81.5	..	..	..	⌒ clouds.
16	29.018	90.0	92.25	83.5	..	..	..	⌒ $\frac{2}{3}$ of heavens.
17	28.991	88.0	92.0	84.0	..	..	..	Hazy. Horizon hazy
18	29.008	89.5	91.2	81.0	..	..	..	∩ over head.
19	29.027	88.0	93.4	83.25	..	..	..	⌒ all over heavens, \ in zenith.
20	29.052	90.6	92.4	83.0	..	..	..	⌇ in horizon. ⌊ to north.
21	29.082	88.0	91.75	81.5	..	..	..	⌒ to south.
22	29.051	88.0	92.4	80.5	..	..	..	⌒ all over heavens, SE. and W. ⌇.
23	29.101	88.5	91.0	81.5	..	..	..	N. ⌒. ⌇ to N.
24	29.146	85.5	86.0	80.5	..	..	..	⌒ to SE. and W. ∩ along horizon.
26	29.015	88.0	91.4	81.2	..	..	..	Clear in zenith.
27	28.923	89.8	92.0	83.0	..	..	..	$\frac{3}{4}$ of heavens. ∩ along horizon,
28	28.975	87.8	89.2	82.5	..	..	..	clear zenith. \ in zenith.
29	29.014	87.5	88.0	82.0	..	..	..	∩ along horizon. ⌇ to S.
30	29.042	88.25	90.2	82.0	..	..	..	∩ along horizon. ∩ in horizon.
31	29.057	88.8	91.5	82.5	..	..	..	⌇ to N. E.
	29.022	88.21	90.74	81.96				

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of July, 1852. LONGITUDE.

Minimum pressure observed at 4 P. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.	Rain Gauges.		
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.				
12	28.877	85.5	92.4	83.0	92.5	85.0	88.75	Hazy over head.			
13	28.929	89.0	90.8	79.3	94.3	84.0	89.15	Ditto ditto.			
14	28.967	86.5	89.9	79.8	90.0	84.0	87.0	∿ all over heavens.			
15	28.909	91.25	92.8	82.0	96.4	83.25	89.825	∼ clouds.			
16	28.934	91.5	92.5	81.25	97.25	84.4	90 825	∼ $\frac{2}{3}$ of heavens.			
17	28.919	87.25	93.25	83.5	94.0	84.8	89.4	∼ $\frac{3}{4}$ of heavens.			
18	28.933	92.0	92.4	81.2	93.5	85.0	89,25	\ all over heavens.			
19	28.967	88.0	93.0	81.4	93.5	85.5	89.5	∿ all over heavens.			
20	28.950	90.8	92.5	84.5	93.5	85.0	89.25	∼ all over heavens.			
21	29.014	87.5	93.0	83.0	93.5	84.9	89.2	∼ all over heavens.			
22	28.994	90.5	93.0	80.9	93.5	86.8	90.15	∿ all over heavens.			
23	28.983	91.0	92.5	81.5	92.5	84 2	88.35	\ N. ∼ S.			
24	29.044	87.5	89.2	81.4	89.5	79.2	84.4	∩ $\frac{3}{4}$ of heavens.			
26	28.910	88.4	92.4	80.0	91.5	82.8	87.15	∩ along horizon. \ in zenith.			
27	28.908	86.8	86.6	80.8	91.0	83.9	87.45	∿ all over raining.			
28	28.911	88.0	88.0	81.25	89.5	82.2	85.85	∩ $\frac{1}{2}$ of heavens.			
29	28.937	87.8	86.0	80.9	88.5	81.9	85.2	∿ all over heavens.			
30	28.959	89.0	91.4	82.0	90.0	81.8	85.9	∩ along horizon.			
31	28.939	89.0	92.7	81.25	91.9	82.9	87.4	∩ $\frac{3}{4}$ of heavens.			
	28.947	88.80	91.28	81.52	92.44	83.77	88.10				

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of August, 1852.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.	
1	..	..	..	..	..	..	..	..
								∩ in hor.
2	29.012	88.5	87.75	81.5	..	..	..	∿ in zenith.
3	28.998	87.5	87.0	82.3	..	..	..	⌣ $\frac{1}{3}$ of heavens.
4	29.070	88.0	89.5	84.5	..	..	..	∩ to E. ⌣ to W.
5	29.029	88.2	89.5	84.0	..	..	..	∿ to N. and E.
6	29.020	86.0	81.25	78.0	..	..	..	∿ all over sky.
								∿ to N. E.
7	29.028	87.0	86.5	82.5	..	..	..	∩ S. W. to N.
8S.	..	..	..	..	..	..	..	..
9	29.011	82.0	86.0	81.0	..	..	..	∿ all along horizon.
								∿ to N.
10	28.976	86.0	85.0	81.5	..	..	..	∩ in hor.
11	28.943	85.2	84.0	79.0	..	..	..	∿ all over sky.
12	28.958	85.5	84.5	79.5	..	..	..	∿ all over $\frac{3}{4}$ of sky.
13	29.003	85.0	83.5	79.9	..	..	..	∿ all over sky.
14	29.036	86.0	86.5	80.0	..	..	..	∩ $\frac{3}{4}$ of heavens.
15S.	..	..	..	..	..	..	..	..
16	28.988	85.5	83.5	81.5	..	..	..	∿ all over sky.
17	29.070	84.0	83.5	80.0	..	..	..	∿ all over sky.
18	29.097	85.5	85.5	82.5	..	..	..	∿ all over sky, raining.
19	29.062	84.0	83.5	81.0	..	..	..	∿ all over.
20	29.104	84.2	83.3	81.0	..	..	..	∿ $\frac{3}{4}$ of sky.
21	29.089	84.8	84.0	81.0	..	..	..	∿ $\frac{4}{5}$ of sky.
22S.	..	..	..	..	..	..	..	..
23	29.145	86.0	86.5	82.0	..	..	..	∩ all along horizon.
								∩ with a few.
24	29.104	86 5	87.0	82.7	..	..	..	∿ all over.
25	29.173	86 8	86.0	83.0	..	..	..	∿ $\frac{3}{4}$ of sky.
								∿ in zenith.
26	29.207	87.2	87.0	85.0	..	..	..	∩ in horizon.
27	29.172	86 0	87.0	83.5	..	..	..	∿ all over sky.
28	29.167	84.0	84.8	79.5	..	..	..	⌣ along hor.
29S.	..	..	..	..	..	..	..	..
30	29.170	85.0	85.0	80.5	..	..	..	∿ all over sky.
31	29.174	85.1	86.2	81.1	..	..	..	∩ in horizon.
Means.	29.069	85.75	85.53	81.46	..	..	..	

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of August, 1852. LATITUDE.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.	
1	..	..	..	..	..	..	..	..
								∩ in hor.
2	28.953	87.4	90.5	81.5	..	..	..	∿ to N.
3	29.001	88.0	89.25	83.0	..	..	..	∩ ⅔ of heavens.
4	29.038	87.5	89.6	84.4	..	..	..	∩ all along horizon.
5	29.001	88.0	88.1	82.5	..	..	..	∿ all over heavens.
6	28.993	86.5	84.0	80.3	..	..	..	∿ all over sky.
								∿ in zenith.
7	28.995	87.7	89.0	83.0	..	..	..	∩ in hor.
8S.	..	..	..	..	..	..	..	..
9	28.956	87.0	86.7	82.3	..	..	..	∿ all over sky.
								∿ to N.
10	28.970	87.0	86.7	82.2	..	..	..	∩ to S. W. and E.
11	28 920	86.0	86.5	81.0	..	..	..	∿ all over sky.
12	28 950	85.5	86.5	80.7	..	.	..	∿ all over sky. [zenith.
13	28 974	86.0	86.2	80.5	..	..	..	∿ all over sky, hazy in
14	29.036	86.0	90.0	82.1	..	..	..	∩ in hor.
15S.	..	..	..	..	..	..	..	..
16	28.991	85.0	84.0	81.0	..	..	..	∿ all over sky.
17	29 058	85.0	84.5	81.0	..	..	..	∿ all over sky.
18	29.078	85.0	86.5	83.5	..	..	..	∿ all over sky, drizzly.
19	29.041	84.0	84.5	82.0	..	..	..	∿ all over.
20	29.070	85.1	85.5	82.0	..	..	..	∩ in horizon, all round.
								∩ in horizon.
21	29.062	85.0	85.1	81.6	..	..	..	∿ in zenith.
22S.	..	..	..	..	..	..	..	..
								∿ in zenith.
23	29.129	86.1	87.5	82.5	..	..	..	∩ along horizon.
								∿ to N. and E.
24	29.211	87.0	88.7	83.1	..	..	..	∩ to W. and S.
25	29.150	87.0	88.5	84.0	..	..	..	∩ to S. ∿ to N.
26	29.165	87.0	87.8	84.5	..	..	..	∩ ⅔ of sky, with a few ∿.
27	29.141	86.7	87.5	83.4	..	..	..	∿ all over sky.
28	29.149	84.0	86.5	80.5	..	..	..	∩ ⅔ of sky.
29S.	..	..	..	..	..	..	..	..
30	29.146	84.8	85.7	81.0	..	..	..	∿ all over sky.
31	29.125	86.0	87.0	81.8	..	..	..	∩ ½ of sky.
Means.	29.050	86.17	87.01	82.13	..	..	..	

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of August, 1852. LONGITUDE.

Minimum pressure observed at 4 P. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.	Rain Gauges.		
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.			3 feet 3 inches from the ground	
1	..	..	..	..	..	..	..	..	..	..	..
2	28.880	87 5	88.0	83.25	91.5	88.0	89.75	⌇ all over heavens.	..	..	..
3	28.931	86.5	89.25	82.75	88.5	79.25	83.87	$\frac{2}{3}$ of heavens.	..	..	..
4	28.947	88 0	91.0	83.6	90.0	81.0	85.5	⌇ to W. and N.W.	..	..	..
5	28.931	87.75	88.7	83.6	88.7	83.3	86.0	⌇ all over heavens.	..	..	..
6	28.912	87.6	86.0	81.6	85.5	79.4	82.45	⌇ all over sky.	..	..	..
7	28.898	87.2	91.0	82.8	89.7	81.0	85.35	⌒ $\frac{3}{4}$ of heavens.	..	..	..
8	..	..	..	..	..	..	..	..	..	..	..
9	28.880	86.0	86.0	82.1	86.2	80.2	83.2	⌇ all over sky. Raining.	..	..	..
10	28.870	87.5	87.7	83.2	88.2	79.0	83.6	⌇ all over.	..	..	..
11	28.848	85.5	86.6	81.0	86.2	79.0	82.6	⌇ all over sky.	..	..	..
12	28.886	86.0	86.0	82.0	86.5	78.8	82.65	⌇ all over head.	..	..	..
13	28.925	86 5	86.0	80.7	85.5	79.5	82.5	⌇ all over sky to N. ⌇ to.	..	..	..
14	29.014	87.0	89.5	82.5	90.0	80.2	85.1	W. S. and E. ⌒.	..	1.23	..
15	..	..	..	..	..	..	..	..	..	..	..
16	28.980	84.5	84.2	81.1	84.2	80.0	82.1	⌇ all over sky.	..	..	..
17	28.988	85.5	86.0	81.5	84.8	78.8	81.8	⌇ all over sky.	..	..	..
18	29.006	85.7	87.0	83.7	86.0	81.9	83.95	⌇ all over sky.	..	..	..
19	28.970	86.0	85.4	83.4	89.5	81.0	85.25	⌇ all over sky. Raining.	..	0.27	..
20	29.024	84.5	81.4	80.0	85.0	79.0	82.0	⌇ all over. ⌒ to W. N. and	..	0.26	..
21	28.990	86.1	88.0	81.5	86.5	79.9	83.2	E. ⌒ to S.	..	0.12	..
22	..	..	..	..	..	..	..	..	..	..	..
23	29.044	87.0	89.0	81.7	89.2	81.0	85.1	⌒ $\frac{3}{4}$ of sky.	..	..	..
24	29.003	87.6	89.0	83.0	88.5	80.7	84.6	⌇ all over sky.	..	..	..
25	29.078	88.0	90.4	84.2	89.0	83.1	86.05	⌇ all over sky. ⌇ in horizon.	..	..	..
26	29.102	87.5	87.0	84.0	84.8	82.5	83.65	Zenith hazy. ⌒ in horizon.	..	0.12	..
27	29.058	89.0	89.0	84.0	88.0	83.2	85.6	Hazy in zenith.	..	..	..
28	29.097	84 8	86.5	80.0	86.6	79 0	82.8	⌇ all over sky.	..	..	..
29	..	..	..	..	..	..	..	..	..	..	..
30	29.083	85.0	86.5	81.0	86.0	79.2	82.6	⌇ all over sky.	..	..	..
31	29.071	87.8	88.0	79.0	88.0	81.9	84.95	⌒ in horizon.	..	..	..
	28.978	86.62	87.43	82.2	87.42	80.76	84.08		..	2.00	..

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of September, 1852.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.	
1	29.178	85 5	85.4	79.0	..	..	..	⌒ all over sky.
2	29.154	86.5	87.5	80.0	..	..	..	∩ in horizon.
3	29.151	86.0	87.0	82.0	..	..	..	⌒ all over sky.
4	29.152	86.4	87.0	79.0	..	..	..	⌒ all over sky.
5	..	..	..	..	..	..	..	..
6	29.118	86.2	85.5	79.1	..	..	..	⌒ all over sky.
7	29.141	86.0	82.6	79.1	..	..	..	⌒ all over sky.
8	29.189	85.0	84.5	80.0	..	..	..	∩ $\frac{3}{4}$ of sky.
9	29.173	84.0	84.8	79.5	..	..	..	Few ∩ in horizon.
10	29.200	85.0	85.8	80.0	..	..	..	Few ∩ to S. E. and W.
11	29.214	85.0	85.5	80.2	..	..	..	∩ E. — W.
12	..	..	..	..	..	..	..	..
13	29.207	87.0	87.3	81.2	..	..	..	∩ in horizon.
14	29.177	87.2	88.4	81.0	..	..	..	∩ in horizon.
15	29.182	87.8	87.8	81.3	..	..	..	∩ in $\frac{1}{4}$ of sky to S.
16	29.170	88.3	89.0	80.7	..	..	..	∩ to N. and S. in horizon.
17	29.156	89.5	89.5	82.4	..	..	..	Few ∩ in horizon.
18	29.092	88.0	89.3	81.6	..	..	..	∩ to E. S. and N.
19	..	..	..	..	..	..	..	..
20	29.081	87.0	87.9	77.2	..	..	.	Few ⌒ to S.
21	29.181	87.5	88.5	79.6	..	..	..	Clear sky.
22	29 189	87.0	87.0	77.6	..	..	..	⌒ $\frac{3}{4}$ of sky.
23	29.200	86.5	87.0	76.0	..	..	..	— a few to E.
24	29.232	86.5	87.2	76.4	..	..	..	⌒ $\frac{2}{3}$ of sky.
25	29.264	86.2	86.6	76.0	..	..	..	⌒ scattered over $\frac{1}{3}$ of sky.
26	..	..	..	..	..	..	..	..
27	29.250	85.0	85.8	73.0	..	..	..	Few — to S. E. and N.
28	29.182	83.0	83.7	72.6	..	..	..	— all over sky.
29	29.184	86.0	85.7	77.0	..	..	..	⌒ in E.
30	29.268	85.0	85.6	78.0	..	..	..	— to E. or few.
	29.180	86.3	86.6	78.8	..	..	..	

Note.—Barometer readings have all been reduced to 32° Fahr. and corrected for Capillarity.

W. Muir, *Secy. to Govt. N. W. P.*

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of September, 1852. LATITUDE.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.	
1	29.159	84.0	85.7	79.0	..	..	..	∿ all over sky.
2	29.136	86.1	89.5	80.1	..	..	..	∩ in E. and N.
3	29.124	87.0	87.0	82.0	..	..	..	∿ all over sky.
4	29.122	86.5	89.4	79.5	..	..	..	∿ $\frac{2}{3}$ of sky.
5	..	..	..	..	..	..	..	..
6	29.118	86.5	87.1	79.5	..	..	..	∿ all over sky.
7	29.105	86.0	84.7	80.5	..	..	..	∿ all over sky. ∿ to E.
8	29.158	84.7	85.5	80.1	..	..	..	∩ elsewhere.
9	29.153	84.0	86.0	80.2	..	..	..	Few ∩ in horizon.
10	29.170	85.5	86.5	80.0	..	..	..	Drizzly.
11	29.188	84.5	87.0	80.5	..	..	..	∩ all over sky.
12	..	..	..	..	..	..	..	..
13	29.167	87.0	89.4	81.5	..	..	..	∩ $\frac{1}{3}$ of sky. ∩ in horizon.
14	29.128	89.0	91.0	84.0	..	..	..	Few ∿ to W. ∿ in N.
15	29.148	88.0	90.0	81.5	..	..	..	∩ to E. W. S. ∿ to E.
16	29.123	88.0	91.1	80.7	..	..	..	∩ to N. S. and W.
17	29.103	90.0	92.1	81.0	..	..	..	∩ $\frac{2}{3}$ of sky. ∩ to N. S. and W.
18	29.050	87.8	89.0	82.3	..	..	..	∿ to E.
19	..	..	..	..	..	..	..	..
20	29.058	86.4	89.6	78.0	..	..	..	∿ to N. a few.
21	29.150	89.0	90 9	80.5	..	..	..	Clear sky. ∩ to N. and W.
22	29.151	86.7	89.0	80.0	..	..	..	∿ to S. ∿ in zenith.
23	29.154	88.0	89.0	75.5	..	..	..	∿ in horizon. ∿ in horizon.
24	29.203	87.5	88.8	76.6	..	..	..	Hazy in zenith.
25	29.237	84.1	89.0	74.0	..	..	..	∩ in horizon.
26	..	..	..	..	..	..	..	..
27	29.213	84.0	90.5	72.5	..	..	..	Clear sky.
28	29.163	85.5	87.4	74.5	..	..	..	∿ all over sky.
29	29.162	85.1	88.0	77.5	..	..	..	∩ $\frac{2}{3}$ of sky.
30	29.246	82.5	86 7	75.5	..	..	..	Clear sky.
	29.149	86.3	88.5	79.1	..	..	..	

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of Sept., 1852. LONGITUDE.

Minimum pressure observed at 4 P. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.	Rain Ganges.		
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.		3 feet 2 inches from the ground.		
1	29.081	86.0	87.7	80.0	87.0	81.8	84.4	Clear sky.	..	..	..
2	29.047	87.5	91.5	81.0	90.5	82.0	86.25	Clear sky.	..	..	..
3	29.043	89.0	90.4	81.0	90.0	82.1	86.05	∿ all over sky.	..	..	..
4	28.998	87.3	91.1	79.8	90.5	81.7	86.1	∿ in horizon.	..	..	..
5	..	..	..	..	..	..	..	.. ∿ scudding.	0.64	..	..
6	29.019	86.9	88.9	79.2	88.2	80.9	84.55	From E. to W.	..	..	..
7	29.053	87.0	84.9	80.5	84.6	79.0	81.8	∿ all over sky.	0.73	..	..
8	29.094	85.0	86.0	80.0	85.2	79.0	82.1	∿ in horizon.	..	..	..
9	29.077	86.0	86.8	80.0	86.1	79.5	82.8	Few ∩ in horizon.	..	..	..
10	29.076	86.5	87.2	80.6	86.3	80.1	83.2	Few ∩ in horizon.	..	..	..
11	29.096	85.5	87.8	80.4	86.3	79.2	82.75	⌐∿ all over sky.	..	..	..
12	..	..	..	..	..	..	..	..	..	..	..
13	29.061	88.6	90.5	81.7	90.2	80.0	85.1	∩ in horizon.	..	..	..
14	29.046	90.0	91.4	81.0	91.0	83.0	87.0	∩ in horizon. ∩ to E. N. and S.	..	..	..
15	29.090	87.9	91.0	80.7	90.3	81.9	86.1	∿ to W.	..	..	..
16	29.044	88.6	91.5	80.6	91.5	82.5	87.0	∩ in horizon.	..	..	..
17	29.034	89.0	88.1	81.6	91.5	83.0	87.25	∿ all over sky.	..	..	..
18	28.997	87.5	84.9	77.9	89.2	81.0	85.1	∿ all over sky.	.	..	..
19	..	..	..	..	..	..	..	..	..	..	..
20	29.010	88.0	90.8	78.5	90.0	79.4	84.7	Clear sky.	..	..	..
21	29.065	90.0	90.0	80.0	90.4	81.0	85.7	∿ all over sky.	..	..	..
22	29.053	88.0	91.0	85.0	90.3	81.1	85.7	∩ in horizon.	..	..	..
23	29.059	86.8	91.0	77.0	90.0	81.0	85.5	∿ all over sky. ∩ in horizon.	..	..	..
24	29.123	90.1	90.2	76.8	89.5	80.6	85.05	To S. and W.	..	..	..
25	29.175	84.0	90.0	73.4	89.5	80.5	85.0	∿ $\frac{1}{3}$ of sky.	..	..	..
26	..	..	..	..	..	..	..	..	..	..	..
27	29.125	84.0	91.0	72.5	90.7	79.7	85.2	Clear sky.	..	..	..
28	29.091	18.5	90.1	71.0	89.5	75.2	82.35	\ all over sky.	..	..	..
29	29.133	85.2	88.5	78.5	89.0	76.5	82.75	∿ in zenith.	..	..	..
30	29.194	83.3	88.3	70.0	87.0	76.0	81.5	Clear sky.	..	..	..
	29.072	87.2	89.3	78.8	89.01	80.30	84.65		1.37	..	..

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of October, 1852.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.285	83.3	84.0	73.2	..	..	..	Clear sky.
2	29.294	83.0	84.0	70.6	..	..	..	Ditto.
3	..	..	..	..	..	..	..	..
4	29.386	83.0	84.0	70.4	..	..	..	Ditto.
5	29.430	83.2	84.6	69.2	..	..	..	Ditto.
6	29.442	83.0	83.6	68.9	..	..	W.	Ditto.
7	29.416	82.9	84.1	67.0	..	..	E.	Ditto.
8	29.399	84.0	87.6	72.2	..	..	S.	Ditto.
9	29.411	83.6	85.1	71.6	..	..	S.E.	Ditto.
10	..	..	..	..	..	..	..	..
11	29.398	84.5	86.0	76.0	..	..	E.	∼ a few scattered.
12	29.344	84.9	85.0	75.0	..	..	W.	Few ∼ scattered.
13	29 350	83.0	82.9	66.6	..	..	NW.	\ to S. and E.
14	29.343	81.0	81.6	65.1	..	..	W.	\ few to S.
15	29.435	81.2	82.4	67.5	..	..	N.	∼ scattered all over.
16	29.302	83.0	83.7	68.5	..	..	W.	Clear sky.
17	29.333	84.0	82.8	70.6	..	..	W.	Ditto.
18	29.401	81.0	80.5	64.9	..	..	W.	Ditto.
19	29.404	81.4	81.5	65.8	..	..	W.	Ditto.
20	29.400	81.5	81.5	67.0	..	..	s.w.	Ditto.
21	29.420	82.2	86.3	68.5	..	..	N.	∼ $\frac{1}{4}$ of sky, to E.
22	29.448	81.5	84.1	69.5	..	..	W.	Clear sky.
23	29.464	81.5	82.6	71.5	..	..	E.	Ditto.
24	29.452	82.5	79.6	68.0	..	..	E.	Ditto.
25	29.458	83.0	84.0	72.0	..	..	S.	Ditto.
26	29.417	79.6	80.0	67.7	..	..	W.	Ditto.
27	29.369	80.1	81.4	66.2	..	..	W.	Ditto.
28	29.425	80.1	81.1	66.5	..	..	W.	Ditto.
29	29.527	79.5	78.9	67.1	..	..	E.	Ditto.
30	29 489	77.0	78.0	65.0	..	..	W.	Ditto.
31	29.477	76.5	78.4	63.0	..	..	Ld.	Ditto.
Mean.	29.404	81.9	82.7	68.8	..	..	..	

Barometer Observations reduced to 32° Fahr. and corrected for capillarity.
Observations omitted on Sunday 3rd and Sunday 10th October.
There being no weather vane, the direction of the wind is not accurately noted.

M. Sherer, *Asst. Secy. to Govt. N. W. P.*

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of Oct., 1852. LATITUDE.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.248	86.5	86.7	68.5	..	..	..	Clear sky.
2	29.267	80.4	86.0	70.2	..	..	..	Ditto.
3	..	..	..	..	..	..	..	..
4	29.359	81.1	86.4	71.9	..	..	..	Clear sky.
5	29.401	87.1	87.6	69.6	..	..	..	Ditto.
6	29 405	84.0	87.3	70.4	..	..	s.w.	Ditto.
7	29.366	83.0	87.6	67.2	..	..	E.	Ditto.
8	29.354	85.0	87.5	70.5	..	..	S.	Ditto.
9	29 376	84.5	88.1	70.5	..	..	S.E.	Ditto.
10	..	..	..	..	..	..	..	..
11	29.360	86.0	89 1	72.5	..	..	E.	∼ a few scattered.
12	29.316	85.3	86.5	74.2	..	..	W.	Ditto.
13	29 312	83.0	87.0	66.2	..	..	W.	\ scattered all over.
14	29.336	84.8	85.0	66.5	..	..	W.	Clear sky.
15	29.302	85.0	84.0	65.0	..	..	W.	∼ a few.
16	29.262	84.6	87.1	71.6	..	..	W.	Clear sky.
17	29.291	84.1	84.5	70.6	..	..	W.	Ditto.
18	29.364	83.0	84.0	64.5	..	..	W.	Ditto.
19	29.376	84 5	83.0	65.6	..	..	N.W.	Ditto.
20	29.358	83.0	84.5	68.2	..	..	W.	Ditto.
21	29.373	84.0	89.3	69.1	..	..	N.	Ditto.
22	29.407	84.0	87.1	68.5	..	..	S.	Ditto.
23	29.429	83.5	84.1	70.1	..	..	E.	Ditto.
24	29.379	84.0	80.5	68.0	..	..	E.	Ditto.
25	29.409	84.1	87.0	72.1	..	..	S.	Few ∩ scattered.
26	29.376	83.0	83.6	67 9	..	..	W.	Clear sky.
27	29.321	83.5	84.0	65.5	..	..	W.	Ditto.
28	29.406	83.0	85.0	66.6	..	..	W.	Ditto.
29	29.470	81.5	81.4	68.0	..	..	E.	Ditto.
30	29.457	81.0	80.1	65.1	..	..	W.	Ditto.
31	29.435	80.0	78.9	63.0	..	..	Ld.	Ditto.
	29.362	83.6	85.3	68.5	..	..	..	

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of Oct., 1852. LONGITUDE.

Minimum pressure observed at 4 P. M.

Date.	Barometer.	Temperature. Of Mercury.	Of Air.	Wet Bulb.	Maximum and Minimum. Maximum.	Minimum.	Mean.	Aspect of the sky.	Rain Gauges.	Direction of the Wind.	
1	29.188	88.0	88.5	69.6	88.5	73.9	81.2	Clear sky.			
2	29.200	82.1	86.6	71.6	86.0	72.2	79.1	Ditto.			
3	..	..	..	..	..	..	..	..		..	
4	29.304	86.1	87.5	71.5	86.4	71.3	78.85	⌒ $\frac{2}{3}$ of sky.			
5	29.346	89.1	89.0	70.5	89.0	76.0	82.5	Clear sky.			
6	29.330	86.0	90.4	69.5	89.5	75.0	82.25	Ditto.		W.	
7	29.270	85.0	89.5	67.5	89.2	72.4	80.8	Ditto.		E.	
8	29.284	86.0	89.0	71.1	88.2	70.5	79.35	⌒ $\frac{1}{3}$ of sky.		S.	
9	29.308	85.5	89.0	70.5	87.5	73.5	80.5	Clear sky.		N.	
10	..	..	..	..	..	..	..	..		..	
11	29.272	86.2	89.7	74.5	89.3	73.0	81.15	~ a few scattered.		E.	
12	29.216	86.5	88.5	73.7	87.9	73.5	80.7	Ditto.		Ld.	
13	29.237	87.0	87.4	67.5	88.0	74.0	81.0	\ all over.		N.	
14	29.226	86.0	87.0	66.5	87.1	71.7	79.4	Clear sky.		W.	
15	29.227	87.0	87.5	65.6	86.0	70.9	78.45	Ditto.		W.	
16	29.214	85.7	89.0	68.2	88.5	72.8	80.65	Ditto.		W.	
17	29.256	84.9	85.6	69.0	85.5	71.0	78.25	Ditto.		W.	
18	29.299	84.2	87.5	65.0	87.0	70.4	78.7	Ditto.		N.W.	
19	29.296	85.0	86.1	65.5	86.0	69.1	77.55	Ditto.		N.W.	
20	29.295	84.3	87.0	67.7	86.0	68.2	77.1	Ditto.		W.	
21	29.310	85.0	89.0	67.6	89.8	69.2	79.5	Ditto.		E.	
22	29.344	85.0	88.6	67.6	88.0	71.2	79.6	Ditto.		S.	
23	29.345	84.1	86.7	68.0	85.4	70.9	78.15	Ditto.		E.	
24	29.274	84.9	82.0	68.9	85.0	69.9	77.45	Few ⌒ to S. E.		S. E.	
25	29.336	85.0	86.3	71.0	86.9	75.5	81.2	Clearsky.		E.	
26	29.305	84.3	85.1	67.1	84.8	73.8	79.3	Ditto.		W.	
27	29.262	85.0	85.4	66.0	85.0	67.9	76.45	Ditto.		W.	
28	29.363	83.5	85.6	67.9	85.2	69.6	77.4	Ditto.		W.	
29	29.412	82.5	83.0	65.7	82.5	68.5	75.5	Ditto.		E.	
30	29.394	82.2	83.0	64.3	83.5	66.9	75.2	Ditto.		W.	
31	29.398	81.5	80.0	63.1	80.0	65.0	72.5	Ditto.		Ld.	
	29.293	85.1	86.5	68.4	86.6	71.3	78.95				


GEOLOGICAL
SKETCH MAP
of
SALT RANGE.
From a Rough Military
SURVEY
Made during the Cold season
of
1851 – 52.
References
Salt Mines open
do Closed
Camel Road
Mule Road
Thannah
Tahseel
Trigonometrical Survey Station — G.T.S.
Approximate Heights above Sea Level, in feet represented by the Numbers
Inclination of Beds
Direction of Dip
Scale 8 Eng. Miles = 1 Inch.
A. Fleming M.D.
Asst Surgn 4th P. Cavly
In Charge of Geological
Survey of Salt Range
in Punjaub.
1851-52.
Reduced in the Office of the Surveyor Genl of India
from the Original, Calcutta 8th June 1853.
Deputy Surveyor General
In Charge Survey Genl Office.
Eocene
Carboniferous
Oolite
Miocene
Thul or Desert.
Sind Sangar Doab.
Ravine ground with dwarf Jungle Bushes and but little Cultivation
Thul or Desert
The Bar or uncultivated jungle covered with Salvadora and Peelloo bushes – very little Cultivation
The Bar or uncultivated jungle covered with The Jhuk Dwarab
ESAKHAIL
KAFIRKOT
NOORPOOR
PINDADUNKHAN
JELALPOOR
PABBEE
KHOOSUM
DILOOK
RUHTAS
JHILUM
SHAHPOOR
Sundral
Beengah
Kalabagh
Kalabagh Salt Mines
Sulphur Mines
Lith. by H.M. Smith, Surv.r Gen.l Office Calcutta. June 1853.

JOURNAL

OF THE

ASIATIC SOCIETY.

No. III.—1853.

Report on the Geological Structure and Mineral Wealth of the Salt Range in the Punjaub; with Maps, Sections, &c.—*By* Andrew Fleming, *M. D., Edin. Assistant Surgeon, 4th Regt. Punjaub Cavalry. In charge of the Geological Survey of the Salt Range in the Punjaub. Season* 1851-52.

(Communicated by the Govt. of India.)

Preliminary Remarks.

In compliance with the instructions received at Maree on the Indus, on the 14th February 1851, from the Most Noble the Governor General, I have endeavoured to make such an examination of the Salt Range as will enable His Lordship in Council to judge as to the exact character of its mineral wealth.

The results of this examination have been embodied in the accompanying Report.

From unavoidable circumstances I was unable to commence the regular survey of the Range, until the end of February 1851, and owing to the heat was obliged to cease work in the middle of April.

On the 1st November 1851, the survey was again renewed, and the sanction of Government having been obtained for the construction of a Sketch map of the Salt Range (the want of which to guide us in our survey has been severely felt), Mr. William Purdon (1st Assistant), aided by Mr. William Theobald (2nd Assistant), was directed to devote his attention to its construction. The map herewith submitted is the result of their labours during the cold weather of 1851-52, to the end of which period the duration of the survey was limited.

The map is I believe the first which has ever been made of the Salt Range from a regular survey, and for its accuracy Mr. Purdon is alone responsible. I trust it will supply a want in all maps of the Punjaub hitherto published, in none of which, that I have seen, is even the general direction of the Range correctly laid down.

The geological examination of the Range has been executed entirely by myself, and in addition to that of the Salt Range proper, a rapid survey was made of its continuation in the range of hills which runs down the west bank of the Indus from Kalibag to Kaffin Kote. I thus have been able to add considerably to our previous knowledge of the geology of the Punjaub. A most interesting mass of hills called Kovana, which rise abruptly from the plain of the Jetch Doab, has also been examined.

During the course of my labours I executed a rough military survey, with a hand prismatic compass, of the district passed over, from which I constructed for my own guidance a rough sketch map. This I have had copied and coloured geologically, by a Mr. Blaney, an Eurasian draftsman, and herewith submit it as illustrative of my report.

The report itself will be found in many parts to be a repetition of the reports on the Salt Range I made to Goverment in 1848. These were drawn up after a very rapid inspection of the Range between Baghanwalla and Kalibag, in the month of April, a period of the year, when it is next to impossible to examine satisfactorily such hot and barren hills.

In the present report I have corrected several errors, the result of a too cursory examination of the strata, and have added very considerably to the matter of my previous reports.

I regret that I am unable to announce the occurence in the Salt Range of much mineral wealth, of the existence of which Government have not already been made aware.

The nature of the formations precludes the likelihood of any valuable metallic ores (we except those of iron) being found. The nature and character of the Coal deposits have been fully described; but, for reasons stated, we fear they will turn out of but little practical value.

In a scientific point of view, however, I would fain hope that much has been recorded which to Geologists will prove highly interesting.

As I was ordered to resume my medical duties at the close of my field work, it was necessary that the sections which accompany the report should be prepared before I separated from my assistants, who were directed to remain at Pind Dadun Khan.

These were hurriedly drawn in camp by Mr. Theobald from rough sketches made by myself in the field, and must be considered rather as sketches than true sections, which without the necessary data at the time as to heights and distances, it was impossible to have constructed.

The table of heights calculated from barometric and thermometric observations will, I trust, prove interesting as well as useful. I need hardly remark that they can only be considered as rough approximations.

A complete collection, for submission to Government, of the rocks, minerals, and fossils collected during my survey has been prepared, and, in compliance with Government orders, collections, illustrative of the mineral wealth of the Salt Range, have also been made for the museums of the Asiatic Societies of Bengal and Bombay and of the Agra College.

The preparation of my report and the examination and arrangement of my specimens have occupied entirely my leisure hours during the past hot season. I am aware that numerous imperfections are to be found in it, but in judging of its merits or demerits, I trust it may be borne in mind, that I have been in a position where books of reference or collections for comparison are quite inaccessible, and have consequently been entirely dependent on my own resources.

(Signed) A. Fleming, M. D.

Jhelum, Punjaub, Sept. 12*th*, 1852.

On the General Physical features of the Salt Range in the Punjaub.

The hills, generally included under the designation of the Punjaub Salt Range, occur in the northern part of the Sinde Saugor Doab, or distinct between the rivers Jhelum and Indus, crossing it from E. to W. between the parallels of 32° 22′ and 33° N. Latitude and 71° 30 and 73° 30′ E. Longitude.

The Salt Range may be considered as resulting from the union of three low independent ranges, subordinate to the Punchah branch of the Himalayas, which run towards the plain in a southerly direction.

The first or most easterly of these ranges runs along the left bank of the river Jhelum, and opposite the town on the line of the trunk road, receives the name of the Kharian Range. Further down the river this is known as the Pubbee Hills, and near Russool, famous for the position of the Seikh encampment after the battle of Chillianwalla, approaches the river, being evidently continuous with hills of similar character, which form its right bank between Darapoor and Jelalpoor, and which are locally designated Surafur.

The central or Rhotas range crosses the Peshawur road about 7 miles West of Jhelum, and stretches in a S. W. direction as far as the Boonah nullah. Here it takes a southerly turn, and under the name of Chumbah runs on to Jelalpoor, uniting in its course with the Kharian Range. The well known mountain Tillah, 18 miles S. W. of Jhelum, is the highest point of this range and not less than 3,000 feet above the level of the sea.

The western or Bukrala Range is separated from that of Rhotas by a ravine country about 10 miles in breadth. It runs parallel with the latter and after crossing the Boonah nullah at the Ghorigulla Pass, forms the ridge known as Diljubba, the west end of which unites with the general map of hills forming the Salt Range.

By the union of the Kharian and Rhotas or Chumbul ranges at Jelalpur, a ridge is formed presenting a steep escarpment to the south and a highly inclined slope to the north, at this point it is about three miles distant from the Jhelum, an alluvial plain intervening, the height of which does not probably much exceed 600 feet above the sea, and which, as we proceed westward, gradually expands into the plain of the Sinde Saugor Doab.

From Jelalpur the direction of the range is about west by south as far as Kuttba. Here it takes a turn to the S. W. running in this direction as far as Jubbi, which is its most southerly point. From this for a distance of about six miles, it runs nearly due west to Chooa, and then gradually trends round to the north, running from Futtipur to the Indus in a N. W. direction. It maintains the same course

for about four miles on the west bank of the Indus, beyond which it gradually expands into the mass of hills, that stretch north between Bunnoo and Kohat, and are known as the Chountuah Hills. The south-western portion of these along the west bank of the Indus, are elevated into a high ridge, presenting a steep escarpment to the east, evidently continuous with that of the Salt Range, and joining it near the village of Kooch four miles N. W. of Kalibag at nearly a right angle. This ridge known as the Chichalee Range runs in a direction S. S. W. towards the Koorum river, beyond which it may be said to be continuous with that of Kaffin Kote, forming the right bank of the Indus for several miles below the village of Bahadur Dok, and which is apparently a branch from the great Suliman Range, which runs parallel with the Indus in the Derajat and Scinde, and forms the natural western boundary of our Indian Empire.

In order to convey, if possible, an idea of the general features of the Salt Range, we shall follow its three natural divisions, into a southern or salt, a central or cultivated limestone, and a northern or sandstone district, beginning from Jelalpur where the Salt Range proper may for practical purposes be considered to commence.

Along its southern limits, the Range presents a most jagged angular outline, produced by a succession of points running towards the plain and separated by deep intervening strata. These points are covered and in many places formed of masses of rock and debris, which during the upheaval of the Salt Range, and subsequently from atmospheric and disturbing agencies, have been detached from a high escarpment with the strata of which they have undoubtedly been at one time continuous.

This escarpment extending from Jelalpur to the Indus is most prominently marked in the eastern part of the Range. Its continuity is frequently broken by deep transverse gorges, running parallel to the general line of dip of the rocks, through which the greater number of the streams which drain the Salt Range escape into the plains. None of these, except during heavy falls of rain, reach either the Jhelum or the Indus, but are absorbed by the thirsty sun-baked alluvial soil which instead of fertilizing, they convert into a comparative desert by the deposition of saline matter which they acquire in their course as they flow over the salt rocks which are chiefly confined to the southern district of the Range.

To this rule the streams which escape from the hills at Baghanwalla, Kuttha and Musakhail are exceptions. The two former though slightly saline are entirely consumed for agricultural purposes. The latter known as the Vehee River runs entirely through strata, superior to the Salt rocks and pours out a considerable volume of sweet water, a very small portion of which is employed for irrigation, the greater part being allowed to run to waste. By the judicious formation of an aqueduct (stone and lime are available in abundance on the spot) with sluices for the withdrawal of the water, means for the irrigation of a very considerable extent of now unproductive soil, could be rendered available. The various streams we have alluded to, after heavy rains, become suddenly swollen and, acquiring the characteristic impetuosity of mountain-torrents, bear along with them an immense quantity of boulders, gravel and mud, which are, along the foot of the hills, deposited in a succession of zones extending for two or three miles.

As may be supposed a district formed in this way presents a somewhat barren aspect, and with the exception of a scanty rain crop of Bajra* and Juar† and annual cotton, there is but little ground under cultivation. In the cold weather after heavy rain, it assumes a somewhat green aspect, but when rain does not fall, as was the case in the cold weather of 1851-52, hardly a blade of grass is to be seen, and much do the villagers suffer for want of water, they being in a great degree dependent for the supply of this necessary on seasonable falls of rain, which they collect in kutcha (mud) tanks, and which as long as a supply of water lasts are resorted to indiscriminately by men and cattle.

A stunted jungle of Capparis aphylla (kurul), Salvadora persica (pelu), Zizyphus (beir), Acacia modesta (phoolahi), and Prosopis specigera (jund), occurs along the foot of the hills, and affords grazing to numerous camels, sheep and goats, as well as an abundant supply of fuel to the villagers. These shrubs appear to thrive best in soil charged with saline matter, and form the mass of jungle in the uncultivated tracts of the Punjaub Doabs which generally present on their surface a white saline effervescence known under the name of kullur, and which is a mixture of salt and sulphate, with

* Panicum spicatum. † Holcus sorghum.

generally a trace of carbonate of soda. As we ascend the alluvial zones along the foot of the hills vegetation gradually diminishes, and on the Salt rocks, which are the lowest in the series, it seems to reach a minimum. A few stunted kurul, pelu and phoolahi bushes may be observed, but succulent salsolas* and other chenopodiacious plants known to the natives under the general term "java," with one or two interesting Cruciferæ characterize these, and abound in the Salt-marl. Above the Salt rocks vegetation again increases, but on account of the want of water along the foot of the escarpment of the Range, is every where scanty.

On reaching the summit of the escarpment which is formed of limestone rocks elevated into a ridge varying from 2 to 5,000 feet in height, we are introduced to a district of a totally different aspect from that to the south, presenting at first generally a considerable slope to the N., which is succeeded by a series of horizontal ridges with intervening valleys.

Between Jelalpur and Baghanwalla, the Range presents merely a ridge; but beyond the latter place this expands into a kind of table-land two or three miles in breadth, extending from the escarpment between Baghanwalla and Jutana N. to the foot of mount Drengan, the highest but one of the Salt Range hills which rises from it behind the village of Bisharut. This table-land is about 2,800 feet above the level of the sea, and, though entirely dependent on rain, is all under cultivation, and yields generally fair crops of wheat, barley, &c. It extends in a S. W. direction for about a couple of miles, and then becomes broken up by limestone ridges, into a succession of small cultivated valleys, one of which runs along the S. side of mount Kurringurli under the village of Vuhali.

Proceeding westward to Katass, we enter the district of Kuhun, which is made up of a succession of ridges and cultivated valleys about 2,000 feet above the sea-level. At the west end of this district is the Salt Lake of Kullur Kuhor (Kullur in Sanscrit means salt, Kuhor, Sansc. a lake). Its extent varies much in different seasons, but may be stated as about a mile long by half a mile broad, its

* These, in the plain along the foot of the Range, are, after the rains, cut, collected into heaps and burnt for the sake of their ashes, which are called saji muttí, a coarse kind of carbonate of soda.

greatest length being from east to west. It receives the drainage from the various hills around, and also a small stream of fresh water which enters it at its West end near the village of Kuhar. Its depth no where exceeds three or four feet, and its margin is formed of black fetid mud, outside which is a thick saline incrustation produced by the evaporation of its water. Its saline ingredients seem derived from salt springs, which issue from a mass of marl at its S. W. end. Its water is a strong brine, but owing to the constant drainage into it, after rains, of fresh water, it never reaches a point of concentration sufficient to admit of salt being deposited in the bottom of the lakes. After any heavy rains and when its surface-level is considerably raised, a portion of its water finds an exit by a nullah at its N. W. corner, which joins a small stream called Nunva in the hills to the north. This periodical overflow also assists in preventing the concentration of the water. It appears to contain no fish, but it is a favourite resort of ducks and other water-fowls.

Beyond Kuhar on to Pyle, the district becomes more hilly and only occasional patches of cultivation are to be seen. Here the Range, which to the eastward does not exceed ten or twelve miles in breadth, becomes narrow ; but soon rapidly expands into a mass of hills which at their broadest point, North of Jubbee, is probably not less than eighteen miles.

Among these are several cultivated valleys, the principal of which are those of Khubakkie and Lone Lihesur. The former presents nothing remarkable, except that after heavy rain, one or two small lakes form in its lower parts.

The Lone Lihesur valley is about twelve miles long, and three broad and is inland, between two ridges of limestone hills. It is for the most part under rich cultivation, and in the hot weather has the reputation of being as cool as Cashmere. At its west end is a great salt lake called " Sumundur," three miles long by one and a half broad, and beyond it mount Lihesur, the highest point of the Salt Range, attains an elevation of about 5000 feet above the sea level. Here the central district of the Range may be said to end, its summit forming a ridge on to the Indus.

The Salt Lake or Sumundur (sea) is in every way similar to the one of Kullur Kuhar, but as far as we are aware, receives no perma-

nent streams. During rain, the drainage into it from the Gumundra, Putial and Kurrung ridges, which surround it, must be very considerable, and the boulders in several nullahs which enter its eastern extremity, mark the force of the floods which it at times receives. There appears no exit for the waters of the lake, which by solar evaporation must be kept within due bounds. All the hills by which it is surrounded are composed of limestone, and hence it is probable that salt springs enter it from below. Its water is a strong brine, and a thick saline incrustation covers its banks.

South of the salt lake, in the hills between Kufree and Vurcha, and about four miles from the former, is a fresh-water lake of considerable depth called Julhur Kuhar (Julhur, Sanscrit, a spring of fresh water), about three quarters of a mile long by about half-a-mile broad. It is most picturesquely situated at the foot of a limestone escarpment, and receives the drainage of the limestone hills around and of the small valley at the west end of which it is placed. We believe we were the first Europeans who had ever visited it, and were not aware of its existence till we stumbled upon it accidentally. The pleasure of beholding such a sheet of fresh water cannot be appreciated to its full extent but in the midst of hills like the Salt Range, where fresh water is no where abundant, and clean water is a scarce luxury.

The vegetation in the central and northern districts of the Range presents a striking difference to that on its south side, but though the hills attain to a considerable height, there is nothing to indicate an approach to an Alpine flora. The want of any of the ordinary trees characteristic of the Sub-Himalayan ranges of elevations from two to five thousand feet is very remarkable, and with the exception of a few stunted Hyperanthera and semul trees (Bombax heptaphyllum), whose large scarlet flowers appear in the months of February and March, nothing deserving the name of a tree is to be seen on the Salt Range from the Jhelum to the Indus. This we conceive is to be attributed entirely to the general absence of soil on the surface of the limestone rock of the district, the debris of which seems all to be washed into the valleys, where it forms a productive soil. But although trees are deficient, the hills of the central district present a green and refreshing aspect, being generally covered

with a low bush jungle, formed in great part of Dodonæa Burmanniana (Sunhetta) and Adhatoda vassica (Behikkur). These two shrubs, but particularly the former, may be considered as peculiarly characteristic of the central district, their fibrous roots penetrating deeply into the soil between the rents and fissures which every where traverse the limestone strata. Mixed with these may be observed the Phulahee and the Kow—a species of Olea* famous for its long and straight sticks which make excellent hammer or hatchet handles.

After rain a good deal of grass springs up, forming tufts along the fissures in the limestone; and a by no means inconsiderable number of the smaller flowering plants may also be collected during the months of March, April and May.

The northern district of the Range is formed of a succession of ridges of soft sandstones and clays separated by deep ravines. These present an escarpment to the south and dip to the north at a high angle under the plain of Potowar, the general name for the country north of the Salt Range, and which in its neighbourhood does not probably exceed 1,000 feet above the level of the sea. They are of small breadth in its eastern and central part, but towards the Indus expand into barren hills that extend from Marie to Mokhudd; a distance of fully 16 miles.

This district presents scarcely any cultivation, and its natural vegetation is much the same as that of the central district, though less abundant. The Grislea tomentosa (Tawa) is the only shrub we have observed to be confined to the soft sandstone ridges.

In the Salt Range all goods, &c. must be conveyed on camels, mules, or bullocks; paths passable for loaded camels cross it at Dundhote, Mukrach, Lurdi, Nurpur, Kuttha and Nummul. The best of these are the Dundhote, Kuttha and Nummul ones. The traffic over them is, however, small, and chiefly confined to salt. The grain grown in the Salt Range is, we believe, not more than sufficient to supply the wants of its population, which is chiefly Mahomedan.

* Probably O. europæa.

On the Geological Structure of the Salt Range in the Punjaub.

All the rocks forming the Salt Range appear to belong to the strata termed fossiliferous by Sir Charles Lyell, whose classification will be followed throughout the present Report.

We recognize then the following formations in an ascending order, and under each of these shall endeavour shortly to describe their various characteristic subdivisions, noticing as we proceed the minerals, &c. which they yield.

1	Primary or Palæozoic.	Devonian.	*a.*	Red marl with gypsum and rock salt.
			b.	Lower red sandstone and grit, with conglomerate.
			c.	Greenish micaceous sandstones and shales with grey dolomitic (magnesian) sandstone.
			d.	Upper red variegated sandstones, grits, conglomerates and clays.
		Carboniferous.	*a.*	Lower limestone, calcareous sandstone and shales.
			b.	Grey sandstone and shales.
			c.	Upper limestone, sometimes magnesian.
2	Secondary.	Oolitic.	*a.*	Yellow iron-stained quartzose sandstones, grits and bituminous shales.
			b.	Cherty thin bedded limestones with shales.
			c.	Green Belemnite sandstone and shales.
3	Tertiary.	Miocene? Eocene.		Brown calcareous sandstone, nummulite limestone, marls and alum shales with lignite.
				Greenish sandstones argillaceous grits, conglomerates and red and green clays.
4	Post Tertiary.	Recent.		Alluvium.

Primary, fossiliferous Devonian Rocks.

a. Red marl with gypsum and rock salt. This rock gives to the Salt Range one of its most characteristic features, appearing generally at the foot of its southern escarpment, and in the bottoms of the various deep ravines which intersect the hills.

The marl occurs as the lowest rock, being subordinate to a red sandstone into which it seems to pass, the transition being marked by dark coloured fissile argillaceous beds. At Jutana and in the Chukie Wan near Jubbee, a coarse red sandstone with bands of conglomerate is seen in some places, cropping out under the marl, but as great disturbance occurs among the strata at these localities, and as the sandstone is identical in mineral character with that which in the regular order of things appears above the marl, we are disposed to consider its occurrence under it in the localities above mentioned as the result of an overturn.

The marl can be recognized at a distance by its most singular brick red colour, totally different from that of any ordinary clay, which immediately impresses one with the idea, that it has been subjected to igneous agency.

It does not disintegrate when treated with hydrochloric acid, but in powder effervesces strongly, the greater part remaining undissolved, in the shape of a red mud composed of clay and sulphate of lime or gypsum. The portion soluble in acid, consists of carbonate of lime and carbonate of magnesia in about equal proportions with a little alumina and peroxide of iron, to which latter substance the marl owes its colour. The rock is therefore a clay, cemented by gypsum and the carbonate of lime and magnesia into the consistency of stone, the gypsum predominating and frequently appearing in laminæ of selenite in the marl, which sometimes presents a radiated aspect, from a peculiar crystallization of the sulphate of lime.

In many places it is traversed by veins of gypsum, which seem to have been formed in rents in the marl, and give it a most singular honey-combed appearance. These veins often traverse the included irregular beds of gypsum, proving they are more recent than those, though in mineral character the gypsum of both the veins and beds is identical. In several localities thin beds of chert and coarse silicious sinter, containing patches of chalcedony may be observed.

The marl is extremely tough, and on this account, though by no means hard, the work of sinking shafts or galleries in it, is very laborious. It forms hills, some of which rise to the height of 1,500 feet above the sea, of a most jagged appearance, which is in a great measure produced by the heavy falls of rain, dissolving out the

gypsum, and its earthy carbonates, and forming in it deep ravines and channels. These by undermining the marl frequently produce extensive slips, which cause serious annoyance in the working of the salt.

On tracing up some of the ravines, where the marl is well developed, it seems to form the centre of an anticlinal axis, the rocks superior to it (see Table No. 7) dipping away from either side of its out crop at a considerable angle. At the end of some of the gorges, it often presents an amphitheatre of small hills surrounded by scarped precipices of the superior rocks. This may be well seen at the upper part of the Milawan ravine below Nurpur and in the Seral Ravine at Surdee, in both of which localities it has a remarkably eruptive aspect.

In the eastern part of the Range, the marl presents scarcely any traces of stratification. Towards the Indus, however, in the neighbourhood of Chooa, Vurcha and Futtypur, where it is extensively developed, thin beds of argillaceous dark red sandstone occur in the marl, and indicate its being a stratified deposit.

At several places, but particularly around Pind Dádun Khan, the marl for some depth from the surface has much the character of a breccia; angular masses of salt gypsum, sandstone and limestone similar to those occurring in situ, being diffused through it. As the numbers of the fragments appear to decrease the further from the surface we examine the breccia, and as they are most numerous where there is evidence of the greatest disturbance in the surrounding rocks, it is most probable that the breccia marl, which we have seen in some ravines fully 200 feet thick, has been formed on the surface of the regular marl at the time of, or subsequent to, the upheaval of the Range to be hereafter noticed. Indeed its formation may be observed after every heavy fall of rain, which washes large quantities of red mud and fragments of rock into hollows in the marl, which ultimately become cemented by the infiltration of sulphate and bi-carbonate of lime, held in solution by the rain-water, and derived from the strata over which it passes in its downward course.

We have hinted that the marl in some places has a singularly eruptive appearance, but the distinct proofs of stratification which it

presents in the western part of the Range negatives the idea. It is probable however, that it has undergone metamorphism from igneous influence, the exact nature of which it is difficult to ascertain. In no one locality in the Salt Range is there any evidence of the existence of plutonic or volcanic rocks by which this metamorphism could be effected, or the great disturbance produced, which is apparent every where. In addition to the brick red colour of the marl, which at once associates itself with the aspect of a well-burnt brick-kiln, the contained gypsum in many places and particularly on its surface, is converted into a powder-like plaster of Paris, which can only be prepared artificially by baking gypsum. This appearance is most common towards the upper parts of the marl, on which at Kewrah, Mukrach and Nurpur patches of a most singular chocolate-coloured argillaceous rock of a somewhat trappian aspect occur, just at the point where the marl passes by fissile argillaceous beds into the red sandstone. It every where appears broken up into small masses, which sometimes present a scoriaceous aspect, and include a curious radiated mineral not unlike some varieties of Tremolite, nodules of green clay, and nests of talc. The patches of this rock are quite superficial, and do not extend beyond twenty or thirty feet, except in the gorge above the Kemah village, where it seems to form a bed about $1\frac{1}{2}$ feet thick, which may be traced on the West side of the gorge for about 80 yards, when it thins out, passing apparently into argillaceous sandstone, a metamorphosed portion of which it appears to be.

It effervesces slightly with muriatic acid, which dissolves a little peroxide of iron, alumina and carbonate of lime with a trace of magnesia.

In addition to the above indications of the marl having been subjected to a high temperature, we would add the fact that the fissile sandstones resting on the marl are every where rent and shivered into small fragments, which appearance gradually vanishes as we leave the marl. The beds of chert and sinter before noticed as occurring in it, could only have been deposited by thermal waters, silica being only soluble in water (generally alkaline) at a high temperature and under high pressure.

Minerals.

The only two minerals of importance which the red marl yields are rock salt and gypsum. These we shall notice in detail.

Rock Salt.

This valuable mineral, the origin of which is so veiled in obscurity, occurs in the marl apparently in a bed from 150 to 200 feet thick, towards its upper surface, but wherever salt occurs, masses of it of all sizes, which have been detached from the original bed, are found scattered through the marl at various depths.

Three varieties of salt occur, the red, the white and the transparent or glass salt. The former is obtained in greatest quantity, and being tougher and more difficult to reduce to powder than the other two varieties, stands transportation better, and is consequently in greatest demand among the salt merchants.

The mineral in all its varieties is a nearly pure chloride of sodium, the only foreign soluble ingredient it contains being a trace of sulphate of lime. Except when the salt is mixed with marl, it contains no chloride of magnesium, an impurity which generally occurs in rock salt, and the absence of which in that of the Salt Range renders it but slightly deliquescent. The colour of the red salt is not, as might be supposed, derived from a salt of iron or manganese, but is probably of an organic nature.

The salt has every appearance of having been formed by crystallization from a brine solution, in which much marl as mud has at times been mechanically suspended. At the lower and upper limits of the bed, where the deposition of the salt has commenced and ended, it is much mixed with marl, but in its interior this merely forms thin partings in the pure salt, which mark its stratification. As the salt presents more of a crystalline aspect in the interior of the bed, than at either its upper or under surface, we are inclined to think that it has been there formed during a very slow evaporation of the brine solution, which from the absence of mud, must have been in a state of great quiesence. The salt is every where solid, and never presents cavities lined with crystals of salt, which we would expect to find had it been a sublimed product.

The salt bed bears evidence of having been exposed to violent disturbing agency, as it can never be traced for any distance in the

interior of the veins, without observing frequent fractures in it, or partial faults, which are generally filled with coarsely powdered salt, gypsum and marl, produced probably by the fractured ends of the bed rubbing against each other during the process of upheaval, or from subterranean movements subsequent to this.

The mineral has hitherto been mined in a most primitive manner, no alterations or improvements having been introduced, since the annexation of the Punjaub in 1849.

When a spot has been fixed upon, as a promising locality, a tunnel is cut in the marl about five feet high and three and half feet broad, and carried on until salt is reached, the proximity of which is generally indicated, by the marl becoming moist and assuming more the character of a dark red clay. The mineral is then excavated as long as a supply is procurable, no attention being paid to leaving pillars at intervals for the support of the workings, the consequence of which is, that great annoyance is experienced from the falling in of the roof of the mines ; and accidents to the unfortunate miners themselves are of frequent occurrence. Should the shaft have been sunk on, and reached only a mass of salt, after this is worked out, the mine is either abandoned, or a gallery driven to a greater depth into the marl until another large mass is found or the salt bed reached. As this invariably has a strike and dip corresponding to the strata superior to the marl, the stratification of the salt guides the miners in their onward course. Along the bed, the process of working is the same as on the masses, the whole of the good salt being mined without leaving any support for the roof of the workings, there being nothing more than huge caves excavated entirely in the salt, which is seldom or ever worked through, either in the floor or roof of the caves, because as the salt approaches its matrix it becomes intimately mixed with marl, and is highly deliquescent from containing magnesia.

In almost every mine in the Salt Range the evil of having left no pillars for the support of thin roofs, &c. is experienced, and some of the larger and best mines have been in a great degree abandoned, in consequence of their becoming filled up with huge masses of salt, gypsum and marl. As the marl is the lowest rock in the Range, and dips under all the others in a northerly direction at an angle of from

25° to 40°; as might be expected, much trouble is occasioned by the filling of the mines with water when they reach to any great depth. During the rains too, in July, August and September, the water rushes through passages in the marl into the mines, and by detaching large portions of rock render them quite unsafe. In these months, the miners desert the mines; partly on account of their danger, and partly on account of the intense heat and numerous fleas and musquitoes which infest them and their neighbourhood.

In consequence of the irregular way of carrying on the workings, the passages into the various mines exhibit at present a succession of ascents and descents over a series of rude steps, which sometimes become so polished and slippery as to render walking over them a matter of some difficulty.

In extracting the salt, the chief instrument used is a hammer, pick-shaped and hard-tempered at one end, and with a round head at the other. A mass of salt being fixed upon as the scene of operation, a portion is lined off, about two feet thick, and along this a groove is cut with the sharp pointed hammer to the depth of some eight or ten inches. Larger sharp pointed hammers as wedges are then introduced at intervals along this line and on their broad heads a series of sharp blows are inflicted. This generally detaches a block of salt, which is then broken up into lumps of a size convenient for being carried out of the mines. The amount of waste resulting from the above method of working is something immense, and as powdered salt is not saleable as long as lumps can be had, it is generally shovelled into the bottom of the workings where frequently there is a deep brine pool ready to receive it.

Instead of making a deep groove along the limits of the mass, it is desired to detach, (we believe the object could be equally well attained by adopting the plan used in the granite quarries of Scotland, and which is as simple as it is effective.) Small holes three or four inches long, two inches broad and four inches deep are picked out at intervals of eight or ten inches in the mass which it is desired to split. Into these holes truncated iron wedges are introduced. Each of these are in succession driven into the holes and continue to receive sharp blows till the mass splits, which is at once known by the elasticity of the stone causing the wedges to jump out of their

holes. A lever is then inserted into the crack and the divided portions separated. Were this process introduced in the mining of the salt, we are satisfied that a considerable saving to Government would be effected. On account of the dangerous state of the roots of nearly all the mines, gunpowder is seldom used, and hence all the work is done by the pick and hammer.

The mines are generally very faintly lighted by small oil lamps made generally out of bits of salt, the glimmer from which reflected from the sparkling salt and salt-encrusted bodies of the workmen has a most singular effect. From the want of circulation of air in most of the mines and the dampness of the atmosphere, the heat is most oppressive, and from the filthy habits of the miners, the stench in some of the mines is quite overpowering. In the month of December when the temperature of the external air was 71° in the Buggie Mine at Keurah, the thermometer indicated a temperature of 81°.

Men, women and children indiscriminately pursue the avocation of salt miners. Families generally work together, the mother and children being chiefly occupied in carrying on their backs the masses of salt from the workings to the mouth of the mine, which the father has quarried. Like miners generally, they are a somewhat discontented set, and strifes among them are by no means uncommon.

The pay of the miners varies a good deal. At Keurah, Mukrach and Vurcha, salt is turned out at the mouth of the mines at the rate of Rs. 3-12 per 100 maunds (£0 7*s.* 6*d.* for 8,000 lbs.) at Surdee they receive Rs. 2-8 (£0 5*s.* 0*d.*) while at Kalibay where the salt occurs in enormous masses which crop out on the surface of the marl, and which have only to be broken up and removed, they receive Rs. 2-14 for quarrying it, and Rs. 1-5 per 100 maunds for conveying it to the depôt at Marree. The above rates include the expense of oil, instruments, &c., all of which are supplied by the miners themselves.

The quantity of salt that can be turned out in a day by a good workman is about 10 maunds (800 lbs.) which at the present rate of Rs. 2-8 per 100 maunds would give the miner 4 As. or 6 pence. Where, however, a family work together, the father and perhaps one of the sons mining while the mother and children remove the salt, their earnings amount to something considerable.

The general appearance of the miners varies greatly. At the end of the hot season they appear very sickly and sallow, but towards the close of the cold weather they do not appear to us to have a more unhealthy aspect than the inhabitants of towns in the Punjaub generally have.

They however suffer a good deal from sickness; but this is probably more owing to the position in which their villages are placed, and to their filthy habits than to their trade. Certain diseases such as ophthalmia and pulmonary complaints are very prevalent among them, and doubtless result from the injurious effect of the finely powdered salt acting as an irritant on the mucous membranes. Fever is very prevalent among the miners at Keurah, where, perhaps from the confined position of their village, they look far more sickly than at most of the other mines.

Goitre is a frequent complaint, but particularly so at Kalibagh, where every one seems more or less affected by the disease. This the natives ascribe to the Indus water which is generally of a milky colour from fine calcareous mud mechanically suspended in it, and which the addition of a little alum speedily removes.

Dracunculus or guinea-worm is also very prevalent, but is by no means peculiar to the Salt Range, being a common complaint all through the Punjaub among the natives, whenever they are dependent on tanks for their supply of water.

As a general rule it may be observed, that where the supply of water to a village is obtained from a kutcha (mud) tank, out of which men and cattle drink indiscriminately, a circumstance, from necessity, by no means uncommon, there guinea-worm will prevail, while in villages supplied by running streams, the disease will be unknown.

During the Seikh rule, salt was mined at almost every spot where it cropped out, but to prevent smuggling most of the mines have been shut up since the annexation of the Punjaub, salt being now only extracted at Keurah, Mukrach, Surdee, Chooa, Vurcha and Kalibagh. At all these places there are regular salt depôts, and there only can merchants procure a supply at the rate of Rs. 2 per maund (£0 4*s.* 0*d.* for 80 lbs.) For whatever quantity they may purchase they receive a permit, and should an ounce more than this indicates,

be found in their custody, confiscation of the salt, and of the mules, bullocks or camels on which it is loaded, is the punishment awarded.

To prevent smuggling wherever salt occurs in the marl or is supposed to, from the occurrence of strong brine springs, a guard is posted, and the villagers are not allowed to take away even for their cattle the saline efflorescence on the sides of the numerous brine streams, which issue from the range or even a pitcherful of the brine itself. As only the very poorest class of natives would think of using the dirty salt on the sides of the streams, or of evaporating the brine in order to obtain a small supply, this proscription falls very hard upon them, and they cannot understand why they may not as well avail themselves of the kullur or kourah pani as allow it to be wasted.

Of all the mines in the Salt Range those at Keurah near Pind Dadun Khan, yield the largest amount of salt, and those of Chooa, Vurcha the least. The annexed table, the materials for the construction of which we are indebted to W. Wright, Esq., Collector of Salt Customs in Punjaub, shows the quantity of salt extracted from the mines at each of the different salt stations or depôts during the commercial years, 1850 and 1851, with the amount of revenue realized by its sale.

	1850.			1851.		
	Maunds.	Seers.	Chittacks.	Maunds.	Seers.	Chittacks.
Keurah mines, ...	4,63,440	14	2½	3,84,242	19	11
Mukrach ditto,.....	1,46,525	5	0	1,31,773	23	6
Surdee ditto,.....	42,505	20	0	19,628	31	4
Chooa, Vurcha ditto, ...	36 385	2	8	39,699	26	0
Kalibagh, ...	79,747	23	2	65,274	7	6
Grand Total,.....	7,68,603	24	12½	6,40,618	27	11
	Rs.	A.	P.	Rs.	A.	A.
Revenue yielded at the rate of Co.'s Rs. 2 per maund of 40 seers, ...	15,37,400	1	7	12,81,295	14	10

The introduction of a scientific system of mining a mineral which yields so large an amount of revenue to Government is of such vast importance that we cannot close our remarks on the salt deposit, without urging the necessity of securing the services of a practical miner, who from extensive experience acquired under-ground in some of the large salt mines of England or the Continent, is thoroughly capable of introducing and carrying out the improvements required. Under his guidance, the mineral should be extracted, shafts sunk, and the whole interior economy of the mines regulated.

The operations now in progress with a view to run a tunnel into the Sugaswalla mine at Keurah, which from the efforts of the former primitive way of working it, is almost entirely blocked up, are, we trust, only the commencement of a series of reforms, which if carried out with vigour by duly qualified superintendents, are certain to be followed by the best results. It will probably, however, be found more economical and satisfactory to sink entirely new mines through the marl into the salt bed, than to attempt radical changes in mines that have been long worked, and had their roofs extensively undermined by the indiscriminate excavation of salt. The waste in working the salt is now so great, that we are convinced with a little care and the introduction of an improved system of mining a large amount might annually be saved to Government. It is not enough to say that because the supply of salt is so abundant, there is no necessity for changing the method of mining that has been adopted from time immemorial.* The supply of salt is undoubtedly large, but as there is such a deal of difficulty, nay impossibility, in the present workings of obtaining accurate information as to its extent or thickness, we conceive it is the duty and interest of an enlighten-

* We have been quite unable to obtain any accurate information as to the period when the salt mines were first opened. The natives assert it was during the reign of the Emperor Akbar (whose accession dates from 1556) to whom the existence of salt in the Salt Range was disclosed by one Asp Khan, on condition of his receiving, as a reward, during his life time, a sum equal to the amount of the wages of the miners employed in extracting it. During Akbar's reign, it is a matter of history, that Lahore salt sold at the rate of about six annas a maund. In the Kohat district at the present time it may be brought for use Trans-Indus at four annas a maund !

ed Government to economize the mineral as much as possible. The powdered and inferior salt now wasted in the mines, might all be saved by dissolving it in water in deep tanks. In these all mud and mechanical impurities would rapidly subside, and on the brine solution becoming clear, it might be run off and evaporated by the heat of the sun in other shallow tanks or by passing the brine through mattings exposed to the sun and air, on which it would rapidly crystallize. In the Austrian mines, the brine obtained from impure salt is dried up in large evaporating houses, but as in this country the heat of the sun would serve instead of fuel, the expense would be but trifling and a large quantity obtained of a salt which for many purposes would be preferable to rock salt.

By economizing also the numerous brine springs and streams which issue from the Salt Range a large supply of an inferior salt could be obtained, and which if sold at a cheap rate, would, we believe, be extensively purchased by the natives, for agricultural purposes.

A large quantity also of an impure salt (a mixture of chloride of sodium and sulphate of soda) might be collected from the banks of the Kullur Kuhar and Sumoondur salt lakes,* which is now utterly useless, the natives on their banks not being even allowed to remove it to give their cattle.

Gypsum.

Gypsum occurs in the marl in a manner similar to the salt, irregular beds and huge masses being scattered through it, wherever it occurs in beds it is much cracked, the fissures being filled with red marl or a bluish clay. Beds of it seem to be both above and below the salt. In some localities the strata of gypsum are remarkably bent and contorted, as if they had been subjected to violent, lateral pressure, previous to their being shattered and upheaved. The mineral is for the most part of a light grey colour with a shade of blue, and translucent on the edges. It has a saccharine appearance, but masses in which a coarse crystalline structure prevails are by no

* The water of this lake has a Sp. Gr. of 1.02 five hundred (500) grains evaporated to dryness yielded 14.97 grains of saline matter consisting of sulphate of soda and chlorides of sodium and magnesium with a trace of chloride of calcium.

means uncommon. Red varieties also occur and beds of a dark grey earthy gypsum are generally associated with the saccharine kind.

It is a nearly pure sulphate of lime and appears to be free of any admixture of carbonate of lime.

When calcined it yields a pure plaster of Paris, which sets rapidly when mixed with water. Gypsums, however, in which carbonate of lime is absent, form, when calcined, a less coherent cement than those where it occurs to the extent of 10 or 12 per cent. By a due admixture therefore of quick lime with the calcined Salt Range gypsum, its hardness as a cement or mortar will probably be increased.

The natives do not appear to be aware of the properties of gypsum when calcined, though they use it in fine powder mixed up with pure lime into a mortar, to produce the shining marbly appearance, so often noticed in their finer chunam work.

In the department of public works, the use of gypsum might be successfully introduced for various building purposes, and a supply to any extent might be procured from around Pind Dadun Khan.

In the gypsum of Maree and Kalibagh and also at Surdee, very perfect rock crystals occur generally in the form of six-sided prisms terminated by six-sided pyramids. After rain these spangle in a most striking manner, and hence have acquired the name of Maree diamonds. Transparent, red and milky varieties occur, the former being the most abundant. The longer and more perfect crystals are much esteemed by the natives, who manufacture them into necklaces.

Very perfect crystals of iron pyrites also occur in gypsum in the Keila Wan above the village of Khond, from beds, of which a sulphur spring issues at a natural temperature, depositing sulphur on the gypsum over which it flows.

In proceeding along the Salt Range from E. to W., the first indications of salt marl occur in the S. E. or scarped side of mount Tillah, where it is very indistinct, being in great part concealed by Tertiary sands and clays. From the West end of mount Tillah it may be traced along the foot of the scarped or West side of the Chumbul ridge to Jelalpore where it is considerably developed, but in the midst of such great disturbance that its relative position can with difficulty be made out. To the West of Jelalpore there is no distinct outcrop of the marl seen along the escarpment of the Range under

the red sandstone until we reach Jutana, where it occurs in great quantity and includes large stratified masses apparently of salt, along with broken up beds of gypsum. No salt is seen in the marl East of Jutana, though wherever it appears, its surface is covered with a saline efflorescence, and all the springs which issue from it yield a strong brine.

From this point it may be uninterruptedly traced to Pind Dadun Khan, in the neighbourhood of which it yields a very large amount of salt, and from thence with but a few breaks on to the Gredi Hills near Moosakhail, between which place and Booreekhail it is not seen. Here it again crops out and yields salt, and may be traced westward for some two or three miles into a ravine, which separates the Lukrukkie from the Majooch Hills. It then disappears and does not again, as far as we are aware, crop out, till near Maree on the Indus, where it forms an isolated ridge overhanging the river, along the right bank of which above the town of Kalibagh it is extensively developed, the salt appearing in immense stratified masses in the marl. Except for a few miles up to the Loon Nullah, which enters the Indus opposite Maree, we have not traced the marl northward, but probably the same formation yields the salt obtained at the mines in the Kohat district, which from the repeated attacks of the hill tribes have gained considerable notoriety.

At Maree and Kalibagh, the marl appears to have been subjected to great disturbance, and the red sandstone strata, which in other localities are immediately superior to it, seem to be wanting entirely. At Maree a few Tertiary sandstone strata, may be seen dipping as it were under the marl, and on the Kalibagh hill it seems entirely covered by Tertiary conglomerates and sandstones. As there is distinct evidence of a great upheaval and fracture of the rocks at Kalibagh, it is not surprising that the salt marl should appear to have suffered in the general disturbance, and to have as it were been forced up through the rocks, which in the regular order of things intervene between the Tertiary strata and the marl.

Its relation to the Tertiary rocks might induce the supposition, that at Kalibagh the marl was of Tertiary age, but its general appearance and mineral character are identical with the rock to the eastward, and leave no room to doubt that it is of the same age.

Besides the general outcrop of marl along the escarpment of the Range, we have noticed it under the red sandstone on the N. W., on the scarped side of mount Kuringali, the path between the villages of Chumbi and Vevhalee passing over it. Here no salt was observed, but the marl contains abundance of gypsum, and its surface is incrusted with the usual saline efflorescence. At the west end of the salt lake of Kullur Kuhar, the marl also occurs in small quantity, appearing to have been forced up through the rocks immediately superior to it, and to be brought into contact with nummulite limestone by which it is covered.

At Vusual to the north of Noorpoor we believe the salt marl with salt occurs in a deep ravine, but as we were not aware of the fact when in its neighbourhood, we never visited the locality. This, as far as we know, is the only spot where salt has been found on the north side of the Salt Range.

b. Lower Red Sandstone and Grit with Conglomerate.

Wherever the salt marl is seen at the base of an escarpment, its upper portion may be observed gradually to lose its brick-red colour, to become more like an indurated clay, and ultimately to pass into thin beds of dark red, fissile, argillaceous sandstone, which in some places alternates with thin beds of gypsum and salt, and with green and chocolate-coloured clays.

This sandstone gradually loses its argillaceous character, its beds become thicker, its colour lighter and, by its constituents becoming coarser, passes frequently into a grit. Conglomerate bands chiefly formed of boulders of primitive rocks of moderate size, among which the prevalence of a red coarse-grained syenite is very remarkable, occur frequently, and present exactly the characters of the old red sandstone conglomerate of Britain.

The sandstone generally, but especially its lower beds, where they approach the marl, is highly hygrometric, and frequently presents on its surface a saline incrustation.

It does not disintegrate in muriatic acid, but a portion dissolves with effervescence, the solution yielding to the usual tests, abundant indications of carbonate of lime and carbonate of magnesia.

The ease with which this sandstone can be quarried is a strong

recommendation in its favour, though from its liability to become damp in moist weather, owing to its being impregnated with salt, it rapidly crumbles, and hence cannot be recommended as a durable building stone. If ever required for the purpose, the lighter coloured portions of the rock should invariably be selected, as they are less hygrometric than the darker variety.

No minerals of importance have been observed in this rock.

Although the most careful search was made, particularly in the lighter-coloured beds where fossils are most likely to be found, not a trace of an organic remain could be detected: when we bear in mind the fact that only a few years ago, the old red sandstone of Britain was regarded, "as the least fossiliferous rock in the geologic scale," our want of success in obtaining fossils from its Punjab representative, will not appear remarkable.

The thickness of this formation varies a good deal throughout the Range, and probably on an average is not less than 500 feet. The upper surface of the beds frequently present ripple markings, indicative of their having been deposited in shallow water.

c. Greenish micaceous Sandstones and Shales with grey Dolomitic Sandstone.

The red sandstone is generally succeeded by a series of greenish micaceous thinly laminated sandstones, dark shales and coarse calcareous bands, which in the eastern part of the Range are developed into an extensive deposit of a very peculiar sandstone, varying from nearly white to dark grey and weathering of a fawn colour. In many localities it is brecciated, the fragments having become recemented by a calcareous paste. A concretionary structure is by no means uncommon, masses of the rock appearing to be sometimes made up of nodules formed of concentric laminæ like the coats of an onion. Its lower beds are generally dark-coloured and parted by bands of micaceous sandstones and shales; brine springs not unfrequently issue from these and their impregnation with magnesia is evinced by the effervescence of sulphate of magnesia in fine acicular crystals, which may be often observed under the ridges of rock. When tolerably well developed, the united thickness of this formation must be about 500 feet.

The grey sandstone when treated with muriatic acid, dissolves slowly with effervescence, leaving a considerable residue of a nearly white silicious sand. On filtering this from the acid solution and applying to it the usual tests, lime and magnesia were found in abundance with a trace of protoxide of iron and alumina. The rock under notice is therefore a sandstone, the cementing agents being carbonate of lime and magnesia. Sometimes the two latter largely predominate, and give the sandstone more of the character of a coarse limestone. In a few of its beds, the cementing ingredient seems to be entirely carbonate of lime, and the examination of a specimen from one of these bands obtained at Baghanwala in 1848, which did not yield a trace of magnesia, led us to believe that this earth was not characteristic of the formation, which its appearance induced us to suspect.

A specimen of this sandstone from Mount Tillah yielded on analysis, the following results in 100 parts.

White quartz sand,	28.000
Carbonate of iron with a trace of alumina,	7.313
Carbonate of lime,	32.874
Carbonate of magnesia,	31.199
Loss,	.614
Total,	100.000

This sandstone or coarse magnesian limestone will, we are assured, be found to be most excellent and durable building stone, and it is much to be regretted, that it was not selected for the construction of the obelisk in the Chillianwalla burial-ground, the red sandstone of Pind Dadun Khan having been preferred. Though rather hard, it is easily worked, and when roughly polished, is highly ornamental from its possessing a semi-crystalline structure.

It may be had in abundance on mount Tillah, the summit of which it forms, and all along the Salt Range from Jelalpur to Mukrach, to the West of which place it gradually thins out in the micaceous green sandstone.

Like most calcarious rocks, it is liable to be acted on by water charged with carbonic acid, and hence along the upper weathered

surface of its beds, it is grooved and channeled in a most peculiar way by the rain water, which passing through the vegetation, acquires carbonic acid in considerable quantity, and becomes a most powerful natural solvent of lime and magnesia.

The only mineral which we have observed in this formation deserving of notice is galena or sulphuret of lead.

This occurs in the dolomitic sandstone, forming the summit of mount Kuringali, and in the same rock in a ravine near the temple on the right side of the Keurah gorge above Pind Dádun Khan. In these localities small cubical crystals are found scattered throughout the rock, but in very small quantity, and no where are there indications of a vein of any consequence. It is in great request among the natives as a cosmetic, to whom it is known by the name of Soorma.

Obscure carbonaceous markings are of frequent occurrence among the green micaceous sandstones, but too indistinct to be identified. They probably are the remains of fuci. In the dolomitic sandstone, no traces of organisms of any kind were detected.

d. Upper, red, variegated Sandstones, Grits, Conglomerates and Clays.

The dolomitic sandstone last described is succeeded by a series of dark red shales, argillaceous sandstones, including nodules of green clay, and quartzose grits with bands of conglomerates of primitive rocks, among which the same red syenite as occurs in the lower red sandstone is most abundant.

These beds are highly charged with peroxide of iron which gives them a blood-red colour, and magnesia may be detected in all the sandstones, grits, and conglomerates of the group in considerable abundance. All the sandstones are extensively ripple-marked, and along the water courses which intersect the beds, present on their surface a saline efflorescence.

Between Jelalpore and Pind Dádun Khan, they are largely developed, while towards the Indus they seem to be in a great measure replaced by a series of red, green, purple and chocolate-coloured shales which weather into clays, and from yielding small concretionary masses of copper ore, present considerable interest. These are invariably superior to the sandstone grits and conglomerates. Thin beds of white quartzose grit occasionally traverse the shales, and

beds of a coarse silicious sinter containing in some places particles of chalcedony are of frequent occurrence. Throughout the shales selenite or transparent gypsum may be noticed in laminæ and crystals, and in small impure concretions of radiating crystals, associated with similar nodular concretions of impure sulphate of barytes and argillaceous hæmatite. These along with the silicious sinter, have probably been deposited by thermal waters penetrating the shales, the variegated colours of which, may probably result from their having been exposed to different degrees of heat during the prevalence of thermal action. Such coloured clays are, we believe, of frequent occurrence in countries where thermal action is prevalent.

On tracing the shales upwards they gradually become arenaceous and acquire a greenish colour. A few dark shales then follow and mark the transition into the formation which succeeds.

Copper Ore.

The existence of copper ore in the Salt Range was first made public by Capt. Hollings, Deputy Commissioner of Leïa. It occurs chiefly in the form of nodular concretions, varying in size from a millet seed to that of a walnut, disseminated through the variegated shales and clays resulting from their disintegration, on the surface of which, particularly after rain, their green colour brings them prominently into view. Small green patches of silicate and carbonate of copper may also be observed in masses of the silicious sinter, which we before mentioned as occurring in the shales. The origin of this concretion is most obscure, but it is probable that the particles of copper in solution in thermal waters were diffused through the shales, and that by a process of crystallization they have aggregated into the form we now find them. Their resemblance to the nodular concretions of kuñkur found every where in the desert alluvial soil throughout the Punjab, induces us to believe that they were formed in a similar way. So complete, however, has been the separation of the particles of copper from the shales in which they are found, that not a trace of copper can be detected in them on submitting small portions to chemical analysis.

The nodules of copper ore are occasionally very pure, but frequently it forms only the centre of the nodular concretionary masses of sulphate of lime and barytes, which we have above alluded to.

No indications of the existence of a vein of ore have been obtained either in the shales or in any rock, superior or inferior to them. In the thin beds of coarse white quartzose grit which occur in the shales, disseminated grains of carbonate and silicate of copper are occasionally to be noticed, but in small quantity.

The ore is for the most part copper glance or sulphuret of copper, one of the richest and most easily smelted ores. Its surface is generally covered with copper, as the result of the action of air and moisture; indeed in a large number of the nodules, the copper glance can only be detected in their centre—their circumference being converted into carbonate of copper.

The purer and undecomposed nodules present on fracture a dark leaden-colour, and are sectile. Particles of the ore heated before the blow pipe on charcoal yield a button of metallic copper.

A pure specimen yielded, on analysis, the following results in 100 parts.

Copper,	75.830
Sulphuret of Soda,	3.155
Sulphur,	21.
Peroxide of iron and alluminæ,	.015
Total,...	100.000

The above analysis shows a much larger percentage of copper, than the concretions usually contain. This from a series of experiments, we believe, to vary from 12 to 20 per cent.

The quantity of ore seems insignificant, and is only interesting in a minerological point of view. After heavy rain, which disintegrates large quantities of shale, and leaves the green copper concretions exposed to view, a man may, in some localities, collect in the course of a day about an ounce of ore. It seems to be more abundant in some localities than in others. The Nulee hill above Kuttha yielding we believe the largest quantity. We have detected it in almost every deep ravine between Bayaar East of Moosakhail and Kuttha, a distance of not less than forty miles, within which limits the variegated shales are principally developed.

The only indications of organisms we have detected in this formation are confined to the dark red, schistose sandstones and upper

arenaceous shales. They are most indistinct and are probably the remains of Fucoids.

The rocks we have described under the term Devonian, form in thickness and extent, perhaps the most striking feature in the geology of the Salt Range, appearing in its steep escarpment subordinate to all the rocks hereafter to be noticed, and in the numerous ravines which intersect it.

On proceeding westward from Rhotas, they first emerge from under the miocene sandstones on the East flank of mount Tillah, the great mass of which they form, all the subdivisions of the series being duly represented in this mountain (see section No. 4) with the exception of the copper shales. From its West end they may be traced across the Poonah Nullah into the Chumbul Range, where they are flanked to the East by the miocene sandstones of the Imapore hills. On the Gurjah hill above Jelalpore, they are extensively exposed, and form the mass of the Range on to Baghanwalla, where the upper red sandstones attain their greatest thickness. From this point they stretch North for several miles, dipping under the tableland of Besharut and rising up again to form the summit and scarped northern face of mount Kuringali and Drengum, from where they may be traced into Diljubba, where they are for the most part concealed by the extensive Tertiary strata which stretch East to Buknala.

From Baghanwalla westward the Devonian rocks can be traced uninterruptedly. Around Kuttha the copper shales first appear, and seem in a great degree to take the place of the upper dark red sandstones, which can scarcely be recognized between that locality and Moosakhail, except in the neighbourhood of Chideru, where thick beds of them occur subordinate to the shales. From Moosakhail on to the Indus, the Devonian formations above the salt marl seem to amalgamate, and the divisions which are so distinctly marked in the East part of the Range can with difficulty be made out, the thickness of the whole gradually diminishing. They disappear altogether around Maree and Kalibagh.

In the Chichalee Range of hills on the West bank of the Indus below Kalibagh no Devonian rocks crop out, but at the North or up-

per end of the Kaffee Kote Range near the village of Bahadur Dak a series of red and grey saliferous sandstones appear for a short distance under carboniferous limestone. Numerous brine springs issue from these, which are doubtless the equivalent of the Devonian rocks East of the Indus.

Primary or Palæozoic Carboniferous Rocks.

Succeeding the formations last described are a series of limestones and sandstones which, from the abundance of marine organic remains they contain, furnish to the geologist a most invaluable aid in determining the age of various rocks inferior to them.

During the very partial examination of the Salt Range, which by orders of Government we made in the month of April 1848, we detected at Moosakhail on our return to Lahore from Kalibagh a developement of calcareous strata, which in our report we stated to be evidently superior in geological position to the salt marl. In a few hours devoted to the examination of this locality, a small collection of fossils was obtained, which were sent to England in order, if possible, to have them identified.

Through the kindness of Sir Roderick Murchison we effected this, and were informed by that distinguished geologist that, the Moosakhail fossils seemed identical with carboniferous forms well known in the British isles.

M. de Verneuil to whom my collection was submitted, identified 5 out of 8 or 9 species with forms well known in rocks of carboniferous age in other parts of the world.

The circumstance of our having detected what we took for belemnites and ammonites associated with genera characteristic of palæozoic formations, and misled by the idea entertained by geologists until very recently, that salt deposits were confined to Triassic or more recent rocks, we had great difficulty in bringing ourselves to believe that the Salt Range salt could possibly belong to a formation older than the Trias. The recent announcement, however, of the fact, that in North America the great salt sources issue from the heart of palæozoic rocks, and that in Russia the salt lies chiefly in the uppermost palæozoic deposit, and also in the Devonian sandstone, immediately removed all doubts from our minds as to the true age

of that of the Salt Range, as well as of the calcareous strata of Moosakhail.

The rocks included under the term carboniferous present in the Salt Range three divisions, which we shall proceed to notice.

A lower limestone, calcareous sandstone, and shales.

The lower beds of this deposit, when they rest on the Devonian rocks, generally present the characters of a calcareous sandstone of a light grey colour. This gradually passes into a limestone of a very compact and generally crystalline character, varying from a light flesh colour to dark grey, some varieties being nearly black. The beds of this rock, in which occur irregular shaped masses of hornstone, sometimes closely approaching to flint, are frequently parted by thin bands of arenaceous shales. There are frequently a mass of corals and corallines mixed up with shells. The limestones generally abound in encrinites and large brachiopodous Mollusca, and in many localities seem to be composed entirely of the disjointed stems of the former. Their fractured surface presents generally a highly crystalline aspect from the encrinite whorls being converted into calcareous spar.

Although generally a purely calcareous formation, in some localities, especially towards the Indus and in the Chichalee hills, it seems to become magnesian and to alter considerably in general appearance. Wherever magnesia prevails, the limestone assumes a cherty aspect, the strata are much disturbed, and frequently shivered, fossils become very scarce, and the same brecciated appearance as is noticed in the Devonian Dolomitic sandstone is very common. The occurrence of magnesia in the limestone is very local, and the same bed may be observed purely calcareous and full of fossils at one point, while half a mile beyond, it is charged with magnesia and scarcely a fossil to be found in it. Although the transition from a calcareous rock to a magnesian one is generally noticed along the strike of the beds, the same change may be observed in some localities extending in a vertical direction; such phenomena have been observed by Sir Roderick Murchison in the Alps, and it has been supposed that the magnesia, subsequently to the formation of such limestones, has been injected into them, and produced a metamorphosis. The absence of fossils too amidst the magnesian limestones has been

accounted for, by supposing that the mineral acid in union with which the magnesia has been introduced, has in accordance with the known laws of chemical attraction, combined with the calcareous matter of the fossils, and caused their disappearance. A similar theory to account for local deposits of gypsum in the midst of calcareous strata has also been propounded, viz. that vapours of sulphuric acid generated during the prevalence of igneous action, have been injected into limestones, and converted the carbonate into sulphate of lime. The origin of the Salt Range gypsum cannot, however, we conceive, be explained in this way; for if sulphuric acid vapours permeated the marl, they would in all probability have produced partial decomposition of the salt into sulphate of soda, an impurity not to be found in the mineral. The almost entire absence too of carbonate of lime from the gypsum, strengthens the belief that it was originally deposited as such.

On tracing the limestone upwards, its beds become thinner and less crystalline, and alternate with thin beds of dark magnesian micaceous sandstones and shales. At the upper limit of these in the central part of the Range and Chichalee Hills as well as at Kaffir Kote, a few thin beds of a compact slaty limestone generally of a dark grey colour occur, and seem to mark the transition into the next division.

b. Grey Sandstone and Shales.

The beds forming this series consist of micaceous fine grained fissile sandstones alternating with beds of dark bituminous shales. Towards their upper limits the sandstones become more compact and of a reddish colour, alternating frequently with beds of slaty limestone similar to those forming the top beds of the division of the series last described. In the upper compact sandstones, ripple markings are common, and in the Bukh Ravine above Moosakhail we detected a most distinct exhibition of markings similar to those produced by rain or hail falling on sand or mud, when in a wet or pasty state. These occur on the upper surface on a bed of sandstone, and were traced along its strike for a considerable distance. The bed dips under other beds of a similar sandstone which present

ripple markings on their surface, and hence we may safely conclude that it has been formed on a beach on which water has ebbed and flowed.

Rain-drop-markings similar to the above, have been noticed by Sir Charles Lyell in the states of Massachusetts and Connecticut in red sandstone of Triassic age.

In all the shales and in most of the sandstones of this series, magnesia prevails, and hence but few fossils occur, those that we have observed being confined to argillaceous sandstones in the immediate neighbourhood of calcareous beds, which are generally free of magnesia impregnation.

c. Upper Limestone.

The two preceding divisions of the carboniferous series are very distinctly marked wherever it is extensively developed, but east of the Indus there are few localities where the upper limestone is well seen. It forms the summit of the Zinnanee Hill above Chederos (see table No. 8) which is upwards of 1,900 feet above the plain. Here, in mineral character, it is undistinguishable from the more crystalline varieties of the lower limestone, and abounds in encrinites and brachiopoda. About ten miles further west in the Bukhh Ravine which intersects the Salt Range between Nummaal and Moosakhail a grey limestone of a hard and cherty character occurs in a similar position, but, as far as we are aware, devoid of fossils. Its lower beds assume the character of a very fine grained sandstone, and rest on a yellow argillaceous limestone of very fine grain, similar to some lithographic limestones. This limestone dissolves in acid with the separation of a considerable quantity of yellow mud, and its solution yields indication of the presence of a small quantity of magnesia: a few indistinct indications of fish scales were noticed in it.

On the Zinnanee Hill, the upper limestone is purely calcareous, and dissolves rapidly in muriatic acid, with the separation of a very small quantity of yellow mud. That of the Bukhh Ravine, however, dissolves slowly, and in its solution magnesia may be detected by the usual tests.

On analysis it yields in 100 parts:

Silica,	4.000
Carbonate of Lime,	69.200
Ditto of Magnesia,	25.809
Alumina with a little Peroxide of Iron,	.100
Organic Matter and Loss,	.891
Total,	100.000

The lower fine-grained sandstone on which the above limestone rests, yields on analysis as follows:

Silicious Quartz Sand,	36.000
Carbonate of Lime,	47.870
Ditto of Magnesia,	14.800
Alumina and Peroxide of Iron,	1.200
Organic Matter and Loss,	.130
Total,	100.000

On the west bank of the Indus in the Chichalee Hills, the upper limestone is far more distinct than on its east bank; and is generally cherty and magnesian, and much shivered and brecciated. In the Kaffir Kote Range, a highly bituminous sandstone of a dirty brown colour, appears to be its representative, from which large quantities of petroleum issue, this being probably derived from the spontaneous combustion of dark bituminous shales charged with pyrites, on which the sandstone rests, and which form the upper member of the middle carboniferous series.

Throughout the carboniferous rocks we have described, there appears no indication of true coal measures, which in Britain are invariably associated with the carboniferous or mountain limestone. The latter, in the south of England, forms the base of the coal formation, while in the Scotch coal fields thick seams of coal alternate with beds of carboniferous limestone and intercalated with limestone and sandstone beds of fresh-water origin. In the Salt Range, however, no fresh-water beds have been observed in the carboniferous series.

The limestones or marbles of this formation can be strongly recommended as highly ornamental and durable building stones.

The compact flesh-coloured and nearly black varieties are perhaps to be preferred, as weathering more uniformly than those which are more crystalline. They take a fine polish, and may be obtained in blocks of any size. Vurcha would be a covenient locality for obtaining the flesh-coloured stone, while in the Nursing Wan near Kuttha, the black variety could easily be procured. The flesh-coloured limestone forms the gateway of the ancient fort of Kaffir Kote, where it seems to have resisted the action of the atmosphere in a most remarkable degree, the blocks being as fresh as the day they were quarried.

As a source of lime, all the limestones of this formation are very valuable. The yellow argillaceous limestone mentioned as occurring in the Bukhh Ravine, is, we believe, well adapted for lithographic purposes, and shales of considerable size might with ease be obtained.

Petroleum, in the carboniferous formation, has been noticed only in the Algud Ravine at Kaffir Kote, where it exudes in considerable quantity from the upper brown bituminous sandstone, which is highly charged with it; where springs issue from the sandstone in the small ravines which intersect its beds, large holes are dug which rapidly fill with water mixed with Petroleum. This from its lighter specific gravity rises to the surface and forms a scum, by passing bunches of grass through which, the Petroleum or Salira as it is called, adheres, and is removed into gurrahs or earthen vessels placed for its reception.

Notwithstanding its most offensive smell, it is burnt by the natives in their lamps. It is also in great demand among the owners of camels, who extol its virtues as an external application to sores and the common cutaneous diseases to which that animal is subject.

Sulphuretted hydrogen springs issue from the carboniferous limestone in several localities. In the Bukhh Ravine one issuing from the upper limestone indicated a temperature of 94° when the air was 71° in the month of February. The water on escaping from the rock, deposits sulphur, and gives a copious black precipitate with a solution of acetate of lead.

Fossils are very numerous throughout the formation.

The lower beds abound in Brachiopodous molluscæ, crinoideæ,

corals, and corallines; of Brachiopoda shells, the genera Producta, Orthis, Spirifer and Terebratula are most abundant. Along with the Brachiopoda we have obtained one or two Gasteropoda, but these are generally scarce.

In several localities we have found large spines of a species of Cidaris, some of these being very perfect and tuberculated, the articulating end of the spine being well preserved.

Though this is the case, the shell of the animal occurs but rarely, and only, as far as we have observed, in comminuted fragments.

The abundance of crinoideæ is very remarkable, whole beds of rock being built up of encrinites, the whorls of which are frequently of large size, and occasionally are found in connection with their lily head.

Towards the upper part of the lower division of the series, where the limestone becomes argillaceous and thin-bedded and alternates with coarse arenaceous shales, the Brachiopoda become scarce and give place to Cephalopoda, which animals characterize a marine zone of less depth than the Brachiopoda which precede them, and generally occur in seas with muddy bottoms. We have obtained examples of species of the genera Bellerophon, Goniatites (?) and Orthoceras. Associated with these large spiral univalves of the genus Cirrus and Enomphalus are abundant, and, in the slaty limestone at the top of the lower division of the carboniferous series, and also in the middle division, a Cephalopodous shell formerly considered an ammonite, but now constituted into the genus Ceratitis abounds, and is generally associated with a small bivalve, probably a species of Passidonia. As Ceratites have hitherto been considered as characteristic of rocks of triassic age and peculiar to the muschelkalk, their occurrence in company with undoubted carboniferous types is highly interesting. We have placed the matter beyond doubt, having in our possession a specimen* which we obtained at Moosakhail in which two Orthoceratites and seven Ceratites are lying side by side in a slab 9 in. × 5 in.; Orthoceratites have never been found

* Through the kindness of Cavendish Johnson, Esq. Asstt. Surgn. 3rd Regt. N. I. we are enabled to submit a drawing of this most interesting specimen, which we believe to be unique in the annals of Geology.

in strata superior to the carboniferous limestone, but abound throughout the older fossiliferous rocks.

Fossils having a considerable resemblance to belemnites occur in the carboniferous limestone associated with the fossils we have alluded to. What they really are, we are unable to determine; but as a set of specimens were sent home to England in March, at the request of Sir Roderick Murchison, we trust soon to hear the result of his examination of them. The exact determination of their nature is of considerable importance, as there is perhaps not a more established fact in geology than that belemnites are confined to strata which succeed the trias; abounding in the seas, oolite and chalk, after which they disappear from the page of geologic history.

In the same flag limestone in which the Ceratitis occurs, Icthyolite remains were obtained in the shape of small sharp and finely striated teeth covered with a shining brown enamel, small fragments of bone and one or two scales have also been procured, the identification of which as well as of a rather extensive collection of fossils from the Salt Range, cannot be effected in our present position with neither collections nor books of reference available. The whole collection will be sent home to England, where the fossils can be satisfactorily examined.

The following species of shells from the Moosakhail limestone were identified in 1849, by M. de Verueuil.

Producta	Cara. D'Orbigny.
„	costata. Sowerby.
	Flemingii. Sowerby.
Orthis	crenistria. Phill.
Terebratula	Royssii. L'Eveille.

On the above, Sir Roderick Murchison remarks, in a communication addressed to the Geological Society in December 1850, "these fossils have already been known to have an enormous geographical range, the Producta Cara. occurring in Peru, Spitzbergen, northern Europe and the Sierra Morena of Spain, whilst two or three of the other species, have an almost equally extensive distribution."

The carboniferous formation, the thickness of which, when well developed, is probably not less than 1800 feet, is entirely confined

to the central portion and western end of the Salt Range. It first appears at Noorpoor in the Nilawan ravine, where a thin bed of a crystalline grey limestone containing a few Encrinites and Terebratulæ, may be seen resting on purple Devonian shales and covered by a ferruginous claystone which marks the base of the nummulite limestone formation, to be hereafter described. On tracing it westward it gradually increases in thicknsss. Productæ and Spiriferæ appear, and in some places literally swarm. At Kuttha it is extensively developed in the Nursingwan, where high cliffs of it may be seen resting on Devonian rocks.

Between Kuttha and Moosakhail, it perhaps attains its greatest thickness, frequently appearing in scarped precipices and forming the mass of the hills which intervene between the south side of the Salt Range and the Sam-Sekisur valley.

In this district rocks, probably of an oolitic age, appear between the carboniferous ones and the nummulite limestone, and this relation may be observed on to the Indus and in the Chichalee hills.

For a short distance on both sides of the Indus near Maree and Kalibagh, the carboniferous rocks disappear; but at Kooch about four miles North of Kalibagh, they again crop out at the base of the Chichalee range, and may be traced south to near Mulakhail, where they are covered up by the oolitic and tertiary formations.

They again appear on the right bank of the Indus below the village of Bahadur Dak, and constitute the greater part of the Kaffir Kote Range, (washed by the Indus,) beyond the upper part of which we have not traced them. As this Range stretches south and is evidently a branch from the great Soohinan Range, it is probable that the carboniferous rocks occur there also, but the hostility of the hill tribes in its neighbourhood will, we fear, for years to come prevent any attempts to gain a knowledge of its geological structure.

In the Kaffir Kote Range, as far as we have had an opportunity of examining it, the carboniferous rocks are immediately in relation with tertiary sandstones and clays, no nummulite limestone or Oolitic rocks intervening; unless the bituminous brown sandstone, which we now consider the representative of the upper member of the carboniferous series, should turn out to be Oolitic.

Secondary Oolitic Rocks.

a. Yellow, iron-stained, quartzose sandstone, grits and bituminous shales.

Resting on the upper carboniferous rocks and separated from them by a few thin beds of a yellow argillaceous limestone, there occur a series of fissile argillaceous sandstones, and coarse quartzose grits and sandstones, generally of an incoherent character, alternating with beds of black bituminous shales charged with iron pyrites. The prevailing colour of the sandstones is a sickly yellow, derived from impregnation with peroxide of iron. Masses of fossil wood converted into jet are abundant, both in the sandstones and grits. These also in some places occur in the shales, which, where exposed to air and moisture, are in a constant state of decomposition from the oxidation of their contained pyrites. So violent is the action and so great the heat produced, that sometimes the shales undergo spontaneous combustion, and whole beds may be observed either converted, or in process of being so, into a ferruginous claystone of a dark red colour, which occasionally presents a kind of concretionary structure.

In the neighbourhood of these decomposing shales and claystones, the sandstones and grits acquire a whitened and baked appearance, and the masses of jet they contain, are frequently converted into coke.

Where the shales are moist, their surface is generally incrusted with an efflorescence of sulphate of iron and alumina, which strongly impregnate the water of springs which issue from them in some ravines, and which on exposure to the air, deposits on the ground over which it flows a crust of hydrated peroxide of iron. In some of the shale beds in the upper part of the series, a magnesian efflorescence has been noticed, but the sandstones and grits seem altogether free of magnesian impregnation.

The lower argillaceous beds occasionally contain very perfect impressions of the delicate fronds of ferns, converted into black carbonaceous matter. These are doubtless of fresh water origin and, from the fineness of the sand and mud of which they are composed, must have been deposited in still water.

The grits which succeed them and contain masses of jet are also probably of fresh-water origin, but the fact of the latter being found only in masses, which are evidently portions of the trunks and

branches of trees, and invariably in a horizontal position, affords proof that they have been transported from a distance along with the coarse materials forming the grits.

No marine organic remains occur throughout these beds, which are succeeded by others of undoubted marine origin, and differing greatly in mineral character.

b. Cherty thin bedded limestones with shales.

The sandstones, &c. last described gradually acquire calcareous matter, and pass into fine grained limestones of a cherty character, varying in colour from nearly black, to a pale yellow. East of the Indus, these beds are of little thickness and contain very few organic remains.

At Kalibagh and in the Chichalee hills they alternate with yellow calcareous sandstones and dark bituminous shales and attain a thickness of three or four hundred feet in some localities.

Marine organic remains are abundant, particularly in the upper limestones, and some of the intermediate beds are a mass of comminuted shells.

Throughout the Chichalee Range a very singular brown calcareous bed occurs near the bottom of the series, in which small globules of a bright metallic lustre may be observed mixed up with comminuted shells. On treating a fragment of this rock with muriatic acid the calcareous matter rapidly dissolves, leaving the globules in the form of a coarse sand, the particles of which have a highly polished surface, and have all the appearance of being the debris of hypersthene rock.

No distinct oolitic structure prevails throughout the limestones, which differ totally in appearance from those of the carboniferous rocks. Some of them bear a close resemblance to the limestones of the lias formation.

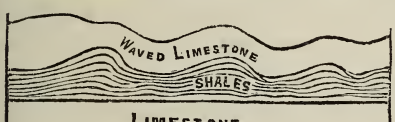
They are hard and splintery and present a conchoidal fracture. When bruised, the darker varieties emit the odour of sulphuretted hydrogen.

They dissolve rapidly in muriatic acid, leaving a considerable sediment of silica in flakes mixed with a little organic matter. They contain a little carbonate of iron with a trace of alumina, but no magnesia when undisturbed. At Kalibagh, however, where large masses of the limestone repose on salt marl, they have a remarkably shivered

appearance, and magnesia may be detected in them in small quantities. A specimen of the limestone of a dark grey colour from Umlakhail in the Chichalee Range yielded on analysis the following results:—

Silica with a little organic matter, ...	3.00
Carbonate of iron with a trace of Alumina, ...	1.70
Carbonate of Lime, ...	95.70
	100.40

At Umlakhail a bed of argillaceous limestone occurs presenting on its upper surface a series of waves passing across the bed at right angles to its strike. These are about $1\frac{1}{2}$ feet apart, and their crest about two inches above the general level of the bed. It presents the appearance represented in the annexed figure. A bed of shale, which occurs beneath it, is, for a short distance, affected in a similar way; but the surface of a limestone bed on which the shale rests, is perfectly horizontal, and does not seem to have suffered in the least from the lateral compression to which the upper bed has been subjected. The force exerted seems to have been nearly sufficient to have fractured the bed, as, along the crests of some of the waves and parallel to these, cracks may be observed extending some depth into the bed, which is not more than two feet thick. It is difficult to imagine how any lateral force could have been applied, so as only to affect one or two beds. The condition of the beds superior to the waved one could not be ascertained, on account of the amount of debris with which they were covered.



c. Green Belemnite, Sandstone and Shales.

In the Salt Range east of the Indus the limestones last noticed are succeeded by a thin bed of yellow quartzose grit, containing a few fragments of jet. At Kalibagh and in the Chichalee Range a series of black bituminous shales succeeded by a dark green somewhat incoherent sandstone intervene, presenting a thickness of four or five hundred feet. The latter is full of pyrites, which rapidly decomposes after rain, sulphurous acid being given off in quantity at times sufficient to be disagreeable.

Small fragments of jet occur in the sandstone, and both in it and the shales, belemnites, and ammonites occur in great abundance. These fossils are of great interest, as enabling us to fix the age of the formation.

All along the Chichalee Range the belemnite shales and sandstone are well developed, and are succeeded by the quartzose grit noticed above, which apparently contains no fossils.

In the oolitic formation there are no building stones of any value; but many of the limestones are valuable as a source of lime.

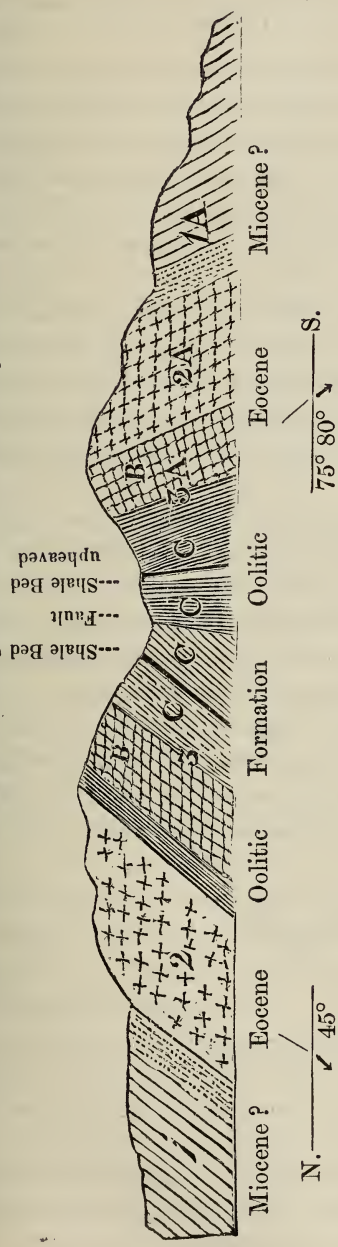
Of minerals, we shall notice the bituminous shales, iron-alum, jet or fossil wood and argillaceous iron-stone.

The bituminous shales which alternate with the sandstones and grits are occasionally used at Kalibagh in the preparation of alum. Some of them are well adapted for this purpose, but, generally speaking, they are very inferior to the shales of the nummulite limestone formation to be hereafter described.

Iron-alum forms, as before mentioned, an incrustation on the surface of the bituminous shales and masses of jet which contain iron pyrites in a state of decomposition. It is called "kaie" by the natives and is extensively used by them, when mixed with an infusion of pomegranate or other astringent bark, containing tannin for the preparation of a black dye. Its colour is white with a tinge of yellow. It gives a strong acid reaction, and has a most powerfully astringent taste. Peroxide of iron and alumina are indicated in its solution, by the usual tests, in union with sulphuric acid. In the Bukkh Ravine at Moosakhail, it is collected in considerable quantity.

Fossil wood in this form of jet occurs in too insignificant quantity in the Salt Range east of the Indus to have attracted much attention. In a ravine, however, about a mile west of Kalibagh, it occurs in considerable abundance, and under the designation of Kalibagh coal has been employed within the last two years to some extent as a fuel in the Indus steamers. Its existence was, we believe, first brought to the notice of Government by Burnes and Wood, and has since been reported on by Dr. Jamieson and myself.

It is found in lumps of various sizes in dark bituminous shales alternating with yellow sandstones; but nothing like a seam has been detected, though films of bituminous coal may in some places



Sketch section across the Kalibagh hill about a mile west of the town.

be seen in the shales. The masses of coal are generally compressed, and are evidently portions of the trunks and branches of trees, the point of junction of the former with the latter being often apparent.

Though distributed throughout all the shale beds, the coal occurs most abundantly in one of these, which is from six to eight feet thick, and is enclosed between beds of yellow sandstone, in which masses of the coal also occur. It has for the last two years been chiefly obtained from the shale-bed at a point where owing to a fracture and upheaval of the strata, a portion of them have been thrown into a nearly vertical position, as represented in the annexed rough sketch.

Line of section from north to south distance about 1 mile.

1 Conglomerate, soft sandstone and red clays.

2 Nummulite limestone and alum shales.

3 (A.) Belemnite shales (B.) cherty limestones.

(C.) Quartzose sandstones and grits with beds of bituminous shales.

3 A., 2 A. and 1 A. The same beds in reversed order.

By digging a succession of holes at different heights in the vertical shale-bed, the masses of coal are obtained with much greater ease, than where the bed in a

regular position dips to the north at an angle of 45° under the superior rocks.

In the vertical bed a gallery has been sunk to the depth of fifty feet in hopes of discovering a seam of coal, but, as was to be expected, with an unfavourable result. Indeed, the labour expended in digging the gallery has not been rewarded, by obtaining a larger quantity of coal, the masses of which, we were informed by the miners, became less numerous and more difficult to detach from the shale the deeper they dug. As it is most probable that the wood now connected with coal has been drifted from the spot where it grew, it is natural to infer, that the masses of it would accumulate more abundantly in some places than in others, just as drift wood does on the bank of a river. This appears to be the case at Kalibagh, as in some places the shale contains numerous masses of coal, while at others scarcely a fragment is to be detected.

The coal has a bright glistening appearance, is very hard and light, and exhibits a conchoidal fracture in which its woody structure is most apparent. It is of a jet-black colour, has a brown streak, and often incloses nests of half decomposed wood resembling peat. The surface of the coal often presents small crystals of gypsum, and imbedded masses of iron pyrites are by no means uncommon.

It burns quickly, without coking, to a light coloured ash and emits a large amount of yellow smoky flame; on being distilled it yields a light spongy coke of a glistening metallic colour with a large quantity of inflammable gas. On analysis the following results were obtained in 100 parts:

Carbon (coke), ...	37.5
Volatile bituminous inflammable matter, ...	60.0
Ashes (Silica), ...	2.5
Total,	100.0

The large amount of volatile bituminous matter as compared to that of coke, at once refers this coal to the class of lignites or coals in which the vegetable matter is imperfectly carbonized. In its small amount of ash (which in some specimens we have found as low as 1.66 per cent.) it differs remarkably from most of these, but the solid nature of the wood forming the coal, not admitting of the infiltration of earthy matter may account for this.

In an analysis, however, such as the above, the amount of ash obtained will invariably be less, than if a large sample of the coal were operated on, as the masses have invariably attached to them portions of the sand, clay, &c. in which they were imbedded. These mechanical impurities fusing and forming a slag or clinker in furnaces during the combustion of the coal, have been found troublesome.

The Kalibagh coal is for ordinary steam purposes an excellent fuel, but not an economical one, on account of the rapidity with which it burns.

The real evaporative power of coals is in the direct ratio to the amount of carbon or coke they contain, and hence as good English coal yields from 50 to 70 per cent. Kalibagh coal should have only half their evaporative power, and about twice that of the ordinary woods used as fuel in the Indus steamers, which yield from 16 to 18 per cent. of solid charcoal.

The coal can only be procured in small quantities at a time, months being required to collect a few hundred maunds. During 1850 about 2,500 maunds were dug, and from the 27th March 1851 to the 11th March 1852, 2,126 maunds were turned out and landed at Kalibagh on the right bank of the Indus, at the rate of eight maunds for the Rupee, a rate which never can remunerate the miners for any length of time for the labour required to extract the mineral.

The ordinary small Indus steamers consume English coal at the rate of 600 lbs. an hour when steaming, and hence on the supposition that double the quantity of Kalibagh coal is required, 200,000 lbs. (2500 maunds) the out turn of coal for one year at Kalibagh would only keep one vessel steaming for 166 hours. We see no prospect of the supply of coal increasing, nay the quantity obtainable, as far as we could ascertain from intercourse with the miners, seems gradually decreasing.

In the absence of any thing like a seam of coal at Kalibagh, we do not consider it expedient for Government to spend money there in sinking exploratory shafts.

The coal has all to be carried on bullocks, mules or donkeys from the pits to Kalibagh over a tolerable hill road, but as it is very hard it stands carriage remarkably well.

Clay ironstone has not been observed East of the Indus, but in

the oolitic shales at Musakhail, in the Chichalee Range we detected several thin beds of it, none of which exceeded $1\frac{1}{2}$ or 2 inches in thickness.

It is of a dark grey colour and has a high specific gravity.

It dissolves with slight effervescence in aqua regia, leaving a considerable residue of dark mud. The solution is of a dark yellow colour and gives with ammonia a dense brown precipitate of peroxide of iron mixed with a little alumina.

It is therefore analogous to the block hard ironstone of Scotland, which, occurring as it does in connection with coal, is perhaps one of the most valuable iron ores known.

It would be interesting to ascertain if this ore is ever used at Kuneegoornul by the Wuzeerees, to yield the iron manufactured there, and which is brought into Kalibagh for sale in lumps of very coarse pig iron. We believe hæmatite ore is chiefly employed, but from what rock it is procured, we could obtain no information. Charcoal is used for the smelting of the ore, no other fuel being accessible.

The beds of clay ironstone above noticed are too small to be of much practical importance, and, even did thicker beds exist, the want of a suitable fuel for the fusion of the ore, would prevent its being smelted at any thing like a remunerative rate.

In the lower argillaceous sandstone beds of this formation, we obtained at Moosakhail and also in the neighbourhood of Kalibagh very perfect carbonaceous impressions of the delicate fronds of a small fern, probably a species of Pecoptaris. These were associated with small pieces of brown coal, which are evidently the compressed stems of soft vegetables. Their remains, however, were too indistinct to admit of their being identified. The masses of jet described as Kalibagh coal present on fracture a woody structure similar to that of the wood of Coniferæ or Cycadaceæ, numerous concentric circles of growth pierced by medullary plates being apparent in most specimens. Some Peeteus, Ostreæ, Terebratulæ and fragments of Echinidæ occur in the limestones, in the upper beds of which a few belemnites were detected.

These latter however abound in the shales and green sandstones which succeed the limestone, and are associated with Ammonites, Gryphææ, Plagiostoma and saurian remains.

The number of belemnites in the shales in some places is quite wonderful, and two species at least occur. The alveoli of the belemnites are frequently found attached to the osselit, and in their interior the casts of the chambers of the alveolus or phragmacone. These are often found detached, and when seen in the rock, have much the appearance of an orthoceratite, being composed of concave or convex discs, fitting one into the other, and having thin articulating surfaces highly polished. Indeed were it not for the want of a siphuncle and the ease with which a disc can be separated from its neighbour, the similarity to an orthoceratite would be complete. Each disc seems entirely disconnected from its fellow; but no partition of the original chambers could be detected between them, the convex surface of the upper disc being capable apparently of free movement on the concave surface of the lower one, as in a ball and socket joint. These discs are sometimes of large size, one specimen which we procured being two inches in diameter.

Ammonites, though occurring in the shales, are most abundant in the green sandstone. They are generally ill preserved and are liable to fall to pieces in extracting them, having been acted on by the sulphurous acid, which is generated in the sandstone by the decomposition of pyrites. Two or three species have been procured.

Of the genus Gryphea, we have obtained probably two species, one of which closely resembles the G. incurva. They are generally ill preserved.

A large bi-valve, probably a species of Plagiostoma, is very abundant in the green sandstone, but good specimens are with difficulty procurable.

In some places bones and teeth of saurians occur in the sandstones, but are no where plentiful. The bones are generally fragmentary, very brittle and crumbly. Nothing like a complete skeleton was observed, the most perfect relic obtained being a portion of a scapula attached to a bit of a humerus. The teeth are better preserved than the bones, but are also very brittle. They are covered with a dark brown enamel, are compressed, sharp pointed and beautifully striated on their surface. One, which we found, but which fell into fragments in attempting to extract it, was at least three inches long and about an inch broad at the base. The decomposition which the

sandstone is undergoing near the surface, destroys rapidly the fossils which are imbedded in it, and hence, to obtain good specimens, the fresh rock must be quarried. This we had neither the time nor means of doing at our command, and hence were reluctantly forced to be content with such specimens as we could procure from the decomposing rock.

A claw, apparently of a crustacian, was observed in the sandstone, but it fell into fragments in digging it out.

All the fossils we have noticed are characteristic of the lias and the oolite; but from the general aspect of the rocks we have described, we are inclined to refer them to the latter formation. The green sandstone and shales are probably analogous to the Oxford clay; but an examination of the fossils by competent palæontologists can alone decide the point.

A formation abounding in oolitic fossils similar to those we have noticed, has been described by Capt. Grant, Bombay Engineers, as occurring in Cutch, and Capt. Strachey has also detected a like formation in the Himalayas, both on their Indian and Thibet sides. In the Rajmahal hills Dr. McLelland, on the slender evidence afforded by the existence of a few species of fossil plants of the genera Zamia, Tæniopteris and Poacites, refers "certain greyish and bluish white indurated clays, rendered slaty in places by the abundance of leaves of plants they contain," to the inferior oolite.

No oolitic rocks appear in the Salt Range in its eastern part. In the hills South of Koofree at the West end of the Sone Sikesur valley, a few shales and sandstones here and there appear under the debris of nummulite limestone rocks. Their thickness gradually increases in a westerly direction; and, on the steep south-east side of mount Sikesur, the oolitic strata are distinctly seen between the carboniferous limestone and nummulitic rocks. From mount Sikesur they may be uninterruptedly traced towards the Indus, preserving throughout a remarkably uniform character. From Kalibagh they stretch round into the Chichalee Range, preserving the same relations as in the Salt Range, but are of great thickness. Excellent sections of them are obtained in the Chichalee pass and in the Ravines between that and Mulokhail; about six miles below which they seem to throw out and to be covered up by nummulite lime-

stone. They do not appear in the upper part of the Kaffir Kote Range as far as we have observed, but it is probable that oolitic strata again re-appear in the Sooliman Range, as we have seen belemnites brought by natives from the hills near Dera Ghazee Khan. These may probably be an extension of the Cutch strata before alluded to.

(To be Continued.)

Supplementary Notice on the new Mineral Resin, Hircine.—*By* Henry Piddington, *Curator Museum of Economic Geology.*

My first notice of this singular and new substance will be found in the Journal No. I. of 1852, p. 76.

Being in correspondence on other matters with Dr. Dawson of Rangoon, so advantageously known in Calcutta by his humane establishment of the Seamen's Hospital at that port, I sent him a minute fragment from our specimen, requesting he would be good enough, if he did not know it, to make enquiries regarding it. His answer just received gives so clear an account of what it is, that I think it well worth putting upon record. It will be seen that my conjecture as to its being a mineral Resin was correct, and we have thus one more added to the list of these singular and mysterious substances. Dr. Dawson writes as follows:

"By the arrival, the other day of 'Fire Queen,' I was put in possession of your kind note, dated December the 12th accompanied by a specimen piece of the new resinous Mineral 'Hircine,' and the paper which you had written and printed upon the subject.

"As early as June 1851, this particular substance attracted my attention, in connection with a miscellaneous collection of minerals, metals, models of machines and a variety of domestic articles, I was then engaged in making, for a Museum in Philadelphia. I found it in the bazar in rather small bits, in the shops of some of the Burmese druggists. This mineral I am informed, is procurable in Burmah, in that section of the country which abounds in the celebrated

petroleum wells. It is dug up out of the ground, at a considerable depth, ranging from one to two hundred feet below the surface. The day before yesterday, an intelligent Burman mentioned to me, that he once saw, not longer, he thought, than four years ago a lump of it about 5 Viss in weight, obtained in that locality, after a great deal of trouble in digging, as a specimen for the present king of Ava. It seems to have two names among those who are acquainted with the article, our name is *Khouk* a stone, and *pa young* —wax; stone wax. The other is, *perai-yet*, which has no particular meaning that I can learn. I have been also told, that there is another variety of this identical substance, which is of a high translucent colour, somewhat resembling spermaceti. It is derived, the natives tell me, from the same district, though I have never seen any of it. One is commonly called the *white* kind, the other, or that which you have experimented upon being the '*black*' *sort*. The Burmese, it appears apply it to no special purpose, either in medicine, or the arts, but the alchemists, a class whom we still find in this part of the globe; employ it in their attempts to effect the transmutation of the baser metals.

"Before the war commenced, and the consequent destruction of Rangoon, a few pieces of the brown kind could have been readily picked up in the druggists' shops, but now after a most diligent search, I regret to say, that not a single specimen of it can be found. Hereafter when the country above Prome is open to traffic, it will naturally find its way down to our bazar as formerly, when I shall not fail to remember your request.

"If it would not be giving you too much trouble, would you be so kind as to send a copy of your paper on 'Hircine' to my friend, Professor James Bryan, M. D. Corner of Tenth and Arch Streets, Philadelphia, U. S., to whom the specimens I have already referred to were forwarded. The gentleman who may examine them, will thus be made aware of the researches you have instituted upon the subject of this new mineral."

The ancient City of Kansonapuri now called Rungamutty.—By Capt. F. P. Layard.

Twelve miles South of Moorshedabad, on the right bank of the river Bhaghirutti, rise the high red* cliffs of Rungamutty, on which at present stands an extensive village peopled by many busy families employed in the neighbouring silk Filatures.

About six or seven years ago the river, in its ever changing course, commenced impinging on the Rungamutty cliff, which at length became undermined and fell in large masses, exposing many ancient foundations of walls, deep wells long filled up with the earth of ages, and, as usual in exhumed eastern cities, innumerable fragments of pottery. These remains, together with the traces of numerous old tanks and mounds, scattered over the low plain, lying between the high ground of Rungamutty and the village of Gowkurn, about four miles distant, had long impressed me with the idea that some old forgotten city had once occupied this spot.

My suppositions were confirmed on perusing Major Wilford's able Essay on the Gangetic Provinces, contained in the IX. vol. of the Researches of the Bengal Asiatic Society. He there states, according to information furnished by Lieut. Hoare, that by tradition, the king of Lanca, (representing either Ceylon or Java) invaded the country of Bengal with a powerful fleet, and sailed up the Ganges† as far as Rungamutty, then called Cósumapurí, a considerable place where the Mahárájá of Bengal often resided, and that the invaders plundered the country and destroyed the city.

If my informants are correct, Lieut. Hoare must have given the name under a misapprehension of sound, as I was careful to have the name written before me in the native character, which distinctly read Kansonapuri or Kurn-sona-ka-ghur, the city of the golden ear. The tradition relating to the visit of the king of Lanca was also given to me, but with a different version.

The city of Kansonapuri is said to have been built many hundreds

* Composed according to Capt. Sherwill of red and yellow ferruginous tough clay, embedding nodules of pisiform iron ore and black mica (decomposing).

† Evident traces exist of the Bhaghirutti having, at this spot, been formerly the main bed of the Ganges, before it changed its course towards Bauleah and Pubna.

of years ago, by a famous Mahárájá of Bengal named Kurn Sén, who resided chiefly at Gour. He erected also a country palace about four miles distant, which was called after him Gowkurn from the circumstance of his ears being of gold and shaped like those of a cow!

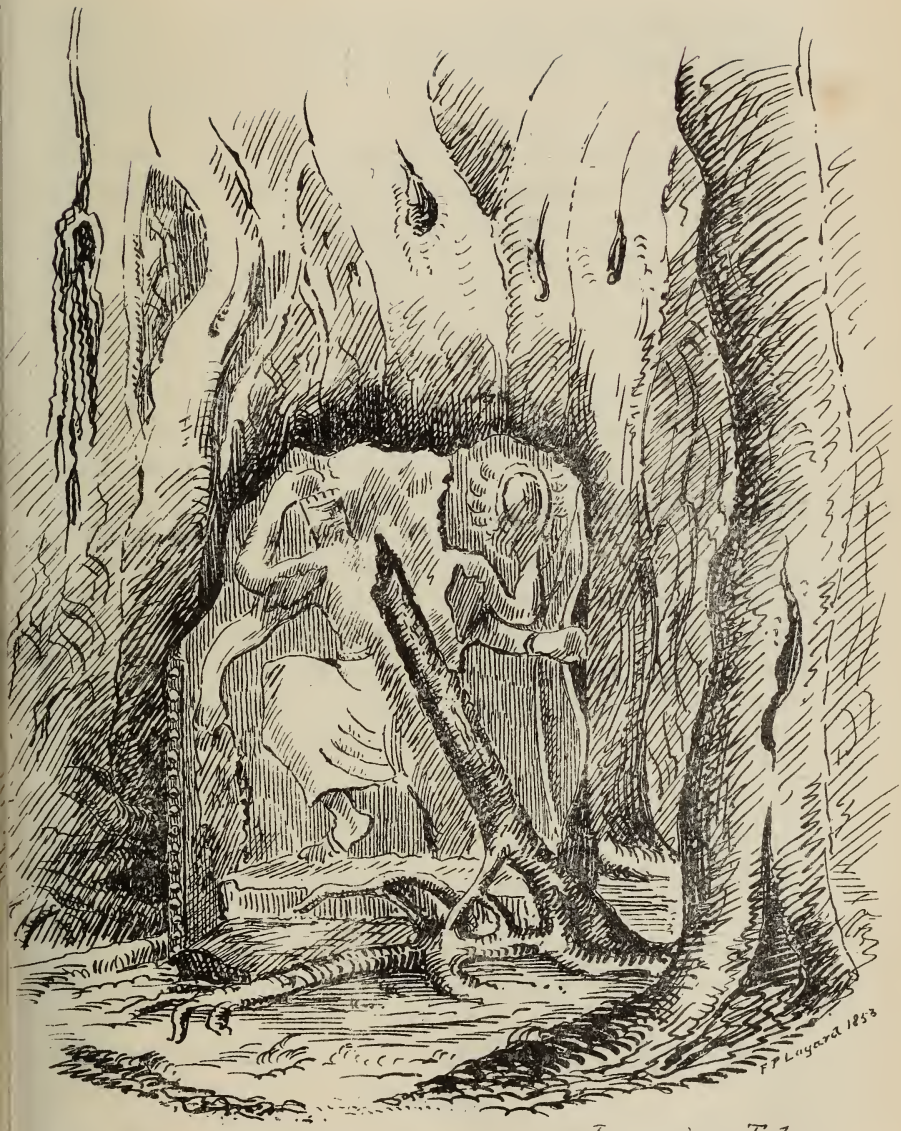
Many interesting spots connected with legends and traditions of the ancient city are still pointed out, such as the Demon's mount and the Rajbarree or palace of Kurn Sén. The remains of the moat of the Rajbarree are distinctly traceable on three sides, although now under cultivation; the fourth has disappeared in the river. On the eastern face of the Rajbarree, stood, a few years ago, the ruins of a very ancient gateway with two large entrances, called by the people of the neighbouring village of Juddoopore, Boorj or the tower; it has entirely disappeared, having crumbled away with the falling bank into the rapid stream below.

Near this spot on the margin of an old tank called Bél Talao, is said to have stood the Cutchery or Court of Justice of Raja Kurn Sén.

West of the factory, near a tank called Jummoona Talao, was the Puttur Ghur or stone fort, in former days, overhanging the river; nothing now remains of this building, but a low mound indicating its site and numerous fragments of stone. A curious six-armed image was found in the bed of the tank some years ago, and transferred to the foot of the magnificent Banian tree at Rungamutty, where, I regret to say, it has been sadly mutilated and destroyed.

It represents a figure kneeling on one knee, and is said by the people of the place to be Bemi Ka Thakoorain, but I should fancy the goddess Káli is intended. The two outer or front arms have been broken off, the centre right arm apparently holds what may have been a human victim suspended by the feet, but the object is too much injured to form any correct idea of its original shape. The hinder right arm is in the act of drawing an arrow from a quiver suspended at the back of the goddess, whilst the corresponding arm on the left holds the bow. The centre left arm appears to support a lotus flower or other insignia, but the upper part of the figure has been too much mutilated to trace any thing correctly.

I annex a little sketch of the stone to illustrate the description.



Black stone Image found in the Jummina Talao at Ruvanwelli

On the Site of the ancient City of Kunsona-puri.

Abstract of a Journal kept by Mr. Gardiner during his travels in Central Asia—with a Note and Introduction.—By M. P. Edgeworth, *Esq., B. C. S.*

As every contribution to the geography of little known regions is interesting, I submit the following extracts and abstract of a journal kept by a Mr. Gardiner. These journals were lent by him to the late Sir Alex. Burnes in Cabul, and but partially recovered. They were written, he informs me, mostly on scraps of paper at the time, and during a subsequent residence in Cabul thrown into the shape they now have, occupying several volumes of country paper. Two volumes remained in Col. Burnes' hands, and were lost at the time of the Cabul disasters. One of these unfortunately, related to the journey through Cafferistan. The route taken by Mr. Gardiner is in most parts quite different from that followed by any European traveller; he merely crosses the routes of Lieut. Wood and Mr. Moorcroft; the late travellers Messrs. Winterbottom, Agnew, and Lieut. Young, in 1848, penetrated into Gilget, and the boundary Commissioners, Messrs. Cunningham and Strachey with Dr. Thomson, came on his route near the Kara Korum, leaving the central region traversed by Mr. Gardiner still unexplored.

I have not made any attempt to compare the routes and inductions of Mr. Gardiner with those travellers, as I have neither the materials nor leisure requisite for the purpose; I give a bare abstract of his route with brief descriptions of the country and remarkable objects. I also give one specimen at greater length of his visit to one very remarkable spot. I cannot but think that were Mr. Gardiner's rough materials placed in good hands, and the losses above noted replaced, a most interesting book of travels might be constructed.

February 9th, 1853. M. Pakenham Edgeworth.

Introduction.

Mr. Gardiner is son of a Dr. Gardiner in the Mexican service. He was educated for several years at the Jesuit College of Clongoose in Ireland. On his father's death in 1823, he left Mexico with the intention of joining his elder brother, who was in the Rus-

sian engineering service at Astracan, in a Portuguese brigantine for Lisbon.

There he met with a Mr. Aylmer connected with the Principal of Clongoose, who induced him to go with him to Egypt. Mr. Gardiner then became acquainted with Messrs. Datterwitz, two German mineralogists, and another M. Musaix, a Frenchman, and travelled with them overland to Astracan, joining the Diarbekr caravan returning from Mecca to Tribizond, thence by water to a roadstead between Vudaun and Kark. Thence by land to the north of the Caucasus—misguided, they were in great danger from the natives at Anacuck, but escaped and reached Georest and Astracan in safety. Found his brother living in the island of Kumchnoe opposite Guricoe.

Mr. Gardiner remained there till 1829, preparing himself for the Russian Engineers, when all his prospects were blasted by the death of his brother. Claims on the part of the Russian Government for settlement of accounts balanced, absorbed all his brother's estate. He determined to return to America; but Mr. Datterwitz with a M. Shrotzky returned from Orenburg and induced him to accompany them to Persia.

From Astracan, about the beginning of September, they proceeded to Karazan where they were joined by a traveller, M. Martigny, who had been examining the coral island in the volcanic range to the East of the Caspian. In November the party had to take refuge from storms in Kramwood bay, North of Balkan. After much delay and contrary winds they reached Astrabad—there M. Martigny and Datterwitz separated and M. Shrotzky remained with Mr. G.—and they proceeded Eastward with the intention of procuring service in the Punjab, in consequence of reports they had heard from a M. Musaix, (nephew of his former companion.)

This course brought them to Herat where the Journal commences.

Journal.

Jan. 24*th.*—Mr. Gardiner left Herat with a small caffila of returned pilgrims for Koondooz. Passed by an unfrequented road East of Bamian, through the Hazari country, for sixteen days: the marches about twelve miles—owing to numerous ravines and streams,

some stages were three or four miles only; a very barren region, but heard that to N. W. and towards Killi Nob it was fertile.

Feb. 8th.—Reached Khoorzzi, a Kimorz or scattered village, each house separate—in the most convenient place for a farm. Here had to part with ponies, &c. The country of the Kalzubi—who inhabit caves or *Dror* during the winter, and in summer dwellings called Báleej;—they were anciently called Yápats; have dark brown or red beards, live by hunting, and use both cross-bows *(kylash)* and common bow or *kaman*. They shoot their large bow reclining, holding the bow with their feet and pulling the string with both hands.

14*th.*—Most of the party hence went round by Bamian. Proceeded; road very rugged, and much fording through icy water; halted at a grassy place among precipices.

15*th.*—Similar rugged country; halt at a basin of water on top of a black flinty rock, three hundred yards round and of great depth. Caught trout with blood red scales on it, but not allowed to eat them as the place was holy; no visible ruins, but the place was said to have been a city; some rude sculptures and a rock.

16*th.*—Through precipices of Basalt or granite, reach the Dror (in the dark) of Khalyze.

17*th.*—At the Dror—*Khalgubys* are Turkoman conquerors, *Therbas* the aborigines.

18*th.*—Proceeded along bed of a mountain torrent; ascended, but snow too deep in the pass; had to return and go round by a dark narrow pass closed by rocks overhead, called Hersh's dark pass; ascended to a boggy valley full of deep well-shaped chasms.

Ascending over a great spur; saw forest, and a valley said to lead in five days to Hamidan. Halted at a village called Tháugush. Lead and copper found in the neighbourhood; rock limestone resting on granite.

19*th.*—Robbed by our coolies: heavy rain detained the party.

20*th.*—Delayed on account of swollen torrents. Visit a great cave, and on polished floor a colossal figure, eighteen feet long.

There saw grand cataracts under natural bridge.

21*st.*—Proceed—pass a cave in limestone at its junction with granite.

Violent shock of earthquake; earth split, &c.; said to be not common.

Cross a deep chasm by basket and rope, over the Chiganook or Sir-i-Moon, being the source of the Morztab; a perilous passage along a cliff on pegs stuck in the rock.

Naeb Therman Khan's dwelling, Droo. Detained; the direct road ahead impassable by snow—might have retraced path to Chiganook, and thence over hills to Deh Kush, the Ab-i-deb river, and so to Balk.

Strolled to rope-ladder bridge.

23*rd.*—Garden of pomegranate and mulberry.

24*th.*—Visit the Mohcuns and alkaline lake.

25*th.*—Propositions to depart; old traditions.

26*th.*—Leave Droo or Drohoo, due North; deep chasms, pines in (MS. illegible).

Halted here. Hot-water spring at a Therba village; snow on ground.

27*th.*—N. E. N. much snow; bivouac under a crag.

28*th.*—Drizzling and hot; still among snow; great avalanches; grand panoramic view.

Descend; halt at some Therba huts called Nárk, where some altercation with slave-dealers.

March 1*st.*—North: cross Siák river by rope-bridge; deer numerous; halt in ravine.

2*nd.*—Lose way, but reach ruins of Killi Kafir.

3*rd.*—Description of ruins; intricate ravines; pass numerous tunnels; meet first Turkomans; get horses there.

4*th.*—Try to join a Kafila of Nyha traders at Bilkrai.

5*th.*—Therman Khan's son Ibrahim leaves them, arrangements for going on.

6*th.*—Join the caravan at Niok, a watering-station, five days N. E. of Minnoo.

7*th.*—Halted; beds of shells; hears news of his former companion, M. Shrotzky.

[Here occurs a break in the journal, a volume having been lost, giving an account of his visit to Bokhara, and adventures there, including a very dangerous illness.]

June 26*th.*—Leaves Qordook; barren, rugged country to Kolâr; new companion—a pirzada of Mushid, a ventriloquist and saint, flying from Cabul on account of a murder and intrigue, also a Hindu named Jyram, a Therba servant and an Affghan.

27*th.*—Kolâr to Kundûz; numerous pools on almost inaccessible pinnacles of rock.

28*th* and 29*th.*—Detained at Kundûz by Meer Ali Morad Shah.

30*th.*—Set off, and again detained.

July 1*st.*—Very hilly country covered with thorny bush, with grand view of snowy mountains.

Ten miles through fertile valley of Shool, counted 27 pools on the hills within 4 miles; wild ravines.

Fort of Oosrooth; 1000 houses. A road thence by Kroo to Kaffirstan, and by Hindus and Mân.

2*nd.*—Very dangerous road to *Shohaal*, which belongs to Rustam Khan; plundered by one Khan Mohammad; with difficulty avoid going on the reprisal expedition.

3*rd.*—Most rugged country to *Khornúshú*, a very curious fort. Ascent by steep steps on hands and feet to a narrow ledge of rock, —thence by a ladder of skin-rope (or baskets and windlass) to the top, where there is a remarkable fountain; the rock, primitive limestone; the basin about 20 feet wide and 6½ deep in centre, gradually sloping—always bubbling and brilliantly clear; cold in summer and hot in winter, when it hisses with a loud noise like *Noo Shoo;* always full and never overflows; all impurities immediately carried off. Fort very ancient with caverns used now as granaries.

Echo most remarkable from a wall-piece; running up a long valley increasing in loudness, then dying away as it returns, again increasing and again subsiding, three times, the third the loudest.

The hill is described as 180 to 200 yards in circumference at the summit and 250—300 at base, and 2100 feet high.

The tradition is, that when Noah was at Mecca the chief of this land, "Khor" by name, was converted to Islám and went to pay his respects. Noah now promised to grant him a favour on which Khor bellowed out in a rude voice "Water;" this demand offended Noah, and he cursed the land of Khor which became solid rock; —however to keep his promise he made this everlasting spring at

the top of the hill, and sent his grandson Shur to carry out his orders, calling out Nooh Shooh, which was obeyed, and Echo conveyed the sound to Mecca, and every winter in commemoration thereof, the waters murmur Noah Shooh, and the Echo carries the sound to Mecca, and the place retains the name of all the parties concerned—*Khornúshú*. Blue limestone shows the limits of Khor's land, still held by his descendants, viz. Rustám Khan on the west, and Mohammad Khan on the east.

Mr. G. was, with his companions, let down the whole distance in baskets.

4*th*.—Marches on limestone rock, the barren inheritance of Khor, to Khan Mohammad fort of Trimooke, about 14 miles from base of snowy range; situated at the end of a tabular hill:—several hot springs in the neighbourhood.

5*th*.—Meets party of Bhuri, with Kaffir girls for sale—a continual kidnapping going on in the frontier. There are three main tribes of Kaffirs.

1, of the Koh-i-low,
2, —— Koh-i-káf,
3, —— Koh-i-ghar,

which last are the Siyahposh Kaffirs of Kabul. The former do not shave the head, save a lock for each Musalmán they kill. The latter shave the head—letting a lock grow for every slain enemy. The most valiant may have a good head of hair or a shaved head as the case may be. One of the slaves was of excessive beauty, and was offered for 50 qai or drops of silver, about $\frac{1}{2}$ ounce.

During this march they quit the limestone and get into a granitic and quartzose region—stop at the Ziárat of Abba Shah, at the foot of a cliff of granite 900 feet high. A large (80 yards broad) torrent loses itself in a chasm at the base, and there are several caves cut out of the rock above the chasm, where the torrent disappears with much noise.

6*th*.—Halt at the Ziárat in order to visit four other *Geths* or chasms of similar nature. The fakeers collect herbs, to eat, from the spongy-mossy sides of the rocky dells in which these streams subside. The valley he compares to a great perpendicular cylinder; in the centre of it, a crater-like orifice about 100 yards round; a dark flinty rock.

It is customary to hang certain herbs down this chasm by long ropes for a month, after which, they are considered as panaceas for all diseases. The plant was very bitter, apparently a gentian. It is called Ṭhoceṭh.

The caves are of various size; inside plain: in one he saw numerous images rudely carved of deities and beasts, and apparently letters. The central smooth pillar, 22 feet high, of the main cave was especially so carved.

He sounds the chasm and gets no bottom at 1140 yards!!! and does not visit the other chasm—rich geological sections.

7th.—From *Abba Geth* diverges about 7 miles. Visits a chasm called Groor-geth. Follows a broad impetuous torrent running at the base of an immense (1000 feet) cliff; the valley is ended by a wall of rock under which the stream vanishes, a rocky island dividing it as it disappears, forming a grand water-fall, meeting 20 feet below.

Thence they ascend to the top in a small valley.

8th.—Continued North East course; rugged mountains interpersed with green valleys; next Khoolook, which lies at the foot of the mountains and border of the desert plain called Esh, which runs from Koondooz twenty-five miles to Pralli; twelve thence to Khoolook.

Delivers Morad Begh's letter to Khan Bahadur; meets a Hindu who has a silver-mounted pocket-compass, and part of a map of India —probably belonging to Moorcroft.

9th.—Halt at Khoolook to visit ruins of an old city called Káfir Derra.

It is situated in a narrow pass. The labyrinthine cave cut in marble, grey, white, brown or black, extending about a mile on each side, of excessive intricacy within; prevented from exploring by innumerable venomous snakes—numerous prostrate pillars sculptured with figures; most of the caves mere burrows, 3 feet high. The city is said to have been depopulated by the snakes, which assume the colour of the ground or rocks they inhabit, blue on the blue marble, green among herbage. The pass at the end of the valley is impracticable on account of the snakes.

About $1\frac{1}{2}$ mile due north of Esh, on a bare plain of rock, a colossal

horse in pitchstone, now lying on its side, measure 55 feet from top of the ear to hoof, 42 from chest to tail; legs 14 feet. Two other similar horses, also in ruins, lie on other two sides of Esh, so as to form a right-angled triangle round it.

10*th*.—From Khoolook, E., pass Prâl to the right, cross the desert, kill an antelope and bivouac by a pool in a ravine.

11*th*.—Desert; pass a few pools; robbed by Bhurs of every thing; wolves and leopards and hyenas all night.

12*th*.—March through desert to Oosfung; a charitable chief gave clothes and guides.

13*th*.—Through desert to Coom; great forest to the south towards Prâl in which the Bhurs escaped.

Forest called Erbabfung; wolves in packs of 1000. *Fung* means forest in Káfir. This forest, he says, extends to the borders of Deer and Deord and Pahlooth.

14*th*.—Leave Coom for Budukshán, meet *Obas* of Oosbres; halt at one.

16*th*.—Mud fort Agsa; black mail in shape of guides to Shoolash —a little cultivation.

17*th*.—Flat and level country; passed Shoh, and put up at an Oba.

18*th*.—Over well-peopled country to Budukshán; stopped at a Ziárat in suburbs.

24*th*.—Leave Budukshán. Easterly, well-cultivated, to Shoh.

26*th*.—Reached low hills and ravines. Trap and greenstone;—old ruined fort of Durum under basalt cliffs—report of old caves—marks of old mines, he suspects for topaz, in a stratum of quartz and litho-marge! some limestone with shells; wandering about, looking for jewels apparently.

27*th*.—The basaltic cliffs assume fanciful shapes; supposed to be Káfirs petrified by Abraham. One very remarkable human face on the precipitous sides of a dark ravine of amygdaloid rock is called Babo Boolan, about 25 feet in height, with monstrous red eyes and mouth and aquiline nose:—they are objects of extreme dread to the natives.

28*th*.—Reached this ravine and hills, resorts of wandering Moor, Shoolies and Usbecks.

31*st*.—Reached foot of Altan mountains, stopped at a stone fort,

called Ooz, belonging to a Shooly chief; met 3 Hindus, Suniyassis who had been on a pilgrimage to a volcano in Khirghiz! They had left Hindustan, by Kashmir and Baltistan, through Gilgit, and the Oordoo pass.

About five miles from Ooz is a chasm about 50 feet long, out of which smoke is continually emitted, sometimes white sometimes dark; edges of chasm lined with sulphur and bitumen: can't make out the rock, lava? or basalt? Traces of silver,—gold washed from debris and sand of rock—copper, especially in some of the Geths, where the water is nauseating—galena and tin? (with doubt), also found in some parts.

August 1*st*.—A long march to Shoh, a small fort at bottom of a deep ravine or pass which it commanded—chief's name Mânûssa. Proceeded to see the ruins of the city along a ravine 500 yards, and then through a narrow chasm to a sort of natural gateway, and entered the ancient city. An amphitheatre of rock surrounded a small round verdant vale. The cliffs of immense height almost perpendicular, and crowned with fantastic needle-shaped pinnacles, while the caves were excavated in ledges or tiers above one another. They returned through a natural arch 90 feet high, 25 broad and gradually narrowing to 3 or 4, and ending in a chasm by which they returned —so narrow, that they could scarcely squeeze their way through.

The Shoolies' hospitality consisted in forcing enormous quantities of melted butter on their guests.

2*nd*.—Revisits the city of Shoh in detail; returns by the narrow fissure—an arid way, the Eastern end is ornamented with rude sculptures to about 15 feet high. The cave was about 60 yards long due E. and W.; the Western entrance 40 feet high by $1\frac{1}{2}$ or 2 wide.

In front of the gate is a chiselled platform 6 feet high, 20 square.

This leads to a closed amphitheatre which is described as a mile in diameter, the bounding rocks 1500 feet high, and the mountains encircling them 3 or 4000, having a chasm of 3 or 4 miles.

The centre is a green mossy oval of about 300 yards broad, surrounded by excavations,—circular or square caves,—outside of which are peristyles, arcades and columns in eighteen different ranges;—the columns very irregular, varying from fifteen to eighty feet in height. From the lofty mountains, fell innumerable cascades down into

deep ravines which wound away to the east, and formed a tributary to the Oxus: none fell actually into the amphitheatre itself. There were but few images carved on the pillars, all very rude in form, some obscene, but highly polished, the smaller hieroglyphics, resembling those at Abba Geth, were neatly finished.

But the most surprising part of the narration is the acoustic effects of the wind and water-falls producing musical notes, which give different effects, louder or softer, according to the situation of the stander, at the base resembling an Æolian harp, in the middle tiers an organ, while in the higher places, military music.

3*rd*.—Proceeds towards Derra Derwas through rugged mountains, stops at caves occupied by two devotees, who worship the sun and certain idols. The principal of whom they styled Akoo or Hakoo (which may have some connection with Akâ Carbghar) the other "Shoob," (query Shiva?) whom they consider the titulary deity of the Shooly tribe.

4*th*.—Through rugged mountains to the fort of Droo at the south entrance of the Derra; here crossed the stream found by the Shooh cascades.

5*th*.—Left Droo and enter the pass. The Oxus here pretty considerable; most of the tributaries from the westward; the pass to Tundrel westerly to the post of Cheela.

A considerable post on the side of the mountain;—north of the pass and on the western side of the mountain, at the foot of the fort, a village of 7-8000 inhabitants, partly Moghul partly Shooly. The chief, a very obliging Moghul. To the east of the village a narrow culturable valley lay N. and S. About a mile off the sources of the Oxus. A long series of spongy ground lies at the base of basaltic mountains, and the springs collecting into one body flow out to the S. then E. for $1\frac{1}{2}$ days march, entered then E. S. E. into the Derra Derwas, 30 miles beyond Cheela, and then westerly to Turkistan.

Distribution of the Kafir tribes.

Great Kafirs Koh i Ghâr,	80,000	Generally called the Kafirs.	In Turkistan proper.
Kâf,	50,000		
Loo,	25,000		
Kafirs of Esh,	15,000		
—— Oohshah,	12,000		
Khâl Krooh,	12,000	Not Mahommedans, but not included in common parlance among *the Kafirs*.	
Gob or Gabr,	12,000		
Ghâr or Gharri,	12,000		
Lâh or Lâshi,	12,000		
Oodoo,	12,000		
Phalooth or Phah,	12,000		
Shooli or Shoh,	15,000		
Khoorook or Kroo,	12,200		
Therba or Thur,	12,000		
Bhur,	25,000	Half Mahommedan with some heathen practices.	
Mâr,	40,000		
Akaa or Cushyhar,	250,000		
Boo or Boolee,	12,000	On borders of Turkistan, Hindus or Budhists.	
Kahooz or Hoohee,	12,000		
Phah or Phagi,	12,000		
Aspah,	12,000		
Koolees,	12,000		
Mookloo,	12,000		
Maha,	12,000		
Kalesh, Lesh, Malesh,	12,000		
Beh or Behel,	12,000	Chinese subjects.	
Plahi or Plaaghii,	12,000		
Bhoti,	12,000		

The language has no resemblance to Persian or Arabic, but has some to Sanscrit ?

The Akaa tribes bear nominal allegiance to Yarkund, the rest seem quite independant—some trace of Geber or fire-worship exists among them.

[Here another hiatus occurs in the Journal.]

27*th*.—Reached the Oostam pass, whence rises the Jeljow river, which runs W. to Ulook where it joins the Karoo from E. N. E. (from Poofean in the Aktagh), thence W. to Rorlaar where it meets the Koorkor from S. E. (rising in the Karatagh), thence W. (and takes the name of Zarafshân or Samarkand River) to Faalghâr, thence by Dhomzul where it is joined by the Lohthoo (which rises at Noo'

Abool in the Konijuk Mountains, two stages E. of Durbend) from Domzul W. by Keemo and Paban, to Koor where it is joined by the Kom (which rises in N. E. out of a lake of Kom in the valley of Yar Ailak at S. base of the Yar Tagh) ; from Kom by Ormaz where the Oor meets it from the south, rising in the Kânuth M. ; it is subsequently joined by the Sanch or Pungkund at Tanoor from the S. by the Joonoojup at Oosk, from the lake of same name, 1½ day from E. of Oranthopa, a large place on south side of the Aktagh ; being joined at Zoon by the Noodoorth, which rises in Lake Maz, two days east of Karatess, and passes by Dizukooch.

From Dook the Zurafshan runs W. to Samarkand, about 250 miles from Oosk.

To the S. of the pass, a day's journey, under the peak of Nouont Kaw rise the Soorkhab or red river, (also called Kafirnoohan,) and Hazár *Hoon*, two main branches of the Oxus.

The Kafirnoohan runs S. W. to Zinoo ; thence to Taux, where it is joined by the Molpooth (rising in mountains of same name) ; S. to Sheroog, where it meets the Zerâb, which runs N. E. in the Molpooth mountains ; passing Shadmar, joins the Amoo at Tahoothen. The Soorkhab rises N. E. of Nornuth Kan, runs by Madpooth joined by Aubkoor from Lake Khiangkul, thence S. and W. to Shunwar, where it joins the Oosh from E. (from Lake Kara Kul,) thence S. to Khâratagoon, S. W. to Cessopek, where it meets the Numa, rising at Taux to N. W., thence S. by Rahamoot, Boolgwan, Yargaan, Doppa, where it meets the Darri Druwas, or Bolor branch, thence S. W. to Chukti and Khojahar, where it meets the Kant Tagh or Budukshan and is first called the Amu.

The fort of Oostam is said to have been built by a son of Timur, named Rustum ;—half the inhabitants Mahommedan Moghuls, the rest Akaas.

The foundations of the fort are of Cyclopean architecture ; squared blocks 24 feet long.

28*th.*—Entered the pass—bottom of deep ravines, continually wading. Halted at springs.

29*th.*—Proceeded through deep ravines, but less wading.

30*th.*—Met three Akaas going to Ausgess—large flocks of wild goats. Akaas brought five down with arrows. They had several bows ;

the Therba had a larger one. Kills a large eagle, said to be migrating—dark brown with triangular spots of grey and white; legs clothed to the toes; tail black tipped. Reach Ausgess, a small fortress near the ruins of a considerable one; only inhabited by Akaas; fed with butter by the chief.

Met three Moghul merchants, who join their party; intend stopping at Oossoobuk for a caravan.

31*st.*—Proceed E. and N E.; reach Oorcombuk, a large well built fort on brink of a precipice to E., at E. end of the Oostum pass, twenty days S. W. of Cashgar; joined by seven more Yarkund merchants—the caravan had preceded them.

The Akaas are short, stout and hardy, but few Mahommedans, except the tribe Oojuem near Andijan—women not handsome—dress, skins. The Keiaz tribe live in caves on the highest peaks; subsist by hunting; keep no flocks; said to be anthropophagous; but have handsome women; eat their flesh raw.

The Keiaz marriage rites are simple, the lover lays his bow at the feet of the lady; if she lifts it up, kisses and returns it, she is his wedded wife. By taking the husband's bow and flinging it on the ground before him, she might divorce herself, and she might secure a husband by unslinging his bow from his shoulder. The husbands have the power of selling their wives. They peculiarly venerate Hindu wanderers, giving up wives and daughters to them; if any progeny result, it is considered as a Demigod.

Two days N. W. of Oorcombuk is a sacred spot of perpetual fire issuing from a rock. The Aktagh Range, as shown in the Oostum pass, consists of gneiss, mica, slate, clay-slates and limestone, with some exception of traps and basalts; specimen of mica half yard square. Gold plentiful in the streams, both washed from the sand, and caught in sheep's fleeces.

Sept. 1*st.*—Leave Oorcombuk for Yarkund, with *musuks*, i. e. water-bags, tied to horse's belly; E. S. E. to Doonchoo three days. Little water and a few ruins for the first few miles; enter desert, bivouak in a dry ravine.

2*nd.*—Some pools in a deep spongy ravine, brackish; numerous flocks of antelope and some wild yaks called *Ausuk* by the Akaas; three different species thereof.

3*rd*.—Continue over arid desert intersected by ravines, reach and ford the Yaman Yar, and reach Doonchoo fort on its S. bank inhabited by the Choo tribe.

4*th*.—Stops at an Oba of Choos.

5*th* and 6*th*.—Had again to carry water.

7*th*.—Reach Châu, a large village on the River Châu, which rises in the Bolor mountains, ten days S. W.

8*th*.—Halt at an Oba on the bank of Lake Doon 1½ by 2½ miles; its water is rather brackish, but better than that of the springs; five marches north is a large lake—Doon Hoog, *Doon* meaning lake and *Hoog* large; *hee* means little; numerous other lakes large and small.

9*th*.—At Doonhee, an Oba of Choos 600 yards by 100, water sweet;—large flocks of geese, &c.

10*th*.—Over undulating desert to fort of Keshing, near a low range of secondary limestone;—five days W. said to be mines of lead in the Khia fiery hills, and two days further copper at Oostom.

11*th*.—Through desert, but water plentiful; through low limestone rocks, the chains N. S.; road E. W., none higher than 100 feet; halt at a good well;—attacked by 100 robbers; rocks alternate clay-slate and sandstone, occasionally gneiss appeared, also black slate and conglomerate.

12*th*.—Proceeded S. E.;—by midday got clear of the ranges; road rocky.

Khoolbrân on the Pohush river said to rise 20 days S. W. at Pooshtee.

Near this is a poisonous well,—not coppery,—unctuous to feel, nauseous to taste, deposits white fine silky threads on knife blade; mercury?

13*th*.—Stop at an Oba—desolate rocky region.

14*th*.—Through ravines, in an extensive plain.

15*th*.—Meet caravan from Yarkund, 100 camels, 50 Tatar soldiers; tea, cloths and silver to Samarkand.

16*th*.—Bare rocky desert intersected with ravine.

17*th*.—Ditto reached Mahoo Shung on the banks of the Pohush, built of massive stone, occupied by Kebee tribe of Tatars. Water unwholesome, save a few wells, though it looks and tastes good; people look *green*. Near it the overwhelmed city of Mahoo.

18*th.*—Halt and visit Mahoo in detail. It is a great tumulus, about 300 feet high and 2 miles round, honey-combs in every direction with chasms and caverns, which are all more or less deleterious from mephitic vapour, encrusted with corrosive salts, grey, yellow and green; no reptiles or bats in the caves. A deep gully allows an approach to the centre nearly, and discloses cut-stone, earthenware and other marks of inhabitants: at the vernal equinox, numbers of Akaas collect, and enter the caves in search of reliques; images large and small and broken, of which he saw seven, some jasper, some of pottery, all pierced, and numerous fragments of vitrified idols; the pilgrims are said occasionally to find large ones; they often perish from the mephitic vapour. The whole ground is a mass of extreme confusion, the upper portion of granite rocks, heaped as it were on the ancient city.

The tradition is that Ma and Hoo, twin brothers, both in descent from Toth, emperor of the east, ruled for some time. Ma was a righteous prince. Hoo murdered him by burying him alive. The prayers of the dying Ma, caused Hoo to be buried alive, and with him all his fellow citizens, the mountain tumbling down upon them.

19*th.*—Left Mahoosung, through hills; reached Meeshaw. Here the route by Dera Drewas meets this. Beyond this, extensive plains stretch E. and S., which to the N. the distant range of Kalook bounds N. E. and joins the Kebee or Ashan ranges.

20*th.*—E. S. E., cross immense plains to Shooshee, a small village; meets the first Kebee revenue office.

21*st*, 22*nd*, 23*rd.*—Extensive plains occupied by the Kahall tribes.

24*th.*—Reached Yarkund. It consists of two cities, one inhabited by the Mahommedan Moghul population, the other by the Chinese or Ketai garrison; gates close at night; 80 to 100,000 souls, 15000 soldiers. There is a Moghul governor (at the time Khan Ali Jan)—the Chinese Governor was Shun Teth.

Tea, green and black, packed in vellum, shawl wool from Chungtang, Porcelain, and Chrysoprase beads are the principal articles.

27*th.*—Left Yarkund along the Kroo river to Phoom.

28*th.*—Khoorgaleek.

29*th.*—Below or eastern branch of Kroo.

October 1*st.*—Jaunshun a small pond of bad water.

2*nd.*—Crossed Kroo to Thoongur.

3*rd.*—Re-crossed river Mahazar; river ankle deep.

4*th.*—Panpoon, source of Kroo in Yagnee Dewas range.

5*th.*—Khandook, centre of range at some small springs in ravine.

6*th.*—Site of old ruins; on a plain, low stunted trees.

7*th.*—Khoolam on N. bank of Yarkund River; met a caravan of 200.

8*th.*—Crossed river; thick jungle to Oomah.

9*th.*—S. E. to banks of Khoolkan River; thick low jungle.

10*th.*—Halted on banks of river.

11*th.*—Reached ruins of Khoolkan at the northern base of the Karakorum.

12*th.*—To S. E. through the range to an Oba of Changtung Tartars, three days west of Sernihee.

13*th.*—Through a rocky wilderness E., along range of hills.

14*th.*—Springs; source of the Koo-le-loo, which joins the Indus near Iskardo.

15*th.*—Crossed the stream S. E.; large springs, source of the R. Cherera (the stream rises at a lake called Koofaloo) which runs through Nobra and joins the Indus at Nahoon, 5 days S. of Ladak.

16*th.*—Crossed rocky well-wooded chains.

17*th.*—Ditto ditto.

18*th.*—Due E., west bank of Shaighuk, opposite Tupchan.

19*th.*—To Khamdavu.

20*th.*—S. E. (to avoid crossing the Shaighuk and Ko tak lek) to Dovin—low marshy ground, five miles from river—opposite to Gartop.

21*st.*—Along banks of river to Bolung Belook.

22*nd.*—Ditto to where the Doorgh meets it on opposite side.

23*rd.*—Ditto to Fitkar.

24*th.*—Ditto to Lohoo.

25*th.*—Ditto to Tooknoh, three miles from Akkan.

26*th.*—Crossed the river; to Meloor, 5 miles S of Dooghan.

27*th.*—S. to Chehe.

28*th.*—Arrived at Ladak.

30*th.*—Leave Ladak for Cashmeer; first march to Tunguh. Boojjoo—lead-mines said to be.

31*st.*—To Shohung.

November 1*st.*—Kulsee on north bank of Indus.

2*nd.*—Crossed to Lemeeroo by a rope bridge—a sangar, two miles lower;—about two miles east of village are ruins of a large city called Lormun.

3*rd.*—Koosun.

4*th.*—Kurjull of Peshmul.

7*th.*—Drass near Kishengunge, at base of snowy range.

8*th.*—Left main road to west to take the horses by larger round; kept at huts 500 ft. below snow.

9*th.*—Halted in snow.

10*th.*—Reached Gughunghir; reached Cashmeer on 13th, just in time to escape being snowed out.

16*th.*—Leave Cashmeer, with the Therba, Syed Mir Ali Shah and Jyekam, with two Cashmeer servants, a party of six intending to go by Khajân. Gilgit and Cashgaar road to Cabul, and thence to Pakrood.

17*th.*—To Baramoola.

18*th*, 19*th.*—Halted two days to sell their horses.

20*th.*—North, to a small village Sehul, at foot of Kukka Brumba mountains; people converted in Aurangzeb's time from Hinduism;—the Kuthrees called Kukka and Brahmans Brumba, hence the name.

21*st.*—N. W. from Kukka Brumba to Choob 22 cos from Baramoola.

22*nd.*—Cross range; halt at huts below snow.

23*rd.*—N. descended to Ameer ke Ghurry.

24*th.*—Deep ravines; crossed Kishengunge at Bukoo; halted at Haji Ghurry.

25*th.*—Dark ravines, then green valley, N. W. Aspeloo Fort of Moorook at head of valley, belonging to Shah Newaz,—very fanatic Mahommedans,—Syuds are every thing;—the *Bolunus* and *Gujars* frequent the mosques all day. Khajum extends to Peeloo and Soogoor on Indus;—butter, a man's load for rupee!

26*th.*—Road through bed of torrent; water very little in morning, increase during day from melting snow;—ascended to foot of snow to Beer.

27*th.*—Pass Poolaik; steep ascent to Shah Husun la Ghur; Meloo Shah, the owner, advises them to keep North of Gilgit to go to Chitral; the Chitral river or Akoo rises in a large lake 6-7 days E. from Bolor or the Peloa Mountain, while on the direct road over

Ashoo Hamoo road from Gilgit; there are six or seven marches through snow in summer.

28*th.*—Reach Peeloon on Indus; get rid of their Ghonts.

29*th.*—Frightful march overhanging the Indus, along ledges, &c.; hauled across in a leather bag, nearly opposite the junction of Gilgit River, to Shooghoor. The range is called Ashoo Hamoo to the *Ushur Kafirgulli* pass at sources of the Abba Sind; thence westward the Deer or Durd Mountain. Bramhu and source of river Lunda which it seems is the *Cabul*, of the Bonur of the Abba Sind.

30*th.*—Cross Gilgit river by rope-bridge, and up its West bank; dreadful path along precipices to Ashnoo. Here in a mosque! in an inner room is an idol, much reverenced, resembling Neptune with a trident and Greek helmet, black sable, called Konchoo; said to have been found in a hot spring. Near Ashnoo, (old name Oor or Oornath) were extensive ruins of a large city and cave on table-top of a large mountain; a large pond in the middle; remains of old Fort. Greek coins plenty, two of King Maius;—petrifactions abundant; they are laid by the image, and then, becoming holy, are panaceas.

The Moolla said they did not worship the image, but respected it as that of the founder of their race, Shoohungrow, grandson either of Solomon or Noah!

The Iskardo people are descended from Askar, son of Alexander by Nargat daughter of Phalgon Raj.

By Oospun daughter of Mamkoosh of Gilgit and Deer, Alexander had two sons Usperan who died, and Ful who was taken away with his mother by Alexander, and became king of Gershon far off in the sea near Mecca;—and by Maihethata daughter of Bambur of Bolor, a Sholee, he had one daughter Lahama who married the son of the Gilgit king.

31*st.*—Left Aushnoor, very difficult road along W. bank of river; entered valley of Gilgit, 10—15 miles broad to Dairshen where it expands, about 80 or 100 miles long, on W. Gil Hamû mountains, which to S. join the Ashoo Hamoo; they have no pass and are covered with perpetual snow.

To S. of this great range is Yusufzahy, between great and little range; Kafirs dwell in valley of Kahinook; the little range or Kahinook joins the Gilgit near Aushman—Kafirs low, red, broad; blue eyes.

Halted at a ruined fort at Morokagul; village and fort of Tahi at junction of Peloo or Hanzi river with Gilgit, which rises at Khankoon and passes fort Goolzar; Gilgit town and fort a day's march on E. bank of river.

Prejudice against married women milking; the animal is killed and eaten, else it is thought too divine.

Estimates population at 25 or 30,000 of all Gilgit; revenue 1-10th of produce.

April 1*st*.—Passed 3 or 4 good villages and forts. Halt at Pok Zoleen belonging to a semi-independant chief, Shah Hosyn; a good day's march, S. W. from Gilgit.

2*nd*.—Well cultivated; halt at Stambook, a fort; opposite to Jaâkoor on E. bank, and two miles lower—on E. bank, Booloo. N. E. of B. are hot and salt springs.

3*rd*.—Hugged the base of mountains—much jungle grass—halted at Plunghaee Pelongue? valley about 12 miles round. On bank of Peloo, which rises at Kafirkál to S. W. and joins the Gilgit at Mishnik, a fort belonging to Ruvanshun.

To W. of Pelongue is a pond and well, whence rises the Akoo, and runs through great range N. W. and W. to Booshperkai, two days from Duirshen.

4*th*.—Crossed Peloo by raw-hide bridge; rugged country; halted at a ruined fort, Zanzé, on bank of Shangrâf, which is 15 yards wide and was crossed by a hide bridge. Hence a pass leads to Chitrál; Galena found.

5*th*.—N. W. bare, uninhabited country to Shemâl on the Akoo, belonging to chief of Dharm-Dairahim; on opposite side a large river joins, which has two branches from Peloo and Bolor ranges.

Then through Akoos from the Chitrál river—cold—ice 6 inches.

6*th*.—Over rocks and chasms down the Chitrál by the *Shoor* pass to ruins of Káfirwan, fort Cyclopean; narrow valley, rock of immense height; 200 yards lower down a 3rd branch called Thook joins the Akáhoo—Kai e Mâl e Kanki—Chitrál mountains granite, mixed with a black rock of glassy fracture.

7*th*.—Along precipitous sides of the den 30 yards; sometimes even with ropes to help; find two murdered bodies on the road!

Reach post of Booskerkan belonging to a Moorzoom chief Mahom-

medan, half savage, named Joonjuk, dependant on Aunwah. The post is on top of a precipice, but under precipitous mountains all round, so that the sun never shines there.

Avalanches from opposite snowy peaks—portions leap the river.

8*th*.—Halt—the proper name of Káfirs is Ziak Kaioon; story of two Europeans who were imprisoned and died 60 years ago.

The Moorzooms still worship sun and moon, and respect idols. The Koo or Khookraw—(dirty Khoo,) is a wandering thieving tribe —worship goats and silver, wear their skins in dress, or any black colour, but red ibex or white never. They eat their meat raw. They eat the heart and liver of their own dead.

The Káfirs generally either bury their dead erect in snow, or expose them on some bare precipice, first extracting the heart and liver, which are burned on an altar, then kept; or occasionally as a sign of affection, the ashes are mixed with herbs and eaten.

Here procures a man of medical character, Shaubul Ali, and with a son of Tunguth Shah determines to endeavour to penetrate into the Kaionook (Káfir) country.

9*th*.—Sets off with Mokl, nephew of Shaubul, Tunguth's son and two other Moorzooms, Joy Ram and the Therbah, the Syud, &c. agreeing to wait at Anony for their return.

Rugged rocks and snow, up and down to ravine with a torrent of melted snow to Khoest, the remains of an old fort and some caves in side of a precipice of immense height, with remains of ruins at the top.

The only residents are Moorzoom fakeers turned Zai. The Zai would not touch the Cashmeer and Kabul Mahommedans, but had no objection to the Hindu and Káfir. *Mamoo* they call Mahommed, and consider him a priest of the Zai order. Zai is the hero-founder of the Khaioo tribe and son of Ool, the god of fire; as an idol he is worshipped as a human head surrounded by fire. That at Zai was cut out of granite, five feet square, in a deep recess, which he was not allowed to approach nearer than ten yards, a line of blood and ochre marking the holy boundary. It was situated at the end of a rocky platform, surrounded by lakes, to reach which they first descended the ravine and then ascended a smaller crevice some 30 or 40 yards long.

Story of two Europeans killed as evil spirits.

10*th.*—Sends all his papers and goods on with the Syud to wait at Peshank, and proceeds simply armed and in goat-skin dress; rambles about Khoest, while a son of Shaubul got permission for him to proceed.

At the meeting of the Khoest torrent with the Khaima river is a bituminous spring forming a black slimy bed 36 yards long, 5 feet thick, at the foot of a precipitous rocky ridge—beneath it a thin stratum of greenish sulphureous matter, then another black bed, looking like metallic scori: two miles from this are emetic springs, used by the natives, which contain copper. The mountains are here composed of granite, on which rests mica slate or clay slate, with occasional masses of lime-stone and sandstone with fossil shells.

Large mountain-deer numerous, also a smaller spotted deer, ibex, goats, &c. &c. &c.; two sorts of musk; the drug is only used for magic, not collected, and the flesh not eaten.

Tradition of the Oosthoo pigmy tribe, now represented by the Khoo and a few wanderers in the most inaccessible recesses, who use slings with great skill.

(Tale of Alexander's conquest of Peshawur is here inserted, (Gandur, the Eusufzahy country), and how the remnants of his army and the Gandurites were repulsed by the Hindus; forced to shelter in the higher ranges and thus founded the Káfir race.)

Snow heavy.

21*st.*—The Rahk, or disciple returns with an invitation to visit Sheheh Thaiu, with two Oorgs or priests to show the way; hands and feet again examined if broke.

22*d.*—Ascended the stream to North, on West bank about five miles to cross by a log thrown across the top of a frightful chasm; most difficult path rendered worse by snow and ice; to summit of ridge 2000 yards. Continued Southerly on E. bank of river; rested for night in a cave opposite Khoest. Their food was toasted *Sall*, (seed of an herb) and Kheira or Khee? with Laiss (wild garlic).

23*rd.*—S. and S. E. rocky bare region; granite and limestone to a

natural reservoir in limestone, called Loong, a short day's march N. N. W. from Thesprâk where there is a village of Khoioos—holy shrine and springs, caves and two idols called *Keoo* and *Beth*.

24*th*.—E. and by S. at first very barren and rugged—then through vales with alpine flowers; meet hunters of Khioo tribe, at Prâ; ruins of a round tower; a cave commences here, said to lead to Thesprâk.

Hunters had an ibex, a chamois, and a *quee*, a small goat, the size of a cat. They were dressed in chamois skins, hair outside, and bear skin caps; head shaved (the Oorgs had long hair).

25*th*.—Along a deep ravine N. E. to foot of snowy range, then S. and S. E.; crossed numerous currents over logs; very barren; two hours before sunset reached base of Shehelkhale; ascent very steep; loose stones and rocks, nearly to snow line; passed sunset when they reached the caves.

Dinner of half roast goat, and uncooked preserved bear's meat, with oongzoo, a sort of tart, wine to drink.

26*th*.—Before breakfast, looked about innumerable scattered caves; very small entrances, dug in gravelly bank of mountain; 2000 feet below is a wooded ravine, the orchard and vineyard of the place, which has about 900 inhabitants. The Shoosher river empties into Khaiemah two stages below Chitrál.

27*th*.—Description of the women, dress, &c. &c. At noon proceed to the shrine; descended 1½ hour to vineyard and fruit trees.

An earthquake, which forced them to halt in caves, where an old man of 150, lived with 5 generations of descendants, his sons, white beards, of 80.

28*th*.—Reached the shrine in ¼ of a day; caves in face of a very high cliff; narrow and difficult path, and steep ascent to platform and cave where the Oorgs live; thence ascended again to a platform, 15 yards by 2; entered cave 4½ or 5 feet high, 3 broad, widened to 15 feet; after 80 yards hightened to 25 feet, a fissure, 2 ft. wide; entered through it into a large cavity 36 yards round and 50 high; on N. side of it two figures cut out of the *Shehel;* that on the right Sheh, on left Heh (or Zahel); by a less difficult path over the rock and to a ravine to the saline springs, which are both cathartic and emetic.

29*th*.—Returned to the old man, and halted some days for guides till 5th May, strolling about many deserted caves, and a large cave with idols—the original shrine deserted, because injured by earthquakes.

[Here the Journal ceases, the next volume describing the journey through Kafiristan, was lent to Sir A. Burnes and lost.]

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL,

For April, 1853.

At a meeting of the Society held on the 6th instant at the usual hour and place,

Sir James Colvile, Kt., President, in the Chair.

The minutes of the last month's Proceedings were read and confirmed.

Donations were received—

1. From Dr. Campbell, Darjeeling. Two skins of the yellow Fox of Thibet, one young and the other a mature specimen.

2. From Dr. Fayrer, Rangoon, a large gilt Figure of Guadama.

3. From W. G. Young, Esq. Under Secretary to the Government of Bengal. A map of the district of Monghyr, for the Museum of Economic Geology.

4. From Lieut. E. T. P. Fergusson, Superintendent of the Government Observatory at Bombay. A copy of the Magnetical and Meteorological Observations made at Bombay, in 1849.

5. From Captain Thuillier, Deputy Surveyor General. A map of the Monghyr district surveyed by Captain Sherwill.

Ditto of the Northern face of the Vindhya Hills surveyed by Captain Sherwill.

6. From Captain Pearse, Hazara. Four small copper-plates inscribed with Bactro-Pali characters, excavated from a small mound in the village of Shâh Dhairee, on the high road from Rawal Pindee to Hazara.

7. From Professor Fleischer, Berlin, part 3rd of the 6th volume of the Journal of the German Oriental Society.

8. From E. Thomas, Esq., twenty-seven silver coins presented on the part of the Government by E. A. Reade, Esq. Commissioner, Benares.

A sketch of the spot on which the annual fair in Sagar Islands is held, lent to the Secretary by Mr. E. A. Samuells, was laid on the table.

The following gentlemen duly proposed and seconded at the last meeting were balloted for, and elected ordinary members—

Babu Rádhánáth Sikdár,
Dr. Macrae, and
J. E. Medlicott, Esq.

Pursuant to the recommendation of the Council, read at the last meeting,

Lieut.-Col. C. H. Rawlinson was balloted for, and elected an honorary member.

The following gentlemen were named for ballot at the next meeting.

Sháh Kabír Uddeen of Sasseram, proposed by Ensign Lees, and seconded by Mr. B. J. Colvin.

Mr. C. W. Cunliffe, proposed by Mr. Grote, and seconded by the President.

Mr. D. Grant, proposed by the President, and seconded by Mr. Grote.

The Council submitted a report, recommending the following changes in the mode of publishing the Bibliotheca Indica.

1. The discontinuance of a paid editorial staff, and the institution of a scale of payment for editorial labour at a maximum rate of 12 Rs. per sheet of 8 pages ; the work to be brought out as at present under the superintendence of the Philological sub-Committee.

2. The publication of each work of the series in such form as to admit of its being separately purchased, whether in text or translation, and the reduction of prices to such sum as shall made good the cost of printing, plus one-fourth that of editing.

3. The discontinuance of the present practice of insisting on translations from the editors of texts.

The recommendations, being put to the meeting seriatim, were unanimously approved.

Communications were received—

1. From Rev. J. Garrett of Bangalore, enclosing lists of Canarese works published in Bangalore.

2. From Rájah Ishri Prasád Bahadur of Benares, forwarding a Catalogue of Hindi and Urdú books contained in his library.

3. From W. Muir, Esq., Secretary to the Government of the N. W. Provinces, forwarding Meteorological Register kept at the Secretariat Office, Agra, for the month of February last.

4. From E. C. Bayley, Esq., enclosing a short and imperfect inscription from Pinjore given to him by Mr. L. Bowring of the Civil Service, and for deciphering which, he has not the necessary references at hand. Mr. B. sends also a copy of the Khunniarah inscription, on the subject of which he observes:—

"I send you also the Khunniarah inscription, or at least a native copy of it; I am sorry it is so disappointing; there are two stones, on one of which is the upper on the other the lower line. The actual letters are said to be four or five inches high, so that this is a mere copy taken by hand. I will endeavour to go myself and get an impression, if you think it worth while. Having once set about this work, I find several inscriptions exist, of which I am getting copies. There is one in the great temple at Kangra, but the copy brought me, was too carelessly made to be worth sending. I have read it however in part, and find it gives three names in the Bansavalis, Megh Chand, Dhurm Chand and Sansar Chand. Of the former I have coins. The date of the inscription, I unfortunately cannot read in the copy, but it must be about 1500 to 1510 Sambat. There are other inscriptions in the fort, one of which is clearly dated 1434 Sambat Vikrama Deba; but unluckly it is so defaced that I have not succeeded in getting any thing else out of it, yet this is also the case with a short one, bearing date 1260 Sambat, but I am still trying to see if I may not get it made more legible by care. Of coins also, I have got another, king Apurwa Chand, and two others still undeciphered; but I dare say, I shall shortly get other specimens to work out these, and give me one or two names."

5. From Captain Cunningham, explaining the cause of the delay

in bringing out his paper on Kangra and other coins, for which plates have been for some years in the Secretaries' hands. Captain C. hopes to be able to send it soon after reaching Mooltan, as well as an account of the Buddhist cave of Dhumnar, which he has recently visited. After enumerating fourteen Kangra kings whose coins he has deciphered, Captain C. concludes thus:—

"The delay that has taken place in the publication of the plates of the ancient coinage of India, is a source of much regret to me, on account of the interesting light which they throw upon the history of India. It is generally known that all the oldest coins and inscriptions now existing in India, are of princes of the Buddhist faith, but, I believe, that few suspect the existence of ancient coins of Brahmanical princes. Such however have been lying in Calcutta amongst my engraved plates ever since 1848. The undoubted coins of Brahmanical princes are those of a *Brahma Mitra*, *Vishnu Mitra*, *Indra Mitra*, *Agni Mitra*, all of whom are Vedic deities. Their antiquity, though not so great as that of the Buddhist coins, is nevertheless earlier than the worship of Siva and his Lingum, as is proved by the significant want of any coins of Mahádeva Mitra, Siva or Iswara Mitra. The alphabetic characters, which are similar to those of the inscription on the Sanchi gateways and in the Buddhist caves of Western India, range these Brahmanical coins about the beginning of the Christian era.

"I have written thus far for publication in the *Proceedings* of the Asiatic Society, if you will kindly insert it for me. I have many papers in view for the Society's Journal, but I can do nothing until I reach Mooltan, I am anxious to have all my plates of Hindu coins, which are now with Laidlay, engraved as soon as possible, and I will then send the letter-press for their illustration. The work will form a complete collection of the ancient coinage of India."

6. From Dr. Bedford, Rámpur Bauleah, enclosing a paper entitled "Contributions to the Statistics of Bengal,—Income, Expenditure and Food."

7. From W. G. Young, Esq., Under-Secretary to the Government of Bengal, forwarding a copy of a letter from the Secretary to the Board of Revenue with its enclosures, respecting certain specimens of gold from the Jugloo River in Assam.

The Secretary exhibited to the meeting the first sheet of a Sanskrita Lexicon, by Professor Bohtlingk, now printing at St. Petersburgh.

The Curator of the Museum of Economic Geology and the Librarian submitted reports of additions made to their respective departments during the last month.

Read and confirmed, 2nd May, 1853.

(Signed) J. W. Colvile.

Report of the Curator Museum of Economic Geology for the month of April, 1853.

Geology and Mineralogy.—Dr. Cantor has presented us with a specimen of Fossiliferous limestone from Girbee in the Straits of Malacca of which the following is his memorandum.

1. Fossiliferous limestone and lignite from Girbee. The late Captain Congalton, H. C. Steamer *Diana* proceeded in July, 1845 to Girbee river, on the Malayan Peninsula in 8° 0′ N. L. On his return to Pinang he communicated to me a diagram and memorandum of the locality in which the lignite occurs.

Támah is a hillock about 11 ft. high above the strata.

Length of the strata from 300 to 400 ft. their diameter from 1 to 14 inches, those of the greatest diameter below the seam of lignite, and they deviate from the upper strata at an angle of 4 to 5°. In the ironstone nearest Datoo Putri appears a cave, nearly circular, about 20 ft. in diameter, but of no great depth. Round the cave radiate short strata, 4 to 5 ft. in length, of fossiliferous limestone like the strata below Támah, Tanjong Datoo Putri is a limestone rock, not stratified, about 500 ft. above low water mark, and about a mile distant from the hillock Támah.

The seam of lignite runs nearly horizontally from east to west. The eastern extremity is 2 inches in depth, the western 8 inches. The shells of the strata appear to belong to the genera Paludina and Melania, and closely resemble recent species inhabiting the Malayan Peninsula and Islands.

Economic Geology.—The following report relates to the specimen of copper ore from the Barragunda mines in the Hazareebagh district, now on the table, which was examined at the request of Mr. Mackenzie. This gentleman informs me that the mine has anciently been worked to a very great extent under the native governments, but that they only worked one

side of the lode, which no doubt was of a kind of ore which they found easier to smelt, or less mixed with silex than this which they have left.

Examination of a Sulphuret of Copper from the Barragunda Copper Mine, sent by Mr. Mackenzie.

This ore is imbedded in a clear quartz matrix, and, unless the dressing be very carefully attended to, a heavy loss will always arise, either from the quantity of ore rejected in small fragments by the dressers on the one hand, or by the quantity of silex which will find its way into the furnace as ore on the other. At least 10 per cent. should on this account be struck off from my actual results, which were of course from a lot of picked fragments of pure ore, as free as possible from matrix. There is also a considerable mixture of iron pyrites with it, which will in practice deteriorate much from its value, for the two are constantly mixed in the dressing.

I find that this ore contains in 100 parts as follows :

Silex,	0.50
Sulphur,	31.42
Iron (Perox. 48.55) Metallic,	33.98
Copper Metallic,	34.10
	100.00

The iron and copper being both in the state of bisulphurets.

In the smelting of this ore on the large scale it must be taken into account that the 34 per cent. of copper will be reduced in practice as follows :

Silex with the ore, from veins and bad dressing,	10	per cent.
Sulphuret of iron mixed with it at least,	10	„
Waste in smelting at least 10 to	15	„
	35	per cent.

or say one-third ; so that the 34 parts of copper will be reduced to 34 less 11 or 23 per cent. of the ore as sent to the furnace : and if this is obtained, it will be by very good management.

H. Piddington,
Cur. Mus. Econ. Geology.

March 11th, 1853.

I have next to announce a discovery which may be of importance, being that of a fine variety of coal in the neighbourhood of Darjeeling, in the Chawa Nuddee, about a coss from its junction with the Teesta.

The late Mr. David Scott, Governor General's Agent, Assam, is said by Dr. Campbell to have found coal near the same locality, but a specimen submitted to the coal Committee, and reported on in one of its printed reports, was considered of no value.

My Report on this coal is as follows:—

Report on a specimen of Jet Coal from the Chawa Nuddee, a tributary of the Teesta, forwarded by Dr. A. Campbell *of Darjeeling.*

The specimens sent are very small and are mere surface and rolled specimens, so that there is much difficulty in selecting a bit for a fair test of the Sp. gravity; and those which I have taken are too small. I found also much difficulty in picking fragments entirely free from earthy matter for analysis without destroying the larger specimens which, from a new locality and with a new variety, it is always desirable to keep as entire as possible till a good supply is obtained.

Examination.—This coal is evidently a Jet; but as none of the books to which I have access contain any detailed examination and description even of the common Jet! I have thought it worth while to put this on record as it differs both from massive Jet and from the common Jet Coal.*

Appearance.—The aspect of this coal is very remarkable. A part of it is a bright glancing jet-like coal, which sometimes occurs in entire pieces, though very small ones, not being larger than a large bean or small walnut but in the larger specimen, this bright jet-like and massive coal is seen to pass into curious small columnar jointed concretions, somewhat resembling on a microscopic scale those of basalt.

In certain lights the joints have a very bright, and somewhat pearly glance, with faint traces of rings in them, which are clearly made out by the magnifier. Larger and more distinct traces of these rings are seen on some of the massive jet-like pieces, the whole conveying the impression of large and small globules loosely aggregated under pressure.

Physical Properties.—It burns readily with a fine greenish yellow flame, and the smell of the smoke, though pungent, is in some degree aromatic;† being not at all the *smoky* smell of common coal. It is easily cut, but brittle and flying into fragments. The streak is a dull black.

* See Vol. XX. p. 366, of Journal (Proceedings of April, 1851,) for my examination of an Indian Jet Coal far inferior to this from the Mootee Jhurna falls, Rajmahal Hills.

† Probably containing a little Succinic Acid. ?

When breathed upon, the smell is that of a foul chimney.

Sp. gravity of a specimen of the massive kind, ...	1.02
Of a specimen which was partly massive and partly concretionary,.....	1.03

The constituents of a specimen which was composed of a fair average of the massive and concretionary parts were found to be as follows. In 100 parts,

Water, ...	10.50
Volatile bituminous matter, ...	27.00
Carbon, ...	58.00
Ash, of a dark grey color and effervescing with Acids, ...	4.00
	100.00

A portion of the ash was evidently in coarse siliceous granules, probably from the external coating of the rolled pieces ; so that, the true proportion of ash would probably be about 3.50 per cent. or less.

If found in sufficient quantities this coal would afford a very valuable and agreeable fuel, but would burn too quick, I should think, to be economical ; the powder in the crucible does not coke as that of the bituminous coals often does.

Postscript.—When about to despatch this report, I received from Dr. Campbell a farther supply of the coal, of which the examination quite confirms it. In the larger and more massive pieces, the concretionary structure is clearly visible on the cross fracture, and they have moreover embedded in them some brown amygdaloidal concretions from one to two inches long which are masses of micaceous gravel and carbonaceous matter, cemented to some hardness by a mixture of carbonate of lime. There are some pieces also of the coal veined with carbonate of lime. The quantity of coal to be obtained and the expense of raising and delivering it at the station, are now all that is wanted to be known regarding this deposit. It cokes into a bright shining metallic coke externally which is remarkably fibrous and wood-like ; and in some pieces divides into laminar masses like wood, as if this Jet Coal was produced not from carbonized plants, but from wood.

Dr. Campbell has also sent us specimens of the rock in which the Jet Coal is found. This is a coarse sandstone grit ; much of the character of those of the true coal formations, and is so far promising ; but it contains no organic remains.

H. Piddington,
Curator, Mus. Econ. Geology.

Major Ramsay now resident of Nepal sent me some time ago, as already noticed in a former report, a collection of 96 specimens of rocks and minerals of various kinds, which the minister Jung Bahadur had had collected, and of which he was desirous of knowing the value, as one was supposed to contain tin, &c. but the whole prove to be valueless, except one of a very fine quartz, equal to the best Brazilian pebbles, a splendid white marble, a Kyanite, (sometimes used in jewellery and inlaying work,) a blue copper ore, and the last of the series No. 96, which as I announced before, is certainly a new mineral, even in the form in which it reached us, Major Ramsay has just sent specimens of the ore, which will be examined in due course. The history of this mineral product I reserve for the full account of its examination.

Captain Haughton, 1st Assistant Agent to the Governor-General on the S. W. Frontier, has sent us a large collection of some 50 or 60 ores of copper, iron and lead, from that quarter, which will be duly examined.

Library.

The following books have been added to the Library since the last meeting.

Presented.

Indische Alterthümskünde von Christian Lassen. Zweiter Band. Bonn, 1852. Royal 8vo.—By the Author.

Magnetical and Meteorological Observations made at the Hon'ble East India Company's Observatory, Bombay, in the year 1849. Bombay, 1852, 4to.—By the Superintendent of the Observatory.

Die Handschriften-Verzeichnisse der Koniglichen Bibliothek. Erstes Band. Verzeichnisse der Sanskrita Handschriften von Herrn Dr. Weber. Berlin, 1853, 4to.—By the Author.

Journal of the Royal Geographical Society of London. Vol. XXII.—By the Society.

Jahrbucher der Literatur. Nos. 2, 4, 26, 28, 78, 89, 90 and 92.—By the Baron von Hammer-Purgstall.

Selections from the Public Correspondence of the Board of Administration for the affairs of the Punjab: Nos. 1 and 2. 4 copies each.—By the Board.

Report of the Revenue Administration of the Lower Provinces for the official year 1851-52.—By the Government of Bengal.

Journal of the Indian Archipelago, for October 1852. 2 copies.—By the same.

Ditto ditto, for November 1852.—By the Editor.

Legende de Sakuntala d'apres la version Hindouie de Mahábhárata, par M. Garcin de Tassy. Pamphlet.—By the Author.

Tableau du Kali Yug, ou de l'age de Fer, par Wischnu Das, traduit de l'Hindouie par M. Garcin de Tassy.—By the Author.

Notice sur une carte routiere de Nuschhed à Bokhara et de Bokhara á Balkh par M. Sedillot.—By the Author.

Journal of the Archæological Society of Delhi. January 1853, 2 copies. —By the Society.

Zeitschrift des Deutschen morgenländischen Gesellschaft. Vol. VI. Part 3.—By the Society.

The Vedánta Sutras. Nos. 1 to 6.—By Ba'bu Ja'davakrishna Sinha.

Combe's Constitution of Man translated into Bengali. By Bábu Akshaya Kumár Datta. 1 vol. 12mo.—By the Translator.

Map of the Grand Trunk Road from Calcutta to Benares. By J. Joseph, Esq.—By the Author.

Ditto ditto from Karmanásá to Agra.—By the same.

A map of the Overland route of Steam communication.—By the same.

The Oriental Baptist. Nos. 75, 76.—By the Editor.

The Calcutta Christian Observer. For March and April 1853.—By the Editors.

The Oriental Christian Spectator. For February 1853.—By the Editor.

Abstract of the Meteorological Register for November, 1853.

Rangoon, 1st December, 1853.

	Thermometer Sunrise.			Thermometer 9 A. M.			Thermometer Noon.			Thermometer 3 P. M.			Thermometer Sunset.			Thermometer 9 P. M.			Remarks.
	Maximum	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	
Wet....	74	66	71.10	77	70	74.10	78	71	75.98	79	71	76.20	78	73	76.0714	81	68.5	75.35	Quantity of rain fallen this month, slight showers on the 16th, 25th and 26th.
Dry....	76	69.5	74.07	83.5	75	79.09	90.5	81.5	86.79	90.5	82.5	88.11	86	81.5	83.714	82	75.5	79	Prevailing winds this month N. E. but occasionally from S. E. on the 30th at 1 P. M. a thunder storm accompanied by a heavy storm of rain. Thermometer fell 7 degrees changed from N. E. to S. W.
	Barometer Sunrise.			**Barometer 9 A. M.**			**Barometer Noon.**			**Barometer 3 P. M.**			**Barometer Sunset.**			**Barometer 9 P. M.**			
	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	
	30.17	30.01	30.07	30.14	30.04	30.09	30.15	30.02	30.07	30.07	29.98	30.03	30.06	30	30.03	30.12	30.03	30.07	
	Of 29 observations.			Of 29 observations.			Of 29 observations.			Of 23 observations.			Of 7 observations.			Of 26 observations.			

J. FAYRER, M. D. *Asst. Surg. Field Hospital, Rangoon.*

Meteorological Observations for the month of November, 1852.

Rangoon, 1st December, 1852.

Date.	Sunrise.					9 A. M.					Noon.				
	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.
	Wet.	Dry.				Wet.	Dry.				Wet.	Dry.			
1	72	75	30.09	Calm.	Clear.	76	81	30.10	E. lt.	Clear.	78	87	30.07	E. lt.	Cir.-cuml.
2	71	74.5	.09	Ditto.	Ditto.	76 5	80.5	.11	N. E. do.	Ditto.	77.5	86.5	.09	N. b. E. do.	Ditto.
3	74	74	.09	N. E. lt.	Ditto.	75.5	80	.11	Ditto.	Ditto.	76	88.5	.09	N. E. do.	Ditto.
4	71	75	.10	Ditto.	Ditto.	75	80	.11	Ditto.	Ditto.	76	87	.10	Ditto.	Ditto.
5	72	75	.09	Ditto.	Ditto.	74 5	77.5	.11	Ditto.	Cirri-cuml.	77	88	.15	Ditto.	Cumuli.
6	72	75	.09	Ditto.	Ditto.	77	80.5	.11	Ditto.	Ditto.	76	87	.10	Ditto.	Ditto.
7	72	75	.10	Ditto.	Ditto.	75	79	.12	N. E.	Ditto.	76	88	.09	Ditto steady.	Ditto.
8	73	76	.10	Ditto.	Ditto.	75.5	81 5	.12	Ditto.	Ditto.	..	..	..	....	....
9	72	75	.17	Ditto.	Ditto.	74	78	.12	Ditto.	Clear.	75.5	90	.05	N. E. steady.	Cumuli.
10	72	75	.09	Ditto.	Ditto.	73.5	75.5	.09	Ditto.	Ditto.	76	87	.07	Ditto.	Ditto.
11	71	74	.09	Ditto.	Ditto.	..	..	..	.. .	....	77	87.5	.09	N. E. lt.	Ditto.
12	72	76	.05	Ditto.	Ditto.	75	80	.09	N. E. lt.	Clear.	77	89	.03	Ditto.	Ditto.
13	72	74	.05	Ditto.	Ditto.	73	78	.06	Ditto.	Ditto.	76	86	.05	Ditto.	Ditto.
14	71	75	.06	Ditto.	Ditto.	75.5	83	.08	Ditto.	Ditto.	77	87.5	.05	Ditto.	Cirri-cuml.
15	72	76.5	.06	N. lt.	Ditto.	76	83.5	08	N. do.	Ditto.	77	88	.06	Ditto.	Ditto.
16	72	76	.07	Calm.	Ditto.	75 5	82	.09	N. E. do.	Ditto.	76	87 5	.05	Ditto.	Ditto.
17	72	74	.06	N. W. lt.	Ditto.	77	83	.07	N. do.	Ditto.	78	86	.03	N. do.	Ditto.
18	72	75 5	.03	Calm.	Ditto.	76	81.5	.07	N E. do.	Ditto.	76.5	90.5	.02	S. S. W. do.	Ditto.
19	71	73.5	.01	Ditto.	Ditto.	75	80.5	.04	Calm.	Ditto.	75	85.5	.02	Calm.	Ditto.
20	69.5	71	.03	Ditto.	Hazy.	72	76.5	.06	Ditto.	Ditto.	74	87	.03	N. W. lt.	....
21	67.5	69 5	.05	Ditto.	Ditto.	72	77	.08	Ditto.	Ditto.	72	83.5	.05	N. do.	Clear.
22	66	70	.06	Ditto.	Ditto.	70	75.5	.10	Ditto.	Ditto.	72	84.5	.07	N. W. do.	Ditto.
23	68	71.5	.06	Ditto.	Ditto.	70	77.5	.10	N.W. b. N.lt.	Ditto.	71	86.5	.07	Ditto.	Ditto.
24	67.5	71	.06	Ditto.	Ditto.	70.5	77	.10	N. E. lt.	Cirri.	74.5	84.5	.07	Ditto.	Cirri.
25	71	73.5	.07	N. E. lt.	Cirri-cuml.	74.5	75	.11	Ditto.	Ditto.	77.5	84.5	.11	E. do.	....
26	73.5	76	.10	Calm.	Cirri.	75	81	.14	Ditto.	Cirri-cuml.	77	85.5	.11	N. E. do.	Cumuli.
27	71	74	.07	Ditto.	Ditto.	71.5	75	.11	Ditto.	Ditto.	76.5	85.5	.07	Ditto.	Ditto.
28	71	73.5	.06	Ditto.	Ditto.	70.5	76	.10	Ditto.	Cirri.	76	87	.07	Calm.	Ditto.
29	71	74	.06	Ditto.	Ditto.	73.5	79	.07	Ditto.	Ditto.	76.5	86	.05	N. E. lt.	Cirri.
30	..	..	..	..	....	74	79	.07	Ditto.	Ditto.	79	89	.04	E b. N. in.	Cumuli.

Thermometer					Thermometer.										
Wet.	Dry.	Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Wet.	Dry.	Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Wet.	Dry.	Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Remarks.
77	88	30.05	E. lt.	Cirri.	76	82	30.05	N. E. lt.	Clear.	74	79	30.09	Calm.	Clear.	Hot, fine evening.
77.5	90.5	.05	N. E. do.	C.-cum.	..	..	..	..	..	75	80.5	.09	Ditto.	Ditto.	Hot.
..	..	..	..	..	..	..	..	..	..	74	80	.10	Ditto.	Ditto.	Ditto.
75 5	88.5	.06	Ditto.	Ditto.	..	..	..	..	..	74	78.5	.12	N. E. lt.	Ditto.	Ditto.
..	..	..	..	..	..	..	..	..	..	73	76	.10	S. E. do.	Ditto.	Cool.
75.5	89	.07	Ditto.	Ditto.	..	..	..	..	..	73	75.5	.10	Ditto.	Ditto.	Hazy after Sunrise.
76	89.5	.07	Ditto.	Ditto.	..	..	..	..	..	73	76	.10	Ditto.	Ditto.	Fine cool breeze.
..	..	..	..	..	..	..	..	..	..	74	81	.11	Ditto.	Ditto.	Ditto.
75	90	.03	Ditto.	Ditto.	77.5	81.5	.06	N. E. v. lt.	..	75.5	82	.09	Ditto.	Ditto.	Ditto.
78	88.5	.04	Ditto.	Ditto.	..	..	..	S. E. do.	..	76	82	.08	Ditto.	Ditto.	
.	..	..	..	..	..	..	..	Ditto.	Cumuli.	76	82	.10	Ditto.	Ditto.	
..	..	..	..	..	..	..	..	..	..	75	79	.09	Ditto.	Ditto.	Ditto.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Ditto.
75	89.5	.02	E. lt.	C.-cum.	..	..	..	..	..	74.5	80	.07	N. E. lt.	Ditto.	Sun covered-cooler.
77	88.5	.02	N. E. do.	Ditto.	78	85	.05	N. v. lt.	..	76	81	.07	Calm.		[E. at 2 o'clock.
78	86	.02	N.W. v. do.	Ditto.	77	84	.03	Calm.	Clear cld.	75.5	80.5	.07	Ditto.	Clear.	A very slight Sh. from
78	89.5	.00	N. do.	Ditto.	..	..	..	..	in west.	76	82	.04	Ditto.	Ditto.	Cloudy. [refg. breeze.
78	90	29 98	N. W. do.	Ditto.	77	85.5	.00	Calm.	..	76 5	82	.03	Ditto.	Ditto.	Slight air. S. S. E.
75.5	89	.98	Calm.	Ditto.	..	..	..	..	..	75	79.5	.03	Ditto.	Ditto.	Therm. outside 70.
73	88.5	.98	N. W. lt.	..	73	82	.02	Calm.	Clear.	68.5	76	.04	N.W. v. lt.	Ditto.	Strati very thin and
71	87.5	30.02	Ditto.	Clear.	..	..	..	..	..	70.5	77	.07	Ditto.	Ditto.	light.
72	88	.03	Ditto.	Ditto.	..	..	..	..	..	71	77.5	.07	Calm.	Ditto.	Fog banks in distance.
74.5	88.5	.02	Ditto.	..	..	..	..	..	..	72	78	.06	Ditto.	Ditto.	Thin vaporing clouds.
75.5	80.5	.06	E. b. S. lt.	..	..	..	..	..	..	..	..	..	..	..	Cumuli-strati shower.
79	88.5	.06	Calm.	Cumuli.	..	..	..	..	..	..	..	..	..	..	Few drops past over.
76	87	.06	..	Cirri.	..	..	..	..	..	81	76	.05	N. lt.	Clear.	
78	89	.03	N. E. lt.	Ditto.	..	..	..	..	..	81	76	.05	Ditto.	Ditto.	
79	90	.00	Ditto.	Ditto	74	86	02	N.W.W. lt.	Clear.	81	76	.05	Ditto.	Ditto.	
78.5	82.5	.02	S. W. do.	Cumuli.	..	..	..	..	..	78	81	.07	E. lt.	Cumuli.	Thunder in distance.
1752.5	2026.5	6906.7	..	..	532.5	586	..	..	..	194.90	205.40	781.94			
76.20	88.11	80.03	..	..	76.0714	83.7143	..	..	..	75.35	79.	30.07			

On 25th and 26th, in the afternoon, showers of rain fell.

At 1 P. M. 30th Thunder storm with heavy shower of rain. Thermometer fell 7 degrees.

Wind changed suddenly from N. E. to S. W.

Abstract of the Meteorological Register for December, 1852. *Rangoon*, 1*st January*, 1853.

Barometrical observations 10 in number. Thermometrical 20. Bar. obs. 10 in number.		Thermometer Sunrise.			Thermometrical observations 20.	Thermometer 9 A. M.			Bar. 12 observations. Thermometer 22 observations.	Thermometer Noon.			Bar. 11 observations. Thermometer 17 observations.	Thermometer 3 P. M.			Barometer none, Thermometer 3 observations.	Thermometer Sunset.			Bar. 3 observations. Thermometer 8 observations.	Thermometer 9 P. M.			Remarks.
		Maximum.	Minimum.	Mid.		Maximum.	Minimum.	Mid.		Maximum.	Minimum.	Mid.		Maximum.	Minimum.	Mid.		Maximum.	Minimum.	Mid.		Maximum.	Minimum.	Mid.	
Barometrical	Maximum.				30.16				30.14				30.12								30.00				
	Minimum.				30.07				30.07				30.03								30.09				
	Mid.				30.13				30.09				30.07											30.10	
Wet.		74	60	66.53		77	61	68.95		80	66	69.22		81	65	72.24		71	69	69.83		77	63	69.25	Rain. Showers (Quantity 0.21.)
Dry...		78	62	67.70		80	67	74.83		89	73	83.95		90	82	85.71		80	78	79.33		89	71	76.75	Prevailing wind E. to N. E. Hot in the middle of the day, but cold at night.
		Barometer Sunrise.				Barometer 9 A. M.				Barometer Noon.				Barometer 3 P. M.				Barometer Sunset.				Barometer 9 P. M.			
	Maximum.				30.13				30.16				30.14								30.00				Weather fine and clear for the most part.
	Minimum.				30.05				30.07				30.07								30.09				
	Mid.				30.09				30.13				30.09											30.10	

J. Fayrer, M. D.
Assistant Surgeon, Field Hospital.

Meteorological Observations for the Month of December, 1852.

Rangoon, 1st January, 1853.

Date.	Sunrise.						9 A. M.					Noon.				
	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Rain.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.
	Wet.	Dry.					Wet.	Dry.				Wet.	Dry.			
1	74.5	78	30.07	N. E. lt.	Cumuli.	020	77	80	30.07	E.b.N.lt	Cirri.	79	85	30.10	N.b.N. lt.	Cumuli.
2	..	..	..	..	..	..	76	81	.10	E. lt.	Ditto.	80	89	.07	E. lt.	Cirri.
3	75	78	.09	N. E. lt.	Cumuli.	..	76	78	.13	N. lt.	Cumul.	77	86	.07	E.N.E lt.	Cumuli.
4	72	74	.09	Ditto.	Ditto.	.	75	78	.14	E. lt.	Ditto.	79	87	.11	E. lt.	Clear.
5	72	72	.13	E. do.	Cirri.	01	..	..	..	..	..	73	73.5	.14	N. E. fr.	Cirri.
6	65	67.5	.13	N. E. do.	Clear.	..	..	..	..	..	..	70	83	.12	Ditto.	Ditto.
7	65	67.5	.10	Calm.	Ditto.	.	68	74	.15	N. E. lt.	Cirri.	70	83	.10	N. E. do.	Clear.
8	65	68	.09	Ditto.	Ditto.	..	68	74	.12	Ditto.	Ditto.	70.5	83	.08	Ditto lt.	Ditto.
9	65	68	.07	Ditto.	Ditto.	..	68	73	.12	Ditto.	Ditto.	72.5	84	.07	Ditto.	Ditto.
10	65	61	.05	Ditto.	Ditto.	..	67	70	.16	Ditto.	Ditto.	72	82	.07	Ditto.	Ditto.
11	..	..	..	..	..	..	.	..	..	..	..	74.5	84	.10	..	..
12	..	..	..	..	..	..	72	78	.13	N.E. stdy.	Cirri.	1	..	..	..	..
13	79	74	.07	N. by W.	C.-Cuml.	..	72	78	.14	Ditto.	Ditto.	..	..	..	..	..
14	..	..	..	..	..	..	..	..	..	..	..	75	88	.07	..	..
15	..	..	..	..	.	..	..	..	..	..	..	..	..	..	..	..
16	..	..	..	..	..	..	..	..	..	..	..	73	88	None.	N. E. lt.	C.-cumul
17	67	68	None.	N. E. lt.	Clear.	..	..	..	..	..	..	74	86	Ditto.	Ditto.	Ditto.
18	65.5	67.5	..	Ditto.	Cirri.	..	74	78.5	None.	N.E. stdy	Cirri.	..	..	..	..	..
19	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
20	60	64	..	N. E. lt.	Cirri.	..	63	69.5	None.	N. E. fr.	Cirri.	65	80.5	..	N. E. fr.	Cumuli.
21	60.5	65	..	Ditto.	Ditto.	..	..	..	..	..	..	66	83	..	Ditto lt.	Cirri.
22	..	..	..	..	..	..	66	75	None.	N. E. lt.	Cirri.	..	..	..	..	..
23	63	66.5	..	N. E. lt.	Cirri.	..	68	78	..	Ditto.	Ditto.	69	83	..	N. E. lt.	Cirri.
24	..	..	..	Ditto.	Cumuli.	..	68	73	N. E.	Ditto.	Cumul	73	85	..	Ditto.	Cumuli.
25	..	..	..	..	..	..	68	72	Ditto.	Ditto.	Cloudy	74	85	..	..	Cirri.
26	57.5	63	..	N. E. lt.	Cirri.	..	61	67	Ditto.	Ditto.	Cirri.	..	..	..	..	..
27	59	62	..	Ditto.	Ditto.	..	66	77.5	Ditto.	Ditto.	Ditto.	..	..	..	..	..
28	78.5	62	..	Ditto.	Ditto.	..	62	67	Ditto.	Ditto.	Ditto.	71.5	85	..	N. E. lt.	Cirri.
29	62	64	..	Ditto.	Ditto.	..	..	..	..	..	.	..	..	..	..	..
30	..	..	..	..	..	..	..	..	..	..	..	67	83	..	N. E. lt.	Cirri.
31	60	64	..	N. E. do.	Cirri.	..	63	75	Ditto.	Ditto.	Ditto.	66	81	..	Ditto.	Ditto.
Total.	1330.5	1354	300.89			0.21	1378	1496.5	301.26			1592	1847	361.10		
Mean.	66.53	67.70	30.09				68.95	74.83	30.13			69.22	83.95	30.09		

3 P. M.					Sunset.					9 A. M.					
Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Remarks.
Wet.	Dry.				Wet.	Dry.				Wet.	Dry.				
81	89	30.06	E.b.N. lt.	Cumuli.	..	..	..	..	..	77	89	30.10	Calm.	Cumuli.	Shower fell yesterday,*
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Light.
78	88	.07	S. lt.	Cumuli.	..	..	..	..	..	77	81	.09	S. W.	Clear.	
77	87	.08	E.b.N.lt.	Ditto.	..	..	..	..	..	..	..	..	..	..	Clear.
73	85	.12	E.N. E. lt.	Cirri.	..	..	..	..	..	..	..	..	..	..	Rain last night.
71.5	85	.09	N.E. stdy.	Ditto.	..	..	..	..	..	70	80	.10	N.W. lt.	Cirri.	Cool night. [clear.
71	84	.06	N. E. do.	Clear.	..	..	..	..	..	..	..	..	..	..	Beautifully cold and
72	85	.06	Ditto.	Ditto.	..	..	..	..	..	..	..	..	..	..	Clear weather.
73	85	.05	Ditto lt.	Ditto.	..	..	..	..	..	..	..	..	..	..	Hazy.
73	88	.03	Ditto.	Ditto lt.	..	..	..	..	..	..	..	..	..	..	Small whirwind travelling in Circular direction round Field Hospital with considerable force.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
75	90	.06	N. E.	Cumuli.	..	..	..	..	..	..	..	..	..	..	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
75	89.5	.05	N. E. lt.	Cumuli.	..	..	..	..	..	..	..	..	..	..	
..		..	..		..	..	..	..	..	.	..	..	..	..	Field Hos. removed†
..		..	..		..	..	..	..	..	..	..	..	..	..	
..		None.	..		..	..	..	..	..	..	..	..	..	..	Cold clear evening.
..		..	..		..	..	..	..	..	..	..	..	..	..	
..		..	..		..	..	..	..	..	..	..	..	..	..	[evening cold.
65	80	..	..	H.cumuli.	..	..	..	..	..	63	71	N.E. lt.	Cirri.	Clear N.	Cloudy and hazy; in
65	82	..	N. E. lt.	Cumuli.	..	..	..	..	..	..	..	..	..	..	
70	85.5	..	Ditto.	Cirri.	69	80	None.	N. E. lt.	Cirri.	..	..	..	..	..	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Hazy. [just over.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Cloudy light shower
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Close evening.
..	..	..	..	..	..	..	..	..	..	67	74	Ditto.	..	..	Eclipse of Moon.
73	86	..	N. E. lt.	Cumuli.	71	80	..	Ditto.	Cirri.	..	..	..	..	..	
69	86	..	Ditto.	Cirri.	69.5	78	..	Ditto.	c.-cuml.	67	73	Ditto.	Ditto.	Ditto.	
..	..	..	..	Ditto.	..	..	..	..	..	66	73	Ditto.	Ditto.	Ditto.	
67	82	..	Ditto.	Ditto.	..	..	..	..	..	67	73	Ditto.	Ditto.	Ditto.	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Hazy.
12285	1457	380.73			219.5	238				554	614				
72.24	85.7	30.07			69.83	79.33				69.25	76.75	30.10			

* cloudy and overcast, thunder in distance at 2 P. M.

† inside Stockade to Barrack of Madras Fusileers; Barometer removed.

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of November 1852.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.461	78.4	77.1	62.0	..	..	W.	Clear sky.
2	29.475	78.0	78.6	61.4	..	..	W.	Ditto ditto.
3	29.497	76.7	76.2	61.1	..	..	W.	Ditto ditto.
4	29 483	77.0	78.4	62.0	..	..	W.	Few \ to S.
5	29.501	76.8	76.1	62.6	..	..	Ld.	Clear sky.
6	29 472	79 2	81.5	65.0	..	..	W.	Ditto ditto.
7	29.548	79.0	77.6	64.5	..	..	E.	Ditto ditto.
8	29.567	77 0	76.5	65.1	..	..	W.	Ditto ditto.
9	29.530	75.5	78.0	64.7	..	..	N.W.	Ditto ditto.
10	29.509	75.2	74.0	63.2	..	..	Ld	Ditto ditto.
11	29 483	75.0	75.4	63.4	..	..	W.	Ditto ditto.
12	29 565	74.5	75 3	63.8	..	..	W.	Ditto ditto.
13	29.449	75.0	75.3	64.6	..	..	W.	Ditto ditto.
14	29.453	77.4	74.5	63.0	..	..	W.	Ditto ditto.
15	29.470	75.8	75.9	64.5	..	..	W.	Ditto ditto.
16	29.451	76.5	75.6	65.0	..	..	S.W	Ditto ditto.
17	29.434	76.0	76.0	65.5	..	..	N.	⌒ in zenith.
18	29.349	77.5	76.0	69 0	..	..	E.	∩ in zenith.
19	29 397	76.9	78.2	66.5	..	..	N.	Clear sky.
20	29.425	73.5	71.3	60.5	..	..	W.	Ditto ditto.
21	29.490	75.7	72.5	60.0	..	..	S.	Ditto ditto.
22	29.507	74.5	74.5	62.8	..	..	W.	Ditto ditto.
23	29.535	74.0	72.3	61.6	..	..	S.W.	Ditto ditto.
24	29.543	74.0	70.0	58.5	..	..	W.	Ditto ditto.
25	29.565	71.0	69.4	57.5	..	..	W.	_ ¾ scattered over.
26	29.610	69.3	66.5	55 8	..	..	Ld.	⌒ all over.
27	29.578	70.0	67.5	56.4	..	..	W.	Clear.
28	29 526	70.0	67.0	56.2	..	..	W.	Ditto.
29	29.558	69.0	67.5	54.0	..	..	N.	Ditto.
30	29.540	68.8	66 0	53.5	..	..	N.	Ditto.
Mean.	29.506	74.90	74.02	61.79	..	..	..	

Note. The symbols used for Aspect of the sky are

\ for Cirri — for strata

∩ for Cumuli _ for Cirro-strata

⌒ for Cumulo-strata ⌒ for Nimbi

The Barometer readings have all been reduced to 32° Far. and corrected for Capillary Action.

M. Sherer, *Asst. Secy. to Govt. N. W. P.*

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of Nov. 1852. LATITUDE.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.421	80.2	81.5	63.5	..	..	W.	Clear sky.
2	29.439	80.0	80.4	61.7	..	..	N.	Ditto ditto.
3	29.454	78.9	80.7	62.6	..	..	W.	Ditto ditto.
4	29.453	78.4	78.4	62.6	..	..	W.	⌐ over $\frac{2}{3}$ of sky.
5	29 436	78.5	80.0	63.4	..	..	Ld.	Clear sky.
6	29.425	80.0	80.0	62.0	..	..	W.	Ditto ditto.
7	29.522	79.2	78.5	65.3	..	..	E.	Ditto ditto.
8	29.521	78.2	78.4	64.5	..	..	W.	Ditto ditto.
9	29.479	78.4	78.5	63.5	..	..	W.	Ditto ditto.
10	29.380	77.0	76.9	63.5	..	..	Ld.	Ditto ditto.
11	29.445	76.6	77.1	63.6	..	..	W.	Ditto ditto.
12	29.468	75.5	78.6	64.6	..	..	W.	Ditto ditto.
13	29 389	76.5	77.5	64.3	..	..	W.	Ditto ditto.
14	29.415	77.7	76 0	63.9	..	..	W.	Ditto ditto.
15	29.419	77.2	78.0	64.9	..	..	W.	Ditto ditto.
16	29.405	77.5	80.9	66.5	..	..	N.	Ditto ditto.
17	29 387	77.7	78.5	66.2	..	..	W.	⌒ to N. E.
18	29.317	78.0	77.0	69.0	..	..	S.	Clear sky.
19	29.351	77.8	77.5	67.0	..	..	S.	Ditto ditto.
20	29.371	75.2	74.7	64.5	..	..	S.	Ditto ditto.
21	29.450	76.0	74.9	60.6	..	..	E.	Ditto ditto.
22	29.430	75.5	76.8	64.5	..	..	W.	Ditto ditto.
23	29.487	75.4	75.5	62.5	..	..	N.	Ditto ditto.
24	29.497	74.0	74.0	59.9	..	..	N.	Ditto ditto.
25	29.528	72.8	72.5	59.3	..	..	W.	⌐ $\frac{1}{3}$ scattered over.
26	29.591	71.0	69.0	57.3	..	..	Ld.	⌒ to S. ⌒ E. W. and N.
27	29.523	71.0	70.5	56.5	..	..	W.	Clear.
28	29.428	71.5	70.0	57.5	..	..	N.W.	Ditto.
29	29.506	70.0	70.5	54.8	..	..	N.	Ditto.
30	29.508	70.0	70.0	54.5	..	..	W.	Ditto.
	29.448	76.19	76.43	62.48	..	..	..	

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of Nov. 1852. LONGITUDE.

Minimum pressure observed at 4 P. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.	Rain Gauges.	
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.		3 feet 2 inches from the ground.	Direction of the Wind.
1	29.360	82.2	82.5	62.5	81.5	65.4	73.45	Clear sky.		W.
2	29.371	80.9	81.9	63.5	82.8	64.2	73.5	\ to S. a few.		W.
3	29.386	82.0	81.9	62.6	82.5	65.6	74.05	Clear sky.		W.
4	29.392	82.0	82.5	64.2	82.2	62.2	72.2	⌒ to E. W. and N. \⌒ to S.		W.
5	29.364	82.0	81.0	63.9	79 9	64.1	72.0	Clear sky.		Ld.
6	29.383	80.0	80.9	63.3	80.9	65.5	73 2	Ditto ditto.		W.
7	29.459	79.8	78.9	64.8	85.5	62.3	73.9	Ditto ditto.		E.
8	29.430	79.0	79.0	64.5	79.2	66.0	72.6	Ditto ditto.		W.
9	29.392	78.9	78.6	64.0	78.0	62.7	70.35	Ditto ditto.		W.
10	29.386	79.0	78.5	63.4	78.1	63.0	70.55	Ditto ditto.		W.
11	29.381	80.0	78.0	64.1	77.8	62.0	69.9	Ditto ditto.		W.
12	29.375	77.5	78.6	64.3	78.2	61.0	69.6	Ditto ditto.		W.
13	29.316	78.5	78.5	64.0	78.0	63.5	70.75	Ditto ditto.		W.
14	29.357	78.0	78.0	64.3	77.6	64.0	70.8	Ditto ditto.		W.
15	29.349	79.6	80 5	65.2	80.3	65.0	72.65	Ditto ditto.		
16	29.337	79.8	80.0	66.5	79.5	64.5	72.0	Ditto ditto.		N.
17	29.306	78.5	81.7	66.5	80.5	65.0	72.75	⌒ to N. E.		W.
18	29.262	79.0	79.0	68.2	78.7	70.0	74.35	⌒ in zenith.	16	N.
19	29.290	78.8	78.0	63.0	77.2	65.8	71.5	Clear sky.		W.
20	29.317	76.8	76 4	59.5	75.5	69.5	72.5	Ditto ditto.		S.
21	29.381	76.5	74.7	61.5	75.3	64.4	69.85	Ditto ditto.		E.
22	29.394	78.5	78.5	65.0	78.6	63.6	71.10	⌒ $\frac{1}{3}$ scattered over.		W.
23	29.407	76.5	77.2	60.3	75.8	69.0	72.4	Clear.		N.
24	29.414	75.7	75.4	60.3	75.2	63.2	69.2	\— $\frac{1}{4}$ scattered over.		W.
25	29.461	74.	73.5	59.2	73.4	57.	65.2	\— $\frac{1}{3}$ ditto.		W.
26	29.512	72.5	70.8	58.2	70.0	58.0	64.0	\⌒ to S. \⌒ E. W. and N.		Ld.
27	29.434	72.0	71.5	58.5	72.0	56.0	64.0	Clear.		W.
28	29.412	72.5	72.8	60.0	72.2	57.2	64.7	⌒ to N. W.		N.
29	29.424	72.8	72.0	56.5	72.0	56.6	64.3	Clear.		N.
30	29.447	71.0	70.8	55.8	71.2	52.0	61.6	Ditto.		W.
	29.383	77.81	77.72	62.59	77.65	62.94	70.295		16	

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of December 1852.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.609	67.1	65.0	52.2	..	..	N.W.	Clear.
2	29.610	65.8	62.4	50.1	..	..	W.	Clear sky.
3	29.566	55 8	60.8	63.6	..	..	W.	Ditto.
4	29 579	61.0	61.0	49.7	..	..	W.	Ditto.
5	29.596	66 0	61.0	50.0	..	..	E.	\ ¼ scattered.
6	29.551	61.0	58.4	54.2	..	..	W.	∿ all over sky.
7	29.595	61.0	60.5	56.7	..	..	W.	∿ all over.
8	29.527	63.9	64.0	59.4	..	..	Ld.	∿ to N. W.
9	29.512	63.0	64.2	59.7	..	..	W.	Clear.
10	29.494	63.2	63.4	56.8	..	..	W.	Ditto.
11	29.514	63.0	63.4	55.8	..	..	s.w.	Ditto.
12	29.563	64.5	64.0	55.0	..	..	W.	Ditto.
13	29.629	62.0	63.0	54.0	..	..	W.	Ditto.
14	29.561	62.0	62.8	54.5	..	..	W.	Ditto.
15	29.517	64.0	63.5	55.0	..	..	S.	Ditto.
16	29.643	60 9	61.0	55.0	..	..	N.	Ditto.
17	29.618	60.0	60.5	51.5	..	..	W.	Ditto.
18	29.607	59.0	60.0	50 5	..	..	W.	Ditto.
19	29.599	62.0	61.5	51.5	..	..	W.	Ditto.
20	29.665	52.0	52 5	48.5	..	..	W.	Ditto.
21	29.691	52.0	52.5	48.0	..	..	W.	Ditto.
22	29.595	58.0	58.5	48 0	..	..	W.	Ditto.
23	29.547	58.0	58.5	49.3	..	..	W.	Ditto.
24	29.527	57.5	58.5	49.0	..	..	W.	Ditto.
25	29.569	61.0	60.0	50.8	..	..	W.	\ all over.
26	29.616	59.5	59.5	51.2	..	..	N.	Clear.
27	29 645	58.2	58.5	50.0	..	..	N.	Ditto.
28	29.561	57.7	58.0	49.7	..	..	S.	— a few scattered.
29	29.558	59.9	59.8	51.0	..	..	E.	⌒ ½ scattered.
30	29,590	59.7	59.5	51.5	..	..	Ld.	— scattered.
31	29.523	62.0	62.0	54.5	..	..	E.	∿ all over.
Mean.	29.580	60.67	60.59	52.47	..	..	..	

Jas. Muir, *Asst. Secy. to Govt. N. W. P.*

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of Dec. 1852. LATITUDE.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.551	69.0	67.8	52.5	..	..	N.W.	Clear.
2	29.561	67.3	66.5	51.1	..	..	W.	Clear sky.
3	29.511	66.5	63.9	51.0	..	..	W.	⌐ scattered all over.
4	29.565	64.3	66.9	51.5	..	..	W.	Clear sky.
5	29.536	66.4	66.4	54.0	..	..	E.	\ ¼ scattered.
6	29.510	63.8	60.0	55.2	..	..	W.	⌐ all over.
7	29.532	62.8	59.4	57.2	..	..	W.	Ditto.
8	29.457	65.1	64.5	60.0	..	..	W.	Ditto.
9	29.446	66.0	65.9	61.2	..	..	N.	⌒ scattered.
10	29.455	67.0	66.5	56.0	..	..	W.	Clear.
11	29.475	65.0	63.8	55.5	..	..	W.	Ditto.
12	29.510	65.5	64.5	56.0	..	..	N.	Ditto.
13	29.583	65.0	64.2	53.4	..	..	W.	Ditto.
14	29.511	64.6	65.0	54.6	..	..	W.	Ditto.
15	29.486	65.5	64.9	56.0	..	..	S.	Ditto.
16	29.603	64.0	64.3	55.5	..	..	S.W.	Ditto.
17	29.563	64.0	64.5	52.3	..	..	N.	Ditto.
18	29.549	62.0	61.7	50.5	..	..	W.	Ditto.
19	29.548	63.0	62.0	50.0	..	..	E.	Ditto.
20	29.609	60.5	60.7	50.1	..	..	W.	Ditto.
21	29.621	60.0	60.5	49.0	..	..	W.	Ditto.
22	29.545	60.5	60.9	50.5	..	..	W.	Ditto.
23	29.496	60.0	59.3	49.3	..	..	W.	Ditto.
24	29.469	60.9	61.0	51.0	..	..	N.W.	\ a few scattered.
25	29.510	62.5	62.2	52.5	..	..	W.	\ ½ scattered.
26	29.529	62.0	62.3	52.2	..	..	N.W.	Clear.
27	29.575	60.8	60.2	51.4	..	..	S.W.	Ditto.
28	29.491	60.7	60.2	50.9	..	..	W.	⌐ a few scattered.
29	29.527	62.0	60.5	51.7	..	..	E.	⌐ all over.
30	29.547	61.0	60.6	52.5	..	..	N.	⌐ scattered.
31	29.506	63.0	62.8	55.5	..	..	E.	⌐ all over.
	29.528	63.57	63.03	53.23	..	..	..	

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of Dec. 1852. LONGITUDE.

Minimum pressure observed at 4 P. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.	Rain Gauges.	
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.		3 feet 2 inches from the ground.	Direction of the Wind.
1	29.474	70.4	70.4	53.9	71.3	54.0	62.65	Clear.		N.W.
2	29.478	69.0	67.9	53.0	67.3	46.2	56.75	Clear sky.		W.
3	29.453	67.5	65.5	53.3	66.5	45.7	56.1	_ scattered all over.		W.
4	29.471	66.5	67.7	53.5	67.0	45.5	56 3	Clear sky.		W.
5	29.446	66.0	66 5	53.4	66.4	45.7	56.05	\ a few scattered.		W.
6	29.477	65.0	61.0	57.0	61 5	51.2	56.35	_ all over.		E.
7	29 469	65.0	62.0	58.0	62.3	54.8	58.55	Ditto.	0.42	W.
8	29.434	66.0	65.0	60.2	64.3	59.4	61.85	Ditto.		W.
9	29.407	66.7	64.7	61.2	66.3	56.5	61.4	⌒ a few scattered.		W.
10	29 589	67.0	68.5	57.0	66.8	55.4	61.1	Clear.		W.
11	29.442	66.1	65.2	56.4	64.4	59.8	62.1	_ towards W. and S. along horizon.		S. W.
12	29.502	66.0	65.4	57.5	63.5	62.5	63.0	Clear.		N.W.
13	29.510	65.7	65.0	55.2	64.2	57.7	60.95	Ditto.		W.
14	29.425	66.6	67.0	55.6	65.5	55.0	60.25	Ditto.		W.
15	29.431	67.0	67.5	58.0	66.2	58.0	62.1	⌒ towards W. & S.		S.
16	29.535	67.5	67.2	55.5	67.1	57.3	62.2	Clear.		N.
17	29.477	67.0	66.7	52.6	66.0	56.0	61.0	Ditto.		N.W.
18	29.457	64.8	64.0	52.3	63.4	53.0	58.2	Ditto.		W.
19	29.517	64.5	63.0	52.8	62.0	61.0	61.5	Ditto.		W.
20	29.537	64.0	64.3	51.2	63.0	52.0	57.5	Ditto.		W.
21	29.533	63.7	64 0	51.5	62.3	52.0	57.15	Ditto.		W.
22	29.459	64.0	63.0	52.4	64.0	52.5	58.25	Ditto.		W.
23	29.443	63.9	64.0	51.0	64.0	52.0	58.0	Ditto.		W.
24	29.409	64.5	63.9	55.0	64.0	51.5	57.75	Ditto.		W.
25	29.496	63.4	62.8	53.0	64.4	53.7	59.05	⌒ scattered.		W.
26	29.482	63.2	63.2	52.2	63.5	52.0	57.75	Clear.		N.
27	29.496	62.5	61.4	52.5	64.4	51.3	57.85	Ditto.		W.
28	29.422	62.5	61.9	52 0	61.2	51.0	56.1	_ a few scattered.		S.
29	29.450	63.0	62.0	52.7	61.0	52.5	56.75	⌒ all over.		W.
30	29.450	63.2	62.2	52 8	62.1	54.0	58.05	\ a few scattered.		N.
31	29.436	63.0	62.5	55.5	62.0	60.0	61.0	_ all over.		E.
	29.471	65.33	64.79	54.46	64.45	53.85	59.15		0.42	

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of January 1853.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.457	61.2	61.0	55.1	..	..	N.	⌒ all over.
2	29.572	53.2	53.0	50.5	..	..	N.	Ditto.
3	29.634	55.5	55.9	49.5	..	..	W.	Clear.
4	29.608	55.9	57.0	48.5	..	..	W.	Ditto.
5	29 632	56.0	56.5	48.8	..	..	N.	⌒ a few to N.
6	29 613	59 0	58.0	50.5	..	..	E.	Ditto.
7	29.529	60.0	59 0	52.3	..	..	E.	⌒ $\frac{1}{3}$ scattered.
8	29.526	59.5	61.5	51.8	..	..	N.	\ a few scattered.
9	29.510	59.8	59.0	53.6	..	..	N.	⌒ all over.
10	29.413	60.5	60.3	55.3	..	..	N.	Ditto.
11	29.570	60.0	56.7	52.7	..	..	W.	Ditto.
12	29.564	55.5	55.3	48.6	..	..	W.	⌒ a few scattered.
13	29.559	59.0	58.5	52.5	..	..	N.	Ditto.
14	29.616	56.0	56.5	50.6	..	..	W.	Clear.
15	29.536	56.4	56.5	48.6	..	..	W.	Ditto.
16	29.541	57.6	57.5	50.0	..	..	W.	⌒ all over.
17	29.683	52.0	52.0	49.5	..	..	N.	Ditto.
18	29.689	54.0	54.5	51.0	..	..	W.	Clear.
19	29.597	55.0	55.1	49.6	..	..	Ld.	⌒ $\frac{1}{2}$ scattered.
20	29.561	58.4	57.8	52.5	..	..	E.	⌒ scattered all over.
21	29.425	59.0	58.4	53.5	..	..	E.	⌒ a few scattered.
22	29.536	56.1	56.1	51.0	..	..	N.	Clear.
23	29.493	58.8	58.7	51.5	..	..	N.	\ a few towards S.
24	29.432	59.5	59.0	52.5	..	..	S.E.	Clear.
25	29.479	59.0	59.0	51.5	..	..	E.	Hazy all over.
26	29.414	60.0	59.3	54.4	..	..	E.	⌒ all over.
27	29.530	56.5	55.0	52.1	..	..	N.	Ditto.
28	29.681	53.6	54.5	53.0	..	..	S.	⌒ a few scattered.
29	29.673	58.0	57.2	51.5	..	..	N W.	Clear.
30	29.641	58.5	56.7	49.0	..	..	W.	Ditto.
31	29.538	59.5	59.5	49.2	..	..	W.	Ditto.
Mean.	29.557	57.5	57.3	51.3	..	..	..	

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of Jan. 1853. LATITUDE.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.419	62.0	61.3	56.4	..	..	N.	⌒ scattered all over.
2	29.524	55.8	56.0	52.0	..	..	N.	Clear.
3	29.569	59.0	59.0	51.3	..	..	N.	⌒ a few scattered.
4	29.542	60.0	60.5	50.0	..	..	N.	Clear.
5	29.534	59.5	59.1	50.5	..	..	S E.	⌒ scattered.
6	29.571	60.7	59.4	51.1	..	..	N.	⌒ in zenith.
7	29.481	61.0	60.1	52.0	..	..	E.	⌒ scattered.
8	29.491	61.2	60.9	52.7	..	..	W.	⌒ a few scattered.
9	29.451	61.0	60.4	54.8	..	..	N.	⌒ all over.
10	29.377	60.1	60.5	55.5	..	..	N.	⌒ scattered all over.
11	29.546	60.0	59.6	54.0	..	..	N.	⌒ in zenith.
12	29.505	58.0	57.5	49.8	..	..	S.	⌒ a few scattered.
13	29.535	61.0	60.0	63.0	..	..	N.	⌒ ⅓ scattered.
14	29.578	60.0	59.6	50.8	..	..	W.	Clear.
15	29.497	59.3	58.4	50.0	..	..	W.	Ditto.
16	29.520	59.5	58.5	51.5	..	..	W.	⌒ all over.
17	29.626	56.0	56.0	51.5	..	..	N.	⌒ a very few scattered.
18	29.653	57.6	57.5	51.0	..	..	N.	Clear.
19	29.530	57.0	56.2	50.0	..	..	N.	⌒ all over.
20	29.483	59.0	57.4	52.1	..	..	E.	⌒ in zenith. ⌒ towards N.
21	29.364	60.0	59.8	54.5	..	..	S.	⌒ in zenith.
22	29.481	59.0	59.3	53.5	..	..	N.	Clear.
23	29.446	60.0	59.2	53.2	..	..	N W.	⌒ a few towards S.
24	29.367	60.5	59.3	52.5	..	..	S.W	⌒ a few in zenith.
25	29.437	61.0	59.7	52.2	..	..	W.	⌒ in zenith and hazy towards horizon.
26	29.353	60.5	59.3	53.2	..	..	E.	⌒ all over.
27	29.501	58.0	57.5	53.5	..	..	N.	⌒ ½ scattered.
28	29.615	58.0	57.8	53.9	..	..	N.	⌒ a few scattered.
29	29.605	59.0	57.6	51.0	..	..	N.W.	Clear.
30	29.589	60.9	60.6	49.9	..	..	N.W.	Ditto.
31	29.445	64.2	64.0	51.5	..	..	W.	Ditto.
	29.504	59.6	59.1	52.5	..	..	..	

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of Jan. 1853. LONGITUDE.

Minimum pressure observed at 4 P. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.	Rain Gauges.	
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.		3 feet 2 inches from the ground.	Direction of the Wind.
1	29.367	63.5	63.8	57.5	61.1	54.9	58.0	∩ a few to S.		W.
2	29.497	60.5	59.8	55 3	60 2	49.8	55.0	∩ ¼ scattered.		N.
3	29.531	61.0	60.5	52.0	59.2	49.6	54.4	Clear.		N.
4	29.480	62.8	62.5	51.1	59.7	50.0	54.85	Ditto.		N.
5	29.497	61.0	60.9	51.5	60.2	49.9	55.05	\ a few scattered.		Ld.
6	29.485	62.0	61.0	52.1	60.4	55.0	57.7	_ scattered.		N
7	29.423	62.0	61.7	52.5	61 0	56.0	58.5	_ all over.		E.
8	29.420	63.0	62.1	53.5	62.5	54.5	58.5	∩ in zenith and _ towards hor.		E.
9	29.401	62.0	61.5	55.8	61.0	56.0	58.5	_ all over.		N.
10	29.362	63.0	62.1	57.0	62.0	56.0	59.0	∩ scattered over.		N.
11	29.489	62.0	61.3	53.6	60 6	53.0	56.8	_ scattered.		N.
12	29.427	60.5	59.5	50.0	59.0	50.0	54.5	_ a few scattered.		Ld.
13	29 451	61.5	61.1	53.8	60.5	56.0	58.25	_ very few.		N.
14	29 500	62.5	61.1	51.5	60.4	53.8	57.1	Clear.		N.
15	29.421	62.2	60.8	50.0	60.8	51.3	56.05	\ a few scattered.		N.
16	29.475	57.9	57.9	52.5	57.0	57.2	57.1	_ all over.		N.
17	29.575	58.5	57.5	52.4	57.0	50.0	53.5	A very few ∩ scattered.	1.4	N.
18	29.564	59.5	59.0	51.8	58.0	50.0	54.0	Clear.		N.
19	29.485	58.5	57.2	50.2	57.0	51.3	54.15	_ all over.		N.
20	29.410	59.9	59.4	52.0	59.4	51.6	55.5	∩ in zenith _ towards N.		E.
21	29.302	63.0	63.0	56.6	62.0	56.5	59.25	∩ a few scattered.		W.
22	29.430	62.0	61.4	53.0	60.5	53.0	56.75	Clear.		N.
23	29.352	61.5	61.0	52.5	61.0	56.5	58.75	_ a few scattered.		W.
24	29.321	62.0	61.3	52.0	60.5	55.9	58.2	_ scattered all over.		E.
25	29.369	61.3	60.5	52.2	59.3	56.5	57.9	_ to E. W. & N. ∩ to S.		E.
26	29.342	60.0	59.0	54.5	59.0	59.0	59.0	Raining. _ all over.		E,
27	29.469	60.5	59.1	54.6	59.0	54.6	56.8	∩ a few scattered.	1.0	N.
28	29.574	60.	59.6	54.2	59.0	50.5	54.75	Ditto.		N.
29	29.570	60.0	60.9	51.4	59.8	56.5	58.15	Clear.		N
30	29.527	64.0	64.0	52.0	63.0	56 2	59.6	Ditto.		N.
31	29.383	68.3	68.0	54.2	66.3	53.4	59.85	Ditto.		W.
	29.448	61.5	60.9	53.3	60.2	53.7	56.95		2.4	

JOURNAL

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Report on the Geological Structure and Mineral Wealth of the Salt Range in the Punjaub; with Maps, Sections, &c.—*by* Andrew Fleming, *M. D., Edin. Assistant Surgeon, 4th Regt. Punjaub Cavalry. In charge of the Geological Survey of the Salt Range in the Punjaub. Season* 1851-52.

(Communicated by the Govt. of India.)

(Continued from Page 279.)

Tertiary Eocene Rocks, Brown Calcareous Sandstone, Nummulite, Limestone, Marls and Alum Shales with Lignite.

A band of claystone, in some places highly ferruginous and in others nearly as white as pipe clay, seems to mark the base of this formation. It has exactly the appearance of the ferruginous claystones described as occurring in the Oolite shales, and as it may be seen occasionally passing into black bituminous shales which are in rapid process of decomposition, its origin is doubtless identical.

Resting on this is an incoherent greenish brown calcareous sandstone, which east of Kuttha is devoid of organic remains. At this place, however, it becomes more calcareous, contains a few nummulites and a considerable number of gasteropodous molluscæ. On proceeding westward to Moosakhail, the bed becomes a coarse arenaceous limestone, and abounds in fossils similar to those which occur throughout all the rocks of the nummulite limestone series, none of those characteristic of the formations inferior to it having been detected.

To this sandstone there succeeds a deposit of very varying thickness of dark bituminous alum shales containing irregular beds and

films of a coal having all the characters of a lignite. The shales contain much pyrites, and large and small crystals of Selenite are abundant throughout them. In many places they are undergoing rapid decomposition from the oxidation of the pyrites. In the neighbourhood of Kalibagh the chemical action is so violent, and often produces such intense heat, as to cause the combustion of the shales and their conversion into red claystone. In some of the old shale pits (from which the alum shales are dug) the combustion is most violent, and volumes of smoke issue with considerable force from their mouths charged with the vapours of sulphurous acid which taints the air all around. On tracing the shales upwards they become arenaceous and marly, and pass by a coarse yellow marly limestone full of nummulites and other shells into a compact grey limestone, the lower beds of which appear as if made up of rounded masses of the same limestone arranged in horizontal layers and cemented in a calcareous paste. This appearance has probably been produced by the breaking up of the deposit shortly after its formation, and the subsequent recementing of the fragments by the infiltration of calcareous mud.

Both the limestone and the cementing paste abound in nummulites, fragments of Echinidæ, &c. Above, the limestone becomes of a grey argillaceous character and when bruised emits a fœtid smell. It gradually passes into blue marls which are succeeded by an upper deposit of bituminous alum shales. Argillaceous limestone beds then follow of a light grey colour, having a striking resemblance to chalk, and are succeeded by a thick deposit of a very compact light grey limestone in which irregular shaped masses and rounded nodules of flint closely resembling those found in chalk are abundant. They are particularly so, in the district between Nummul and the north side of mount Likesur, and were there collected in large quantity by the Sikhs for the preparation of musket flints. They seem to be arranged generally in layers, and are of a dark grey or black colour, their surface being covered with a white chalky crust, and sometimes with an incrustation of peroxide of iron, which, both in nodules and in small veins, is of frequent occurrence in the limestone. These are apparently decomposed pyrites.

The limestone in many places seems formed entirely of the shells

of Foraminiferæ, especially of nummulites which are most apparent in the weathered surface of the rock, a freshly fractured surface often presenting no trace of them.

It is very hard but brittle, and presents a splintery conchoidal fracture. The rock is invariably traversed by deep fissures and cracks indicative of its having suffered severely from the commotions to which the Salt Range has been subjected.

It is a very fine limestone dissolving rapidly in muriatic acid, and with the separation of a small quantity of flocculent silica.

The nummulite limestone formation west of Pind Dadun Khan forms generally the top of the escarpment of the range, appearing between that place and Kuttha and in the Chichalee Range, in precipitous cliffs several hundred feet high, which weather of a white colour and in the distance have a strong resemblance to chalk.

Owing to the rapid disintegration of the shales in the cliffs, the limestone becomes undermined, and huge masses of the rock thus become detached, and strew with their debris the steep sides of the hills. To the north of the escarpment of the range in its central part, the nummulite limestone in a great degree conceals the inferior rocks, and is generally distributed over the ridges, table-lands and valleys which intervene between its north and south sides. Its strata are, however, very much broken up, and in all the deep ravines its relation to the inferior rocks may be observed.

The thickness of the formation varies much, but when well developed, it cannot be less than a thousand feet; in many places it is much more.

In this formation the limestone as a source of lime is very valuable, being more generally burned, than any other limestone, in the Salt Range. It is never quarried by the natives who have only to collect the boulders of it which are strewed in great abundance all along the foot of the hills.

From its brittle splintery character, and the difficulty of obtaining blocks of it of any size, it is not adapted for a building stone.

The minerals we shall notice as occurring in this formation are the alum shales as a source of alum, and thin enclosed beds of lignite, petroleum and mineral sulphur.

Alum shales are extensively mined at Kalibagh, and at Kathee in

the Chichalee pass. At Kalibagh the principal workings are at a place called Chatab on the north-east side of the Kalibagh hill, above the Soan Nullah and about a mile from the Indus opposite Marie. Here the lower alum shales are fully two hundred feet thick, and are surmounted by a high scarped precipice of nummulite limestone. Regular shafts are sunk in the shale or "Ral" as it is called by the natives, to depths varying from two or three hundred feet. After being carried out of the pits by men and boys, it is packed in coarse blanket bags and conveyed on bullocks or donkeys to the alum works at Kalibagh, where the miners are paid at the rate of one rupee for from thirteen to seventeen maunds, according to the quality of the shale delivered. From the incoherent character of the beds, and the rude way of mining them, accidents to the miners are of very frequent occurrence, who, from the sulphureous air they are obliged to breathe in the pits, and the laborious nature of their employment, have a most sickly and emaciated appearance.

In the town of Kalibagh there are generally from twelve to fourteen kilns for burning the shale, to each of which the necessary arrangements for the preparation of alum are attached. In 1852 only twelve kurrahs or evaporating pans were in use, one being attached to each kiln.

In preparing the kiln a layer of brushwood (generally tamarisk jungle which abounds on the banks of the Punjaub rivers) is spread on the ground to an extent varying according to the size of the one to be constructed. On this a layer of the Ral or Shale in fragments is deposited to the depth of about a foot, to which succeeds a second layer of brushwood, and then another of shale, a quantity of wood being added according as the shale is more or less bituminous. When several of these layers have been arranged, the kiln is set on fire from below, care being taken that the combustion is not too rapid, which from time to time is moderated by sprinkling water on the shales. The kiln being well lighted fresh layers of shale and brushwood are added, and when the whole has attained the height of thirty or forty feet it is left to burn, six or eight months being sufficient to effect the thorough decomposition of the mass, which when completed has changed from a black to a brick red colour in consequence of the oxidation of the pyrites. Its surface is covered

with an efflorescence of alum containing a large proportion of sulphate of iron or green vitriol derived from the mutual reaction of the clay and iren pyrites in the shales, which from containing thin films of coal are admirably adapted for alum manufacture. Close to the kiln, and on a level a little below its base, there is a baked clay vat 12 feet square by $1\frac{1}{2}$ feet deep. Into this a portion of the burnt shale is thrown and treated for several hours with water which rapidly acquires a dark brown colour. When a saturated solution of the soluble matter in the shale is obtained, it is drawn off from the vat by an aperture in its side (which during the lixiviation of the shale is stopped by a plug) into another vat of similar size, but on a lower level. Here the crude alum liquor is allowed to deposit any mud which it may contain, and is then run off into a third but smaller vat on a still lower level, when it is again allowed to deposit any remaining impurity. From this it is transferred into an iron evaporating pan or "kurrah" where it is rapidly boiled and mixed with a brownish impure salt called "Jumsan" from which it derives the alkali necessary to convert the crude alum into an alum of commerce. When a proper quantity of this has been added, which is judged of from the apparance of the liquid, the whole is allowed to settle and the clear brown alum solution removed into vats about nine feet long $5\frac{1}{2}$ broad and about $1\frac{1}{2}$ feet deep, a series of which are arranged beneath a shed close to the evaporating pan. In these the solution, which is concentrated to a point a little short of that of crystallization, is allowed slowly to crystallize for several days. During that time small alum crystals are formed of a slightly pink colour devoid from the impure mother liquor which contains a quantity of chloride and sulphate of iron. When a considerable crop of alum has separated, the crystals are removed from the vat, slightly washed with cold water on a sirkee frame, and allowed to dry. These are afterwards fused in an iron pan, in their own water of crystallization and when in a fluid state are removed into large conical earthen jars, one foot eight inches deep, the same breadth at the shoulder, and six inches wide at the mouth, where for eight or ten days the alum is allowed to crystallize. At the end of this period a hole is made in the mass of alum, which is generally hollow in its interior, the gurrah inverted, and the uncrystallized alum liquor

allowed to escape. The gurrah is then broken and the alum, moulded to its form, is ready for sale and exportation.

The following is an estimate of the expence at Kalibagh per diem of keeping one kurrah or evaporating pan, &c. at work. Payments are made in a 13 anna Rupee for the Company's maund.

40 maunds of shale, ... Rs.	3	0	0
Wood to burn this and evaporate the alum liquor,	4	8	0
5 maunds of Jumsan, ...	3	0	0
7 Coolies, ...	1	4	0
Sundries, ...	0	8	0
Water-fee paid to Mulik Ulla Yar Khan, ...	0	1	6
Fee to Mulik of Kalibagh, ...	0	4	0
	12	9	6
Difference between 13 anna Rupee and Co.'s Rs. in Rs. 12-9	2	5	0
Total Expence, Co.'s Rs.	10	4	6

The above expenditure yields a return of three maunds and ten seers of alum, the value of which at Rs. 3-4 per maund is Co.'s Rs. 10-9. Assuming the above to be correct (and we give it exactly as stated to us) the owner of each kurrah will only have a clear gain of As. 0-4-6 per diem. At Kalibagh however as the Mulik of the place Ulla Yar Khan is sole proprietor of five out of the twelve kurrahs at work, and as he generally pays his workmen and miners in flour, clothes, &c. instead of in cash, his profits are doubtless considerable. He moreover levies a tax of Rs. 2 on every camel load of alum removed from Kalibagh.

Alum is manufactured at Kalibagh for ten months in the year and about 12000 maunds (8571 cents) is annually prepared, which at Co.'s Rs. 3-4 per maund will yield a return on the spot of Rs. 39,000.

At the Kathee alum works in the Chichalee pass, the expenses are considerably less, and the alum prepared, though of equally good quality, is sold at the rate of Rs. 2-8 per maund.

They are owned by a Joint Stock Company of eight members who are chiefly residents of Esakhail on the Indus, annexed is the expenditure for one kurrah per diem, of which there are eight.

60 maunds of shale, ... Rs.	1	0	0
Wood to burn this and evaporate the alum liquor,	4	0	0
3 maunds of Jumsan, ...	2	8	0
9 Coolies' wages, ...	1	12	0
Fee for right to water taken by the Lumberdar of Esakhail, ...	0	6	0
Sundry Expenses, ...	1	0	0
Rupees	10	10	0
Difference between 13 anna Rupee and Co.'s Rs. in Rs. 10-10, ...	2	0	0
Total Expence, Co.'s Rs.	8	10	0

From the above 4 Co.'s maunds of alum are produced, the value of which at Rs. 2-8 per Co.'s maund would be Rs. 10, which gives a clear profit to each kurrah per diem of Co.'s Rs. 1-6. About 10,000 maunds are annually prepared.

The Kathee alum-works are, we believe, of recent origin as compared to those of Kalibagh, where the manufacture has been carried on in the same way by Mulik Ulla Yar Khan's ancestors for eight or nine generations. Between the owners of the new and old alum-works there is considerable jealousy, and as the former can obtain the materials for the manufacture at a cheaper rate, they are likely to damage the monopoly that formerly existed at Kalibagh, in the days when the Mulik of the place was looked upon as a petty king. It has been already stated that the substance from which the alkali of the alum is derived is a brown salt called "Jumsan," which occurs as an efflorescence on the jungle soil of the plains which skirt the Salt Range and Chichalee Hills and, indeed, is of common occurrence in all grass jungles and waste grounds throughout the Punjab. It is called "kullur" by the natives, and from it "Jumsan" is obtained by treating the former with water and drying up its filtered solution in shallow earthen vessels exposed to the sun. This on analysis proves to be a mixture of sulphate of soda with common salt, with varying proportions of carbonate of soda; its quality depending chiefly on the amount of sulphate of soda which it yields.

In all the commercial European alums as far as we can ascertain the alkaline base is potash or ammonia, the former alkali being characteristic of British alums while the latter occurs in those of France. In the alum of Kalibagh, however, soda forms the alkaline base, a fact which the addition of "Jumsan" to the crude alum liquor first led us to suspect, and which an analysis of the alum subsequently confirmed. A soda alum has hitherto, we believe, been known only as an interesting chemical preparation, but previous to 1848, we are not aware that it had been noticed as a staple article of commerce in the N. W. Provinces of British India.

Considering the coarse apparatus in which it is prepared, its purity is astonishing. It effloresces considerably on exposure to the air, and has a slight pink colour arising from the presence of a little iron which strikes a blue colour with yellow prussiate of potassa, and only contains a trace of muriate of soda. Although alum is only manufactured Trans-Indus, alum-works might, we believe, be established with advantage in the Bukh ravine between Mosakhail and Nummul, as there the alum shales are of considerable thickness, aud wood and water could be obtained in abundance. In other parts of the Salt Range the alum shales are too inaccessible and their thickness too small to be profitably worked as a source of alum.

Lignite or Salt Range Coal.

Throughout the Salt Range from Jelalpoor to the Indus and in the Chichalee Range, irregular seams of lignite, having, in many places, the aspect of good bituminous coal, may be observed imbedded in the lower alum shales. Lignite also occurs in the upper shales but in too thin films to be of any use as a fuel.

We shall notice the different localities where we have observed the lignite deposit proceeding from east to west.

Baghanwalla. This coal locality was first brought to the notice of Sir Henry Lawrence by Lt. Robinson, Bengal Engineers, who forwarded samples of it to Lahore in the Autumn of 1847. From these we made an analysis, the results of which, along with a few remarks on the general characters of the coal, were laid before the Asiatic Society of Bengal in February 1848.

Baghanwalla is a small village on the south side of the Salt Range, about ten miles west of Jelalpoor, and about eight miles from the right bank of the Jhelum. The coal seam occurs in a ravine about three miles north-east of the village among the hills and at an elevation of about one thousand feet above the plain. The access to it is by a narrow path, rather difficult and steep, but over which bullocks can travel, if moderately loaded. The nummulite limestone at this point rests on the upper red sandstone formation, and a burnt clay sandstone passing into a baked white quartzose sandstone of a few inches in thickness, marks the base of the deposit. Beds of greenish yellow marl, about a foot thick, follow, which gradually pass into sandy bituminous shales eighteen feet thick inclosing the lignite seam, on which rests a grey nummulite limestone seventy-five feet thick, the lower strata of which are marly, of a yellow colour and full of shells of a species of Ostrea and nummulites. On this limestone a thick series of miocene grey sandstone grits and red clays reposes conformably, all the strata dipping to the N. N. W. at an angle of from 40 to 45.° (See section No. 5.)

The coal seam though it may be traced on either side of the ravine where the above section was taken, for about a mile, does not present an uniform thickness as exposed on its out crop. On digging into the seam to the depth of several feet, we obtained about three feet of good coal, and about two feet of coal alternating with films of sandy shale which latter in many places seems developed at the expense of the coal which is extremely brittle, so much so that fully one-eighth falls to powder in extracting it. It loses this character, however, to some extent on digging into the seam, but we fear at whatever depth it might be mined, it never would have the solidity of genuine coal.

In a few hours two or three coolies turned out eight or ten maunds of fair coal, which bore carriage on bullocks over the hills to Baghanwalla pretty well; a camel load of it was subsequently forwarded to Lahore.

That several thousand maunds of a good fuel could be obtained from this locality at a moderate cost, I entertain no doubt, but the question as to its yielding a supply for any length of time can only be decided by sinking an experimental shaft or gallery into the

seam from its out crop and working along its strike. This we had neither time for, nor the means of effecting. In sinking such a shaft, considerable annoyance would be experienced from the amount of debris and the incoherent nature of the overlying strata in the cliffs above the coal. The high inclination too of the beds, and the consequent liability to have any shaft sunk in them filled with water after heavy rain, are very serious obstacles to working the coal successfully, even supposing the seam preserves a continuous thickness for any distance, which we are very much disposed to doubt.

Should government determine on making attempts to mine the Salt Range Coal, we strongly recommend that this locality be fixed on for the purpose, as it is the only one where any hope of success can be offered.

Drengun. On the north side of this mountain and to the west of the path leading from Besharut to Chooa Gunj Ali Shob, lignite of a similar character and in a similar position occurs, but from exposure to atmospheric influence, it is soft and crumbles into a brown dust in the hand. In a ravine of most difficult access about two hundred yards west of the path, highly bituminous shales about one hundred feet thick are exposed, dipping under nummulite limestone to the north north-west at an angle of 70°; in these two or three seams of tolerably good coal were found, the thickest of which was only eight inches. On tracing these, however, for any distance they seemed all to thin out into mere films in the shale.

As the Drengun coal is evidently an extension northwards of the Baghanwalla seam, a shaft sunk through the nummulite limestone on the table land of Besharut would doubtless reach it, but the expense of sinking a shaft through the hard limestone would be very considerable, and would in all probability not be repaid by obtaining a supply of coal, of any consequence.

Keurah. About a mile north-east of the salt-mine village of Keurah near Pind Dádun Khan, and near a tank known under the name of Ruthlum, a mass of nummulite limestone forms a rounded hill in a ravine, at the foot of which bituminous shales occur, from which in 1848 we obtained specimens of coal, from a seam about two feet thick, resting on blue clay. In 1849, five hundred maunds of coal were mined from this locality, and sent to Jhelum for the use

of the "*Conqueror*" steamer, in the month of July. This seems quite to have exhausted the supply, as when we lately visited the locality we could only find nests of lignite in the shales, which was so soft and powdery, that it was impossible to procure even a specimen. The nummulite limestone formation at this point, and indeed all the rocks, are much disturbed, and the mass of nummulite limestone with the shales is evidently a portion, which has been detached from its connection with the regular bed, and got thrust under some broken up beds of Devonian sandstone, which may be seen in the hills above overlying the nummulite limestone.

Pid. This locality is to the west of the direct path from Kurrah to Chooa Seydun Shah. The shale beds lie under a cliff of shattered nummulite limestone due south from the village of Pid, and between that village and Taber. The access to the locality is difficult, and the coal occurs in two seams, the lower one of which is in some places two feet thick, and separated from the upper which varies from one to three feet by shales of about a foot in thickness. From extensive spontaneous decomposition which the shales have undergone, the coal is for the most part charred and brittle, and is encrusted with yellow alumimous earth. In some places the shales have been burnt into a white claystone which is blotched occasionally by peroxide of iron. The brown calcareous sandstone too on which the shales rest here and there presents a baked and whitened appearance, resulting from the heat to which it has been subjected during the combustion of the shales.

The coal is of inferior quality to that of Baghanwalla though evidently part of the same deposit. As the cliff on which it occurs is covered by so much debris, we were unable to dig any depth into the seam, so as to obtain specimens which had not been subjected to the influence of decomposition. Where the seam crops out, it is at least two thousand feet above the plain, and is in too inaccessible a locality ever to be worked to advantage. By mistake in our Report of 1848 we called this coal locality Ruttipind.

Demdhote. In a ravine about five hundred yards west of this village and under the high escarpment of the Salt Range, a mass of nummulite limestone which has evidently been detached from the escarpment, forms a small rounded hill, at the foot of which some

lignite in a seam about two feet thick crops out. As this is only a detached portion of the regular deposit, it is of no importance, except as proving the extension of the coal seams along the range.

Mukrach. We have seen coal under detached masses of nummulite limestone in the hills above the salt-mine village, but the regular shale bed is covered in the escarpment where we examined it, by a great quantity of debris.

Noorpoor. Under the high cliffs of nummulite limestone below Noorpoor, the shale beds are distinctly seen, much decomposed however, and containing two small seams of coal from eight inches to a foot in thickness. A great amount of debris covers the shales and renders it unsafe to make exploratory diggings.

Kuttha. At the top of the Kurrumea Wou above Kuttha and beneath a high precipice of limestone, dark arenaceous shales full of pyrites occur, and enclose two or three seams of coal of good quality, the thickest of which was not more than half a foot. It has a much more mineralized and compact appearance, than the lignite from most other localities. When we first observed the coal in this locality, in March 1851, the seam could be traced for about thirty yards, dipping to the north north-west at an angle of 25° under the nummulite limestone. In January 1852, when we again visited the spot, the out-crop of the coal was completely concealed by enormous masses of the limestone, which had a few days previously become detached from the cliffs above, during an earthquake. We merely mention this as illustrative of the difficulties that would attend any attempts to mine the coal, as it occurs generally in the Range.

Kathee in the Chichalee Pass. Between Kuttha and the Indus we have seen no coal deserving of notice, though films of it may be observed in the alum shales of the Bukkh ravine and in other localities. In the highly bituminous alum shales which supply the Kathee alum works, layers of very compact bituminous coal occur, but they seem to be continuous for but a short distance, either thinning out in the shales or becoming interlaminated with these. From the interior of one of the shale pits we obtained several specimens of coal which appeared to form a sort of nest inclosed in the shales, and was being quarried along with them for transmission to the

alum kilns. The miners declared to us that the coal never occurred in seams, but merely in patches of irregular extent and thickness. The shale at Kathee is remarkably fresh, and, except on the surface, is not at all decomposed. It contains more carbonaceous matter than any other shale of the sort we have seen in the nummulite limestone formation, and hence, as but little wood is required to burn it when once it is lighted, it is most economically used in the preparation of alum. The pits are sunk to no great depth in the shales which dip under the limestone at an angle of from 30 to 35°. By sinking a shaft to some depth in the shale it could be easily determined whether the coal occurs here as a seam or not. The locality is a convenient one and access to the present shale pits, easy.

Having thus indicated the existence of coal in seams of irregular thickness throughout the nummulite limestone formation for a distance of one hundred and thirty miles, it is evident that a very considerable amount of fuel exists; but the very irregular thickness of the deposit, the high angle at which the strata dip, their inaccessible position and the immense amount of debris in the cliffs above the coal will we believe prove serious obstacles to mining it successfully as a steamer fuel. A few experiments conducted in the more favourable localities can alone decide the point.

Wherever the coal has been observed, its characters are identical. It is evidently a lignite or brown coal as it gives a brown streak, and frequently contains half-decomposed patches of brown carbonaceous matter resembling peat. Specimens of the coal obtained from some depth, and which have not suffered from atmospheric influence, are highly bituminous, of a glistening black colour like jet or cannel coal and sometimes present a pavonine lustre. It is very brittle, a character peculiar to all lignites or recent coals, small crystals of gypsum may generally be observed in the coal; which, in most localities, contains but little of the iron pyrites so abundant in the alum shales. The origin of the coal is probably marine and from the abundance of large gasteropodous molluscæ in the strata both above and below the shales, it is probable that by their decomposition as well as that of fuci and other marine vegetables the coal has been formed. No indications of fossil wood or remains of land-plants have been detected in the shales, from which, however, we have procured one or two shells

of the genus Cerithium or some allied genus. The surface of the shales is sometimes encrusted with an efflorescence of sulphate of magnesia.

The coal is somewhat difficult to ignite, and at first emits a large quantity of smoke which has a strong empyreumatic odour. When combustion, however, is once established, it burns without coking, gives out a considerable amount of flame and heat, and leaves a brown ash, the quantity of which varies considerably in different specimens.

We annex the results of the analysis of two specimens of Baghanwalla coal, and of the coal from the Kathee alum-shale pits.

Baghanwalla No. 1.

Coke (carbon),	41.36
Volatile, bituminous inflammable matter,	40.64
Ashes,	18.00
Total,	100.00

Baghanwalla, No. 2.

Coke (carbon),	59.705
Volatile, bituminous inflammable matter,	38.455
Ashes,	1.840
Total,	100.000

N. B. No. 1 was from the upper part of the seam. No. 2 was from its centre, and was a remarkably fine fresh specimen.

Coal—Kathee alum-shale pits.

Carbon (coke),	33.579
Volatile, bituminous inflammable matter,	36.421
Ashes,	30.000
Total,	100,000

From the above it will be seen that though inferior to good English coal, that of Baghanwalla possesses the necessary requisites for a good steamer fuel. The small amount of ash in No. 2 is very remarkable.

From its large amount of ash the Kathee coal is of inferior quality and in burning would yield a quantity of clinker. If it could be got in quantities it would, however, be valuable, as it burns freely notwithstanding the large quantity of earthy matter it contains. Seams of coal apparently of a very similar character to those in the Salt Range are described by Sir Roderick Murchison as associated with nummulite limestone formation in the Alps and Appenines, in a paper published in the quarterly Journal of the Geological Society for 1848. He states that, "in the Brattenberg near Thun, a band of coal is associated with the nummulitic deposit which is now extensively used in the manufacture of gas at Berne. Near Val D'Agno to the south of Pecoaro, seams of coal are worked for use in that neighbourhood which lie in shales which dip away from the older rock, and pass under the adjacent hills of nummulitic limestone. In fact these coal beds occupy the same place as those of Entrevennes in Savoy, of the Diableritz, and of the Brattenberg in the Canton of Berne." We much regret that no particulars are stated in the invaluable paper from which we have quoted, as to the thickness, mode of working, &c. of the coal seams.

Petroleum exudes from the nummulite limestone rock in the Kuttawan near the village of Jubba, on the north side of the Salt Range, ten miles east of the Indus. It occurs but in small quantity, and is collected by a method similar to that employed at the petroleum springs of Kaffir Kote. It is associated with springs of sulphureous water, the sulphur of which as well as the petroleum are probably derived from the destructive distillation of the bituminous shales beneath the nummulitic limestone. It here receives the name of Gunduk ka tél (sulphur oil). It is of a dark brown colour, very fluid, and yields on distillation a good deal of Naphtha.

Besides the numerous springs charged with sulphuretted hydrogen, and which deposit sulphur on the rocks over which they flow, and on the grass and weeds by their sides, sulphur, in a mineral form, occurs near the surface of the nummulite limestone at Jubba, a little above the petroleum springs, in a white porous gypsum, which has evidently been formed by the decomposition of the limestone, unaltered portions of it still remaining imbedded in the gypsum.

The metamorphosis has doubtless been effected by the action of sulphuretted hydrogen and sulphureous acid. These gases, generated in the decomposing alum shales by passing through the fissured limestone and porous gypsum which covers its surface, become mutually decomposed, sulphur being deposited. Dumas in 1846 proved that when sulphuretted hydrogen at a temperature above 100° Faht. and still better when near 190°, comes into contact with certain porous bodies, a catalytic action is set up, by which water, sulphuric acid and sulphur are produced. In this way sulphur is universally formed in nature, and even in volcanic countries, "no well authenticated case of its sublimation in an uncombined state,"* is known. The thickness of the sulphur formation is very trifling, but may be observed over a space of about two miles along the strike of the limestone.

The sulphur is in small quantity and of a bright yellow colour. It was formerly worked by Maha Raja Goolab Singh of Cashmere, who found it unprofitable and removed his establishment to Nákbund (a most appropriate name for a sulphur manufactory), near Kooshalgurh on the right bank of the Indus between Attock and Kalibagh, where it is said, sulphur exists in considerable quantity. The unsettled state of the hill tribes in the Kohat district prevented our visiting the Nákbund sulphur deposit. We are however informed by Misser Gyan Chund, the present Tehsildar of Pind Dádun Khan and former tax-man of the Salt Range salt mines, that during the Seikh rule, he, for three successive years, from the above locality extracted 1000 Lahoree maunds of sulphur, for the manufacture of gunpowder for the Seikh army. This he was able to supply at the rate of Rs. 6 per maund. He described pits of thirty or forty feet in depth as being dug into the sulphur formation which he reckoned of considerable extent. The mines are about five miles from the Indus near a village called Ricí and about three miles below Kooshalgurh.

The mode adopted by the natives for extracting the sulphur from its matrix is very simple. A hole is dug in the ground on which a large gurrah or earthen vessel with a wide mouth is placed. This is then filled with the coarsely powdered rock. A second gurrah in

* Daubeny on Volcanoes, 2nd edition, p. 615.

the bottom of which a large hole has been made, is then put on the top of the lower one, and secured to it by a coating of clay, to which succeeds a third and a fourth, all communicating with each other. A sharp wood fire is then lighted under the lower gurrah, by which the sulphur is gradually sublimed in the form of flowers of sulphur into the upper ones, to the sides of which it adheres. The subliming process generally goes on for eight or ten hours, by which time all the sulphur has been expelled from its matrix.

None of the organic remains which occur in the nummulite limestone formation have been detected in the rocks inferior to it. The mulluscæ which characterize it have a totally different character, and neither belemnites, ammonites, nor terebratulæ which occur in the oolitic rocks beneath are to be seen, their place being taken by swarms of Foraminifera of the genera Nummulina and Fascialites? and by large Gasteropoda of the genera Conus, Trochus, Oliva, Mitra, Voluta, Terebellum, Natica, Acritina, &c.

Several large bivalves also occur, and a small Ostrea (?) forms in some places patches of yellow marly limestone.

The abundance of nummulites is very remarkable; and at least two or three species occur. They have of late years been considered as characteristic of formations superior to the chalk, and as regards the Alps where the nummulite limestone is so extensively developed, Sir Roderick Murchison, in his paper above quoted, says, "I am persuaded that no form of the genus Nummulina occurs below the surface of the chalk, or its equivalent," and again, "that the lowest beds with nummulites are completely above all those rocks which are the equivalent of the white chalk of northern Europe."

Cephalopoda seem very scarce. We have only obtained specimens of two large species of nautilus.

Radiata are in some places rather plentiful, and specimens of species of the genera Spatangus, Galerites and Clypeaster have been procured; some of the former are of large size.

The only indication of vertebrata we have obtained, are a few teeth, evidently those of sharks, and one or two small fragments of bone too indistinct, however, we fear, to be identified.

The fossils, except in the calcareous sandstone, are generally ill-pre-

served. In the limestone they are generally mere casts of shells, and those obtained were generally much weathered.

In superficial extent, the nummulite limestone formation covers a larger space in the Salt Range, than any of the rocks hitherto described. In the eastern part of the Range it is first observed on the northern flank of mount Tillah, a little above the village of Bhet, as a band of yellow marly shell limestone, not more than twenty feet in thickness, resting on upper Devonian red shales, and covered by thick beds of Miocene (?) strata. Preserving the same relations, it may again be seen at Jalalpoor on the North side of the Range, and from thence may be traced uninterruptedly to Baghanwalla, where it has a thickness of from seventy-five to eighty feet.

West of this it seems rapidly to increase in thickness and from the top of the Range when it crops out in the escarpment, it stretches north in nearly horizontal strata forming the table-land of Besharut. Here it skirts the flank of mountains Kuringuli and Drengun, the ridges of which, formed of Devonian rocks, have been forced up through the nummulite limestone, and throw it off with an anticlinal dip from either side. On the west end of mount Drengun, it entirely conceals the Devonian rocks, and from thence dips north under the narrow valley which separates mount Drengun from Deljubba. In this valley it is covered up by Miocene strata, but on the north side of the Deljubba ridge, again crops out dipping to the south-east under the Miocene strata at a high angle. At the west end of the escarpment on the north side of Deljubba it appears resting on the Devonian rocks, but on proceeding eastward it seems to thin out and to be covered over by the Miocene strata. The limestone can however be traced projecting here and there through the latter on to the Gharigulla Pass where it appears in a nearly vertical wall, some thirty feet thick, crossing the pass from south-west to north-east, and gradually disappearing under the Miocene strata, which are thrown off from it, from either side of an anticlinal axis.

We are not aware that the limestone is anywhere seen, between the Gharigulla Pass and Bulerala.

From the neighbourhood of mountains Kuringali and Drengun, the nummulite limestone stretches westward, and forms the superficial

rock in great part of the central district of the Salt Range. As far west as Noorpoor, it is in relation with Devonian rocks; but between this and Koofree, the carboniferous rocks intervene. In this neighbourhood the Oolitic rocks appear at the base of the Eocene formation, and as we proceed westward, separate it more and more widely from its eastern associates.

At the west end of the Sam Sikesur valley all the strata forming the high ridge of mount Sikesur are tilted up at a high angle. Along the foot of its scarped or S. S. E. side all the rocks are very much disturbed; but in the escarpment itself great regularity prevails, the nummulite limestone forming its summit and N. N. W. side till near its base, where it is covered up by conformable Miocene sandstones, &c.

From mount Sikesur on to within two miles of the Indus the nummulite limestone occurs uninterruptedly; but though of greater real thickness than to the eastward, makes comparatively little show, owing to the high angle (45 to 50°) at which it dips to the north-east under the Miocene rocks.

In the disturbance which the strata in the neighbourhood of Maree have undergone, the nummulite limestone seems to have been entirely removed, but on crossing the Indus to the Kalibagh hill, beds of it again appear.

These stretch round into the Chichalee Range, and, as seen in the Chichalee Pass, have a thickness of upwards of one thousand and three hundred feet. In this Range, as in the Salt Range, the nummulite limestone appears in bold white cliffs forming the summit of its scarped or south-east side, and the formation may be traced down to within six miles of the Koorum river, where it thins out under Miocene sandstone.

It does not appear in the upper part of the Kaffir Kote Range, though from the researches of Captain Vicary, it is known to occur to a considerable extent in the southern part of the Sooliman and Hala ranges. Capt. Grant too, in Cutch, has described a series of beds of nummulite formation extending over a space of about thirty miles, many of the fossils obtained from which are identified with those we have found in the Salt Range.

During the hot weather of 1851 we detected nummulite limestone

of a very different appearance from that of the Salt Range, as forming the surface rock at least of several of the Hazara hills north of Rawul Pindee and on the mount Mochpoor. About fifteen miles north of the new Murree Sanatarium, which attains an elevation of upwards of nine thousand and seven hundred feet, we obtained abundance of nummulite limestone on its sides and summit.

From Cashmere too, Mr. Vigne obtained limestone containing nummulites. This we have seen in situ on the side of a mountain at the upper end of the Manasabul lake, where it is much disturbed and calcined by greenstone. It probably forms the summit of many of the higher hills on the northern side of the Cashmere valley, a district fraught with interest to the Geologist, and hitherto quite unexplored.

When we consider that the nummulite formation may be traced from the Mediterranean through Egypt, Asia Minor and Persia into the north-west and southern provinces of British India, and throughout all this extent preserves the same zoological character, though differing considerably in mineral aspect, the importance attaching "to a right understanding of its true position in the Geological series," cannot be overrated.*

* Since writing the above, we have had the pleasure of perusing the anniversary address, for 1852, of the President* of the Royal Geographical Society, in which it is stated, on the authority of Professor Oldham, that "the coal and iron of the district of Cheera Punjee, or the range of hills which separates Assam and the Beramputer from the plains of Sylhet, belong to the nummulite tertiary formation." We may also state that from specimens of the coal and rocks connected with it, which were forwarded for our inspection from the Singrowlee coal mines near Mirzapore, in December, 1849, by Claude Hamilton, Esq. one of the proprietors, we gave our opinion that it was a coal of a similar character and of a similar age, with that of the nummulitic formation of the Salt Range. This coal is now pretty extensively consumed by the Ganges Steamers, and is sold at Mirzapore at the rate of 75 Rs. per hundred maunds. A sample of this coal, which we analyzed in September 1850, gave the following results.

Carbon (coke),	43.34
Volatile, bituminous inflammable matter,	50.00
Ashes,	6.66
Total,	100.00

* Sir Roderick Impey Murchison.

Tertiary, Miocene (?) Rocks, greenish Sandstones, argillaceous Grits, Conglomerates, and red and green Clays.

Resting on the nummulite limestone there is observed throughout the Salt Range a conglomerate of small rounded boulders of a similar limestone connected by calcareous sandstone. This passes into a series of soft greenish sandstones, alternating with bands of conglomerate, in which small boulders of plutonic and metamorphic rocks predominate. These bands are very numerous near the Indus above Kalibagh where among the boulders a black porphyry (melaphyre) is very abundant. Along with the sandstones and conglomerates, beds of argillaceous grit and red and green clays occur, which contain crystals of selenite and small veins of carbonate of lime and quartz.

The sandstones are highly calcareous, effervesce strongly when treated with muriatic acid, which, after dissolving the calcareous matter, leaves a sand chiefly composed of quartz, felspar, hornblende, mica and magnetic iron. In the neighbourhood of the nummulite limestone, their surface is frequently encrusted with a slight saline efflorescence, but this disappears in the upper beds.

Where exposed to atmospheric influence and to the action of water charged with carbonic acid, the sandstones are extremely soft and incoherent, but at some depth from the surface, many of the strata are hard and compact, and of a dark grey colour.

The thickness of the above strata is enormous, and cannot, we should think, be less than ten thousand feet, having, wherever seen, a remarkable uniformity of character. Fragmentary portions of the bones of large mammalia, &c. are everywhere to be found associated with silicified wood of a brown colour. These are most abundant in the argillaceous grits which are often so hard as to form excellent millstones.

The harder beds of grey sandstone yield a remarkably handsome building stone, though by no means likely to be a durable one in many localities, on account of the facility with which water charged with carbonic acid removes its calcareous cement and reduces it to the strata of a slightly indurated sand. It has, we believe, been used extensively in the construction of the various works along the new Peshawur road west of the Bukrala Pass, where fresh beds have

been exposed in the deep cuttings which have been made through the sandstones and clays which form entirely the Buhrala Range.

Gold is found in this formation in the form of minute scales diffused through the sandstones, and has doubtless been derived from plutonic and metamorphic rocks, the disintegration of which, has furnished the material of which the strata of the series are composed.

In the beds of the numerous nullahs or water-courses which flow through the Miocene district, the sand is washed pretty extensively for gold by the natives. It seems to be obtained in greatest quantity towards the Indus north of the Salt Range.

As compared with the gold fields of Australia and California the auriferous beds of the Punjaub are, as far as is yet known in a practical point of view, insignificant; but are nevertheless interesting as illustrative of the extensive diffusion of gold in debris over the globe.

We have been quite unable to trace the source from whence the gold has been derived, and are not aware that, among the quartzites and quartzose mica slates, which are much developed in the Punchal Range near the Baramula Pass into Cashmere and stretch west into the northern Hazara mountains, the metal has ever been detected in situ. From similar rocks, there can be little doubt that the auriferous sands have been derived; but the Himálayas must, at the period of their formation, have had a very different aspect from what they now present, and may not have been elevated at all above the general level of the country.

The mode of obtaining the gold is, we fancy, nearly the same as that adopted in other countries.

A part of the bed of a nullah or water-course or dry channel of a river having been fixed upon as a likely spot, the superficial stratum of sand and mud is removed, and that beneath collected with a wooden shovel and carried to the spot where it is to be washed, generally close at hand. The washing is effected in a long wooden box resembling a small shallow flat-bottomed boat, wide at one end and narrow at the other, where there is an opening for the escape of the water. The wide end of the "cradle" or troon as it is called, is slightly elevated, so as to give its flat bottom a gentle inclination towards its forepart, and a coarse sieve of reeds is then placed across the wide end of the box. On this the sand is thrown, and water

dashed upon it, by which means the finer sand is washed into the cradle, the coarser gravel being retained on the sieve. By continuing the washing with a gentle stream of water, the lighter particles of the sand are carried down the inclined floor of the cradle and escape with the water, while the heavier and auriferous sand assumes the highest level next to the point where the water is applied. In a very short time nothing remains on the floor of the cradle but a thin stratum of black iron sand in which the scales of gold may occasionally he seen to spangle. By continuing the washing of the sand the lighter particles are removed and the auriferous portion concentrated within narrow limits. When the washing in the cradle has been carried as far as is considered safe, the sand is removed by the hand into a circular concave wooden platter called a Kuttree, about two feet in diameter, made generally of sissoo (Dalbergia sissoo) or other hard wood. In this, by a circular motion, it is agitated with water by which means an additional portion of the black sand is got rid of, and washed away from the inclined sides of the platter by a stream of water skilfully applied. The residue is then rubbed up with a little mercury which quickly by amalgamation separates the gold from the black sand. The mercury is then removed from the platter, enclosed in a fragment of cloth and placed on a bit of live charcoal, by which means the mercury is speedily vapourized, leaving the yellow gold entangled with the tinder of the cloth, from which by rubbing, it is easily removed. In this state it is taken to the goldsmiths, who by fusing it with borax remove any mechanical impurities. The Indus gold is said to have a whiter colour than that obtained to the eastward, which probably results from its containing a small portion of silver alloy.

By the process above described, a party of two or three individuals can in one day collect from six to eight annas worth of gold. The washings are generally most productive after rains, during which of course large quantities of fresh sand are washed from the surrounding rocks with the nullahs.

In the neighbourhood of the Salt Range the scales of gold are small and almost invisible, but we have heard from natives that in Hazara, grains of gold are sometimes found of a size such as to admit of their being picked out of the sand. If this be true, we may infer

that the auriferous source is somewhere to the north, and that by tracing the gold stream, so to speak, we might arrive at a point where the drifted materials become coarser, and where the gold, from its high specific gravity, has been deposited in larger quantity.

By a similar method of reasoning, Messrs. Clarke and Hargreaves, in 1851, were led to the discovery of the extensive gold fields in the alluvial deposits of the Bathurst district, in Australia, where the amount of gold obtained, seems likely to produce an entire revolution in the monetary system of the world.

From the similarity of the central hilly districts of the gold fields of Australia with the auriferous districts of the Ural mountains, Sir Roderick Murchison, so early as the year 1844, predicted the existence of gold fields "and in 1846 he addressed the President of the Geological Society of Cornwall on the subject, and recommended any Cornish tin-miners who were unemployed to emigrate to New South Wales and dig for gold in the debris and drift, on the flanks of, what he had previously termed, the Australian Cordilleras, in which he had recently heard that gold had been discovered in small quantities." Had the British Government then attended to the suggestions of science, much of the evil resulting from the recent announcement of the abundance of gold might have been prevented by the timely introduction of suitable regulations for its mining.

Gold, wherever it has been noticed in veins, is found in greatest quantity near their surface, "which accounts for the existence of the metal in such abundance" in the debris of auriferous rocks, "the same agencies which deposited the drifted materials having also carried away the gold from the superficial portions of the veins in which it was originally formed."

In the sandstones and grits, but especially in the latter, bones, teeth, &c. occur. The bones seem chiefly to be the remains of large mammalia and are of a grey or a light brown colour. They are generally fragmentary, and are much rubbed, as if they had been transported from a distance. Associated with them we have found portions of the teeth of a species of mastodon and of a mammoth or elephant, the tusks of which, of enormous size, are occasionally found imbedded in the sandstone. We have also procured the core

of the horn of a species of deer, and teeth probably of a camel or nearly allied animal, besides several large saurian teeth and one large and curved tooth, probably that of some large carnivorous animal; a portion of the carapax of a Chelonian was also found. The fossils nowhere occur in great abundance, but are everywhere found in the miocene strata between the Jhelum and the Indus.

The only examples of molluscæ which have been detected in connection with the above remains, consist of three specimens of probably a species of Unio or Anadonta. These were found in the soft sandstones on the southern side of mount Tillah near the village of Hoon by my assistant, Mr. Theobald.

The fossil wood formerly alluded to as occurring throughout the strata, is evidently of endogenous structure, and many of the masses appear to have belonged to trees of large size. At Kullar Kuhar, in soft sandstone strata north of the Salt lake, patches of jet occur in small quantity, which are probably carbonized portions of wood, but in these the woody structure is in a great degree obliterated.

From both the mineral and zoological character of the tertiary strata which we have just described, there can be little doubt that they are merely the western extension of the strata of the Sivalik Range, which in the annals of geology have been rendered famous by the researches of Cautley and Falconer. These strata flank the great Himálaya Range, and from the Sutledge, we believe, may be traced along the north-eastward or hilly districts of the Punjab to the neighbourhood of the Jhelum, where they form a succession of ranges, preserving a general parallelism, running in a S. S. E. direction towards the plains from the flank of the Punchal Range.

On the left bank of the Jhelum, opposite the town, they form the Khorian range, and lower down stretch across the river into the Surafar hills which flank the east side of the Chumbal range between Tillah and Jelalpoor. In the neighbourhood of this range the miocene strata dip to the east at an angle of 70°, the dip gradually decreasing as we proceed eastward towards the Jhelum. They extend along the bank of the river to Jelalpoor where, in nearly vertical strata on which the town is built, they appear at the foot of the southern escarpment of the Salt Range, having evidently been formed into this position by the upheaval of the older rocks. About half a mile

west of Jelalpoor the sandstones disappear and no miocene strata are again seen on the south side of the range east of the Indus.

Proceeding westward from Jhelum along the Peshawur road, the miocene strata appear about four miles from Rhotas, rising out of the plain at a high angle, with a dip to the east and form the Rhotas range, which from the right bank of the Jhelum stretches south-west to Mount Tillah. By the upheaval however of the older strata of that mountain, an extensive fault has been produced by which the tertiaries in the immediate neighbourhood of its southern escarpment have been made to dip north, and, as it were, under the Devonian strata. Between Rhotas and Tillah the miocene beds are elevated into an anticlinal ridge, on the north side of which the strata dip westward towards Bukrala, where they are elevated into another parallel range to that of Rhotas. Beyond this they extend uninterruptedly to Rawul Pindee, presenting a series of anticlinal and synclinal axis.

From the Tillah and Bakrala ranges the miocene strata extend along the north side of the Salt Range, elevated into scarped ridges with a dip at a considerable angle to the north, which gradually diminishes as we recede from the Range.

In its central part where the nummulite limestone strata are in many places in a nearly horizontal position, patches of miocene sandstones, &c. occur, but from the facility with which they decompose, are rapidly undergoing disintegration on the surface of the limestone. Along the north side of mount Sekesur and on to the Indus, the tertiaries are elevated along with the inferior rocks, and at Nummul above Moosakhail may be seen dipping conformably with them (as is the case everywhere else) at an angle of from 50° to 60°.

Above Maree on the Indus they form barren hills of considerable height, which extend along the river up to Mokhudd, a distance of about sixteen miles. On its right bank they attain a greater height, and the summit of the well known scarped precipice of Dinghote, about two miles above Maree at the foot of which the Indus flows, is, as ascertained by the Thermometer, 2,113 feet. Above the Indus at Maree, looking north from its summit; the horizontal ridges of miocene strata can be seen as far as the eye can reach, crossing the Indus from N. N. W. to S. S. E. with a dip to E. N. E. At Maree the angle of dip is 35°, but this diminishes as we ascend the Indus.

On the Kalibagh hill the miocene strata have suffered great disturbance, and rest in some places on the salt marl. At this point there is a great amount of nummulite limestone conglomerate at the base of the formation. Along the north side of the hill it appears in normal order, resting on the nummulite limestone, and preserving this relation, stretches round into the Chichalee Range. On its west side the miocene strata are arranged in regular ridges forming the Chounterah Hills and in the Chichalee Pass, dip with the nummulite limestone to the north at an angle of 35°. From this to the Kaffir Kote range they occur uninterruptedly and there rest conformably on the carboniferous rocks dipping to the north-west under the Puncalah Pass, on the west side of which they are elevated into a high ridge which runs parallel to that of Kaffir Kote.

Along the east side of the Chichalee Range the same miocene sandstones, &c. occur as on the west side, but much disturbed and evidently overturned in some places during the upheaval of the range, which has thrown them under strata of the older rocks also overturned along with them, on which in a normal order they invariably repose.

Captain Strachey in a paper recently laid before the Geological Society, has described a series of tertiary ossiferous sandstones, &c. which occur on the Thibet plain on the north side of the Himálayas at an elevation of from 14 to 16,000 feet, which most probably are of an identical character with those of the Sivalik and Salt Ranges. These he describes however as "presenting an almost perfectly horizontal surface," and resting unconformably on oolitic strata, (apparently similar to those of the Salt Range), from whence he draws the conclusion that the oolitic strata, &c. on which the ossiferous tertiaries rest, have been elevated previous to the formation of the latter, but from the abundance of remains of large mammalia in these, he considers that "there can be no doubt that these strata have been elevated to their present height from some lower level since the time of their deposition."

In the Salt Range, we think, we have obtained sufficient proof that until after the deposition of the miocene sandstones, &c. no sudden or extensive elevatory action had been exerted, and that during their formation, the surrounding country must have been in a condition

suitable for the maintenance of numerous huge mammalia, the remains of which, now entombed in rock, must, judging from their appearance, have been transported to a distance from the spot where they died.

That plutonic, metamorphic and igneous rocks must have formed the district, by the disintegration of which the materials forming the miocene strata have been derived, every one must admit, and as the boulders found in the conglomerates are small and such as we see now carried down by streams from Indian mountains during ordinary floods, we think it probable that the district in which the miocene beds occur, must have presented a range of mountains skirted at their base by a grove of forest capable of affording food to large pachydermata, and washed by an extensive fresh-water lake, in which the saurians, &c. whose teeth occur in the sandstone, could live and flourish. Into this, floods from the surrounding mountains transport boulders of rock, gravel and sand as well as the remains of land animals and trunks of trees. A succession of floods over an extended period would, we conceive, supply material for the formation of strata similar to the miocene beds we are considering.

It is not at all improbable that the sea may have had occasional access to our supposed lake, indeed the saline incrustation on the sandstones, &c. where they approach the nummulite limestone (an undoubted marine formation) strengthens this idea.

The absence, however, of marine shells, or other remains which exist so abundantly in the inferior strata, completely, we conceive, refutes the supposition that the miocene strata have been deposited in "a true sea bottom," an opinion, which as regards the Thibet tertiaries in which no marine organic remains have been found, Strachey seems disposed to adopt, while at the same time he admits "that there is no direct proof that these beds are marine."

When we consider the fragile character, and we believe comparative scarcity, in northern India, of land or fresh water shells, it is not surprising that they should so seldom occur in the miocene strata. The Physæ, Pupæ, and Helices, which abound over the Salt Range hills, are very rarely to be found in the alluvial deposits at their base, and the fact that rain water charged with carbonic acid, which it always acquires by passing through vegetation, is a most powerful solvent of carbonate of lime may explain in a great mea-

sure the scarcity of land shells. The rarity of the common land-shells of the Punjab in the high alluvial banks seen on the sides of the rivers, has often struck us as very remarkable.

Should the beds described by Strachey be proved hereafter to be identical with those on the southern flank of the Himálaya or Sivalik strata, it will go far to prove that this stupendous range has been upheaved from near the level of the sea to its present altitude at a comparatively recent period.

From a cursory examination of the ranges of hills between Rawul Pindee and the Baramula Pass, we are inclined to believe that from the former place to Ooree on the Cashmere river, nothing but miocene strata occur, forming ranges of from 4 to 8000 feet in height. At Ooree the metamorphic schist of the Punchal Range seems to have been forced through the sandstone strata, both being at this point tilted up into a nearly vertical position with a strike from east to west. Hard specimens of sandstone from this locality are undistinguishable from the hard grey miocene sandstone of the Salt Range. Between the Jhelum and Cashmere river in a line from Ooree to Rawul Pindee, we have never observed any organic remains, but towards Bhimbur to the eastward of Ooree, we believe, they are occasionally found, and are called by the natives "deo ka dant" or Demon's teeth, a name by which they are generally known in the Salt Range.

In reckoning as miocene, the sandstone grits and conglomerates we have endeavoured to describe, we only follow the generally-received opinion as to the age of the Sivalik strata. Further investigation may prove that these, as well as the corresponding strata west of the Sutledge, are of even more recent formation.

The occurrence of gold in the formation, furnishes an argument in favour of its being of post tertiary age, this metal and platinum being considered "the last formed of the metals" by the learned author of the article entitled Siberia and California in No. 174 (September 1850) of the Quarterly Review.

Post pliocene strata.

ALLUVIUM.

Resting on the miocene strata in an unconformable manner, may be noticed in many places along the north side especially of the

Salt Range, terraces composed of a succession of nearly horizontal layers of small boulders, gravel, sand and mud, the debris chiefly of Salt Range rocks. The boulders and gravel in these are very generally cemented by calcareous matter into the consistence of rock, and bands of kunkur, an impure concretionary limestone, are in some places abundant. This has doubtless been deposited by calcareous springs or by rain water which by passing through vegetation, has acquired carbonic acid and, through its solvent agency, carbonate of lime. In a similar way extensive deposits of travertine and calcareous tufa have been formed over the surface of the nummulite limestone and miocene strata.

In the neighbourhood of the Salt Range the alluvial beds have a slight dip towards the north, but gradually acquire horizontality, and increase in thickness and fineness of material, as we follow them into the plain or rather ravine country north of the range, where sections of them fifty to sixty feet in depth are exposed in the numerous nullahs and water courses which intersect the district, and in the beds of which they are seen reposing on the tilted up ends of the miocene strata.

Along the southern or scarped side of the range deposits of a similar character occur, but for a distance varying from one to two miles from its base, the materials are coarse and consist entirely of boulders of rock and gravel brought down by the numerous streams, which during rain acquire transporting powers which must be seen to be believed; we have on several occasions seen boulders three and four feet in diameter rolled along with the noise of thunder, by the force of streams suddenly swollen. As we recede from the range, the boulders gradually diminish, and are succeeded by deposits of gravel, sand and mud, the layers of which in the plain assume a nearly horizontal position.

Travertine or calcareous tufa is extensively burnt and yields a lime of excellent quality. It frequently, however, contains a quantity of mud, which is objectionable. At Jhelum the greater part of the lime used is obtained from travertine, and at Rawul Pindee, around which enormous deposits of it occur, we believe it is exclusively burnt. From its porous character it requires less fuel for its perfect calcination than the ordinary limestones of the district, a

matter of some importance when wood is scarce. Kunkur, used extensively for the metalling of roads is abundant every where in the alluvial deposit. Irregular beds of it occur in the neighbourhood of Jhelum.

The organic remains found in the alluvial formation appear to be entirely of a recent character, and to consist of the bones of bullocks, horses, camels, goats, &c. mixed with a few land shells of the genera Physa, Pupa, &c. The extreme scarcity of the bones is very remarkable, considering the number of bones and skeletons every where seen lying on the surface.

We are not aware that the remains of any large pachydermata have been found associated with the above bones.

As the alluvial strata north of the Salt Range are apparently formed from the debris of the tertiary strata, "gold dust" must occur in these, and, during rain, must be washed into the various streams and water courses. The immense number of boulders of Plutonic, Volcanic and Schistose rocks which occur in the alluvion or drift in the neighbourhood of Mokhudd on the Indus (though identical with those in the miocene conglomerates), may possibly in part be derived from other rocks to the northward which may contain gold. The black slate rocks of Attock if metamorphic or of Lower Siberian or Cambrian age (we have never visited the locality) and invaded by quartz veins, may probably yield gold. Boulders of slate rock, similar to hard specimens we possess from Attock, occur abundantly both in the auriferous miocene (?) as well as drift or alluvial strata between Kalibagh and Mokhudd. As illustrating the statistics of gold in the Punjaub, we may add on the authority of L. Bowring, Esq. C. S. that in the Jhelum district, which includes all the auriferous ground near the Salt Range, with the exception of a small corner near the Indus in which Mokhudd is situated, there were in the year 1850, 158 cradles or troons in use for gold washing, which paid to Government an annual tax of Rs. 525, from Rs. 2 to 5 being levied on each troon. We can obtain no information as to the yield of gold from each troon; but when at Mokhudd, in 1848, the Kardar of that place informed me that in

1844,.....409 tolas* of gold were collected.
1845,.....272...Do. ..... Do..... Do.
1846,.....332...Do. ..... Do..... Do.

It is of course the object of the gold-washers to conceal as much as possible the amount of gold obtained, so as to keep the tax as low as possible.

The Upheaval of the Salt Range, &c.

Before closing our account of the Salt Range, it remains for us to notice certain particulars in the conditions under which its formations were deposited, and certain phenomena they in some places present, resulting from the general upheaval of the range into its present elevated position.

We conceive that previous to the general elevation of the strata and during the period of their deposition, they must have undergone a succession of gradual risings and sinkings.

The Salt marl and the Devonian strata which succeed have been probably deposited in shallow water as indicated by the frequent occurrence of ripple markings on the sandstones.

The lower beds of the carboniferous limestone which follow, must from the abundance of large Brachiopoda they contain, have been deposited at a considerable depth, as such molluscæ are known to characterize a marine zone of upwards of eight hundred feet in depth. At this depth the influence of tides could not produce the ripple markings observed in the Devonian sandstones, and we must therefore infer that previous to the deposition of the carboniferous strata, the former must have undergone a gradual subsidence to an extent sufficient to admit of the deposition of the latter, the strata of which must have rapidly increased in thickness, so as to have had their surface raised to a depth at which the Cephalopoda which abound in the upper beds could exist.

By the deposition of the sandstones and shales of the middle carboniferous series, the strata seem to have been elevated to the surface of the sea and a beach at least must have existed, on which the marks of falling rain or hail were impressed. After this period, a

* This Tola weighs 165 grains. In 1844, there were therefore collected 140 Troy Oz. and 285 grains of gold.

second subsidence must have occurred to admit of the formation of the upper carboniferous beds which in some places contain brachiopoda in abundance. By the gradual accumulation of calcareous and sedimentary matter, these seem again to have been brought near the surface, and dry land must have existed at the commencement of the oolitic series on which delicate ferns could support existence.

Succeeding the beds which contain these, we have the oolitic grits and shales, with fragments of large coniferæ which incontrovertibly prove the existence of land from whence the wood, &c. had been drifted. As we ascend in the oolitic series the wood becomes scarcer and as terebratulæ occur in the upper limestones and belemnites and ammonites in the upper shales and green sandstone, it seems probable that soon after the commencement of the formation, a third subsidence occurred, by which the strata were sunk to a considerable depth under the sea, from which they did not emerge until towards the close of the nummulite limestone formation. By a gradual and local deposition of calcareous matter along a particular line, similar to the manner in which coral reefs are formed, a sea barrier may have been raised, inside which in an inland fresh-water sea, the miocene strata have probably been deposited.

The occurrence of small water-worn boulders of nummulite limestone cemented by calcareous sand into a conglomerate which forms the lower member of the miocene beds in the Salt Range, indicates the existence of a beach where they may have been formed by the lashing of the waves.

As all the strata seen in the Salt Range repose conformably on each other, it appears to us certain that from a position of comparative horizontality they have all been upheaved subsequent to the deposition of the miocene strata. The upheaving force seems to have extended from east to west, the direction of the Range corresponding to the strike of the strata. Whether this has been exerted by the agency of plutonic or igneous rocks, we have no means of judging, as no rocks of the kind appear in the Salt Range or its neighbourhood.

Between Rhotas and mount Tillah the elevating force has raised the miocene strata into an anticlinal ridge. Along the line of this mountain, however, to the westward it has been exerted with greater violence, having produced a fracture of the strata along the line of

strike elevating the northern portion into a high ridge, the strata forming which have a northerly dip, and present a steep escarpment to the south. Along the south side of this line of fault the miocene strata seem only to have suffered, and are either thrown under the older elevated strata of the escarpment, as along the south side of mount Tillah, or tilted up at a high angle with a southerly dip, as at Jelalpoor. Moving westward, the elevatory action seems to have extended laterally over a greater surface, and to have produced several lines of fault which, in the central part of the Salt Range, have in some places thrown the strata into great confusion, and caused the formation of numerous longitudinal valleys, ridges and transverse ravines. In section No. 8 two very distinct faults, seen in the range west of mount Sikesur, are represented.

At Moosakhail where the range running in a north-west direction is not more than three miles broad, and is intersected by a transverse gorge, an excellent section is exhibited of the strata from the carboniferous limestone to the miocene beds. Here the upheaving force has raised the carboniferous strata into an anticlinal ridge, and without fracturing them has produced a graceful curving which is well seen near the entrance to the ravine. Above the carboniferous strata, a fracture has extended through the oolitic and superincumbent rocks, dipping to the N. N. E., and a vast amount of their debris covers the carboniferous limestone as it dips to the S. S. W. under the plain. Between Moosakhail and the Indus, where the range again expands, and is eight or nine miles in breadth, considerable disturbance prevails among the strata.

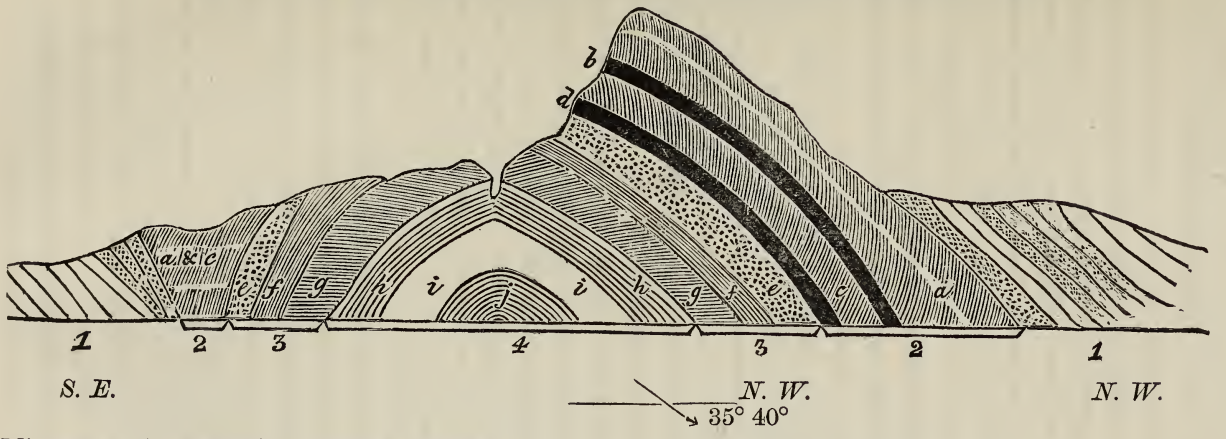
When describing the position of the Kalibagh coal we alluded to the overturning of the strata in the Kalibagh hill, and need not refer to it again.

In the Chichalee Range which runs from north-east to south-west the elevatory action seems to have extended laterally with violence over but a small extent, but has produced a most remarkable and distinct overturning of the strata along its south-east or scarped side. This is represented in section 9 as seen in the Chichalee pass, at the entrance to which, in an overturned position, the strata from the miocene sandstones, &c. to the oolitics, may be observed, and separated by a fault from the same beds on a steep escarpment, in regular order, dipping to the north at an angle of from 30° to 35°.

A more complete overturn of strata can nowhere be found. The lower portion has evidently been broken off the upper portion of the series, and by the eruptive force been made to describe an arc of 18°.

On moving south along the range and about five miles beyond the Chichalee pass, in a ravine called Peela Wan the strata present a distinct anticlinal axis along the foot of the escarpment.

Section across the Chichalee Range in the Peela Wan, five miles below Kothee.



1. Miocene sandstones, grits, conglomerates and clays.
2. Eocene strata.
   - *a*. Upper nummulite limestone with flints.
   - *b*. Upper alum shales.
   - *c*. Lower nummulite limestone.
   - *d*. Lower alum shales.
3. Oolitic strata.
   - *e*. Belemnite and ammonite sandstones and shales.
   - *f*. Cherty limestone.
   - *g*. Sandstones, grits, and shales with fossil wood.
4. Carboniferous strata.
   - *h*. Upper limestone with Encrinites, Productæ, &c.
   - *i*. Sandstone and shales.
   - *j*. Lower limestone with Encrinites, Productæ, Orthoceratites, &c.
3. Oolitic strata reversed.
2. Eocene limestone strata reversed and much compressed and shattered; no shales seen.
1. Miocene sandstones reversed.

Here a section is exposed of all the strata from the lower carboniferous to the miocene beds as in the rough sketch annexed, a fracture extending through all the upper strata and into the upper carboniferous formation, the middle and lower beds of which are only sharply curved by the elevatory action, which has, along the line of fracture, not only separated the southern from the northern portion of the oolitic and superior strata, but has produced a complete overturn of the miocene and eocene beds, bringing them under the oolitic and carboniferous formations. The eocene formation seems to have suffered much during the overturn as it is much reduced in thickness and is everywhere shivered and contorted. The alum shales too seem to have been squeezed out of the limestone as it were, as no trace of them is to be seen.

The same anticlinal arrangement of the strata may be traced along the Chichalee Range to Mittha near the Kurum river, where a scarped ridge of miocene strata forms the range. All along the southern side of the line of fault or fracture in the Salt Range, the strata have suffered denudation to such an extent as to have removed in most places all traces of rock in situ.

The effects of the overturning of the strata in the Chichalee Range are, to a Geologist, often most perplexing, and until we had seen the section as exposed in the Chichalee Pass and to the south, we had difficulty in explaining how shales full of ammonites, belemnites, &c. could possibly occur dipping apparently under carboniferous limestone full of palæozoic fossil, as may be seen above the village of Kalokhail near Kalibagh.

The upheaval of the Himálayas after the tertiary era and contemporaneously with the Salt Range will fully explain the anomalies described by Captain Strachey of tertiary, secondary and palæozoic strata dipping on the south or Indian side of the Himálayas, as it were under the metamorphic schists of the central ridge, while on the northern side they rest upon these in a regular order.

The researches of Dr. Thomson while engaged on the Thibet Mission, will, we trust, throw light on this interesting subject. A journal of his travels for two years in the northern Himálayas is now, we are happy to know, in course of publication in England.

(To be concluded.)

Remarks on the different species of Orang-utan.—By E. Blyth, *Esq.*

To Mr. W. W. Nicholls of Sarawak, the Society is indebted for the nearly perfect skeleton of an adult wild Orang-utan, of the peculiar species known to the inhabitants of Borneo, according to Sir James Brooke, by the name *Mias Pappan;* and which, together with other skulls and skeletons of adult Orangs in our museum, and the exquisite lithographs of others, again, published by Professor Owen, fully bears out the opinion of Sir J. Brooke expressed in a letter to the Zoological Society and published in the 'Proceedings' of that Society for 1841, p. 55, of the existence of three distinct species of Orang-utan in Borneo.

Professor Owen had previously distinguished his Pithecus morio (*Mias Kassar* of Brooke) from the great Orang then known to him, from specimens to which I had the pleasure of first calling his attention, and which are admirably figured in the 'Transactions of the Zoological Society,' Vol. II, pl. 30 to 34 inclusive; and from certain differences observable in skulls of great Orangs compared and figured by him, believed or known respectively to be from Borneo or Sumatra, the same zoologist has indicated what appeared to him to be at least local varieties, one proper to each of those islands, and he applies the names P. Abelii to that of Sumatra and P. Wurmbii to that of Borneo, of course under the impression that the great Sumatran Orang referred to was identical with that described by Dr. Clarke Abel from Sumatra in *As. Res.* XV, 489.

A huge skull of an adult male Orang, undoubtedly from Borneo, is figured in *Trans. Zool. Soc.* II, pl. 31 and 32; and that of an adult female (?), said to be from Sumatra, in the same work, Vol. I, pl. 53 and 54. The differences between these skulls are considerable: and they are, to some extent, borne out in a huge male skull marked from Sumatra and in an aged female skull marked from Borneo, in this Society's museum.* In both of the latter, however, the characters are throughout intermediate. The zygomatic suture

* Presented by Major Gregory in 1838 (vide *J. A. S.* VII, 669); the Sumatran male skull, however, having been for some years reserved.

of the Sumatran male begins even anteriorly to that of Prof. Owen's Bornean male: the *symphysis menti* in both is equally developed: the supra-orbital ridges, however, are much more prominent in the male from Sumatra, as in Prof. Owen's Sumatran female; but in our aged Bornean female skull, they are considerably more developed, proportionally, than in Mr. Owen's Bornean male. In both of Mr. Owen's specimens, the palate is represented as contracted posteriorly, between the last molars on each side, to $1\frac{1}{2}$ in. (or rather more in the Sumatran female). In our Sumatran male the distance is fully $1\frac{3}{4}$ in.; and in the Bornean female $1\frac{5}{8}$ in. I can come to no other conclusion than that all represent individual varieties of one species, having perhaps a tendency to exhibit the local variation which Prof. Owen has indicated.

The same naturalist adds—"The Bornean Pongo, if we may judge from the few specimens undoubtedly from that locality which exist in the museums of this country, is clothed with loose long hair of a deep fuscous colour, approaching in some parts to black; the Sumatran Pongo is covered with loose long hair of a reddish-brown colour. The adult male of the Bornean species has the countenance disfigured by large dermal callosities upon the cheek-bones. These do not exist in either sex of the Sumatran species." It is worthy of note that the term *species* is here bestowed, probably from the remarkable difference implied by the last mentioned character. The fully adult Sumatran male described by Dr. Clarke Abel, however, and the skin of which is still in this Society's museum, possesses the cheek callosities, less developed however than in the Bornean male figured by Prof. Temminck.

Sir J. Brooke, in his highly interesting letter already referred to, besides pointing out the distinctions of two of his three species of Bornean Orangs from personal observation of the living or freshly killed animals wild and tame, remarks that the skulls also examined by him may be divided into three distinct sorts.

"The first presents two ridges, one rising from each frontal bone, which joining on the top of the head, form an elevated crest, which runs backward to the cerebral portion of the skull." To this may accordingly be referred the P. Wurmbii and the P. Abelii of Owen, and, it would seem, all the adult skeletons at present in Europe

without described exception.* It would appear that neither sex has the cheek callosities at any age; and the colour of the hair is said to be darker than in the others. This description corresponds with the appearance of an enormous female Orang-utan that was exhibited some years ago in Calcutta (vide *J. A. S.* XVI, note to p. 729); and the animal is the *Mias Rambi* of Sir J. Brooke.

The same observer continues—"The second variety [of skull] is the SIMIA MORIO, and nothing need be added to Mr. Owen's account, save that it presents no ridge whatever beyond the frontal part of the head. No. 9 in the collection is that of an adult male. * * * There are many other skulls of the SIMIA MORIO which nearly coincide with this suite, and this suite so entirely coincides through the different stages of age, one with another, that no doubt can exist of the SIMIA MORIO being a distinct species. The different character of the skull, its small size and small teeth, put the matter beyond doubt, and completely establish Mr. Owen's acute and triumphant argument, drawn from a single specimen."—Of PITHECUS MORIO, our museum contains a skeleton (minus most of the bones of the hands and feet) of an aged female, presented by R. W. G. Frith, Esq., in 1836.† It had died in Calcutta, and the skin containing the bones of the hands and feet had been unfortunately thrown away when Mr. Frith secured the body for the Society's Museum. A few of the digital bones, however, were recovered. Comparing the skull of this specimen with that figured by Prof. Owen *(Trans. Zool. Soc.* II, pl. 33 and 34), I incline to infer that Mr. Owen's specimen is the skull of a male animal, chiefly from the greater depth of the alveoli: the longitudinal extent of grinding surface of the series of upper molars (bicuspids included) is exactly 2 in., as also in another skull of an adult female to be presently noticed, and 2 in. 2 l. in that figured by Prof. Owen: lastly, the zygomatic arch of our aged female skull is much more slender than that of either of the others.

* Unless, perhaps, that of an adolescent female in the museum of the Royal College of Surgeons, London.

† Vide *J. A. S.* V, 833, where mentioned as "the Sumatran Orang-utan." She was one, however, of a pair purchased by our joint-Secretary Mr. Grote, at Singapore; and this gentleman informs me—"They were not from Sumatra, but from Borneo. At least I am pretty sure that my memory does not deceive me on this point."

We have also another and complete skeleton of an adolescent female, which lived twelve years in Calcutta in the possession of J. Apcar, Esq., and was very young when he received it. The last molars above and below had just pierced the gums. The skin of this individual is mounted in our museum, possessing hair of a very dark colour on the crown, back and arms. Having passed its life in close captivity, with nought to call forth the vigorous action of its muscles, their development with that of the osseous system generally would seem to have been considerably affected, and the skull retains a remarkably juvenile (which in this case means *anthropoid)* expression, contrasting greatly with that of our other and aged female skull already noticed. But making every allowance for difference of age and a life of close imprisonment, and the other specimen had in all probability been captured when fully adult, there remain some extraordinary discrepancies, which probably indicate a further specifical distinctness. All the bones of the aged animal are more robust than those of the other; but while the leg-bones and the *humeri* of the two are of the same length, or at all events the *humerus* of the aged animal does not exceed by $\frac{1}{4}$ in. that of the adolescent, the *radius* of the aged specimen is 2 in. longer than that of the other.

The differences in the form of the skull are very considerable. The younger individual has the face conspicuously shorter and broader, with circular orbital cavities, while those of the aged animal are perpendicularly oblong. The vertical span of the orbital cavity is $1\frac{1}{2}$ in. in the aged specimen, $1\frac{3}{8}$ in. in the other; horizontal span of the same $1\frac{1}{4}$ in. in the former, $1\frac{3}{8}$ in. in the latter. In the younger individual the orbital process of the frontal and that of the malar bones form together a projecting angle where united by the suture; in the other they do not angulate at all. Extreme breadth of bony orbits in the adolescent specimen 4 in.; in the other $3\frac{3}{4}$ in. The zygoma of the aged individual, as before remarked, is much more slender than in the skull figured by Prof. Owen; in the younger, the malar portion of the zygoma is even broader than in Mr. Owen's specimen. The nasal orifice of the aged skull is much larger than that of the other. The development of the alveolar portion of the jaws is also much greater in the aged animal; whence the chin

slopes but little, whilst in the other it slopes excessively. In the aged specimen the ramus or ascending portion of the lower jaw turns abruptly at a right angle with the alveolar portion, and the coronoid process is little developed, and does not rise to a level with the zygomatic arch; in the young specimen, the form is more as in Mr. Owen's figure, though less angulated. In this adolescent skull the intermaxillary bones continue strongly demarcated.

It remains for future observation of additional specimens to determine whether the differences here indicated denote a diversity of species, or whether they may be referred to extraordinary individual variation.*

"The third distinction of the skulls," continues Sir J. Brooke, "is, that the ridges rising from the frontal bones do not meet, but converge towards the top of the head, and again diverge towards the posterior portion of the skull. These ridges are less elevated than in the first mentioned skulls, but the size of the adult skulls is equal, and both present specimens of aged animals." A wild adult male killed by himself, with huge cheek callosities, proved to possess this form of skull: but Sir J. Brooke erroneously assigns the animal to Pithecus Wurmbii apud Owen, in which, as we have seen, the lamdoidal crests unite upon the crown, as they also do in his P. Abelii (here regarded as a mere variety of the same species); whereas the Bornean animal of Van Wurmb and the Sumatran animal of Dr. Clarke Abel were of the present race distinguished by the ugly cheek callosities, and to which no special name has been assigned, as the appellations *intended for them* have been at-

* I had recently the opportunity of observing a nearly grown living male of what I considered to be Pithecus morio. It had no cheek callosities, and had not developed its hindermost *molares*. This animal was taken in the 'Hindustan' steamer for Suez; and is, I think, a larger Orang than has hitherto been seen alive in Europe. Before reaching Madras, it escaped from its cage and found its way into the saloon, where it would appear to have been re-captured with some difficulty and to have severely bitten two of its captors. In its cage it seemed quiet and good-tempered, and I handled it freely; but could not get to see it to much advantage. It appeared to resemble much the adolescent female above described, but was smaller, with larger face, and the expression was as distinctly masculine in the one as feminine in the other.

tached respectively to Bornean and Sumatran examples of the *Mias Rambi*.

The Bornean species with double-crested skull and huge cheek callosities is the *Mias Pappan* of Sir J. Brooke, or rather of the native Dyaks: and Sir J. Brooke remarks of it (not at that time having seen a female), that—"Both Malays and Dyaks are positive that the female of the *Mias Pappan* has cheek callosities, the same as the male:" and from his own observation he adds that the *Mias Kassar* has no cheek callosities in either sex; whereas some young *Pappans* he had shipped, "(one of them *not a year old*, with two first molars,) shew them prominently."* For a figure of the adult male of the *Mias Pappan* of Borneo, and series of plates illustrative of its anatomy, vide the great Dutch work of Dr. S. Müller and Professor Temminck; but unfortunately they give no representation of the bony crests upon the skull.

Of the long celebrated specimen of a large Orang-utan procured by Capt. Cornfoot in Sumatra, and described by Dr. Clarke Abel in the 'Asiatic Researches,' Vol. XV, p. 489, we still possess the skin minus the right hand and right foot, and of its osteology only the lower jaw and the bones contained in the dried left hand and left foot. It is by no means a specimen of the largest size, as long ago shewn by Dr. Harwood in *Lin. Trans.* XV, 472;† but the teeth and appearance of the jaw prove it to be fully grown, and the third inferior true molar is scarcely less abraded than the penultimate. This lower jaw is remarkable (especially as being that of a mature male animal) for the small antero-posterior diameter of its ramus or ascending portion as distinguished from the alveolar portion, and also for the small size of the condyle. Vide figures in *As. Res.* XV, pl. IV, and ($\frac{1}{2}$ size) in *J. A. S.* VI, pl. XVIII; and compare these

* Mr. Nicholls states, in a letter, that—"Both sexes of the *Mias Pappan* have immense cheek callosities: a full grown female was lately killed at Samaratan, the callosities of which extended as low down as the breasts [here the *tracheal sac* must be referred to!] The *Mias Rambi* is without any callosities, and is, I think, covered with longer fur than the *M. Pappan* has."

† Dr. Harwood gives the length of the feet of a Bornean Orang described by him as $15\frac{1}{4}$ in.: the dried foot of Dr. Abel's specimen (containing the bones) measures 13 in.

with the representations now given of the lower jaws of other Orangs, and especially with that of the great Sumatran skull of a female *Mias Rambi* figured by Prof. Owen in *Trans. Zool. Soc.* I, pl. 53. Its greatest antero-posterior diameter (on a plane with the molars) is $2\frac{1}{4}$ in. only, that of a female (?) *Pappan* from Borneo is $2\frac{3}{4}$ in., of a Bornean female *Rambi* $2\frac{5}{8}$ in., of a Sumatran male *Rambi* $2\frac{3}{4}$ in., and of Prof. Owen's Bornean male the same, and of his Sumatran female $2\frac{7}{8}$ in. Yet all the teeth are somewhat larger than in the Bornean female (?) *Pappan*, and equal those of our great Sumatran male *Rambi*. The hands and feet also are larger than those of our female (?) *Pappan* from Borneo. There are no materials for extending the comparison: but it may be remarked, of Dr. Clarke Abel's specimen, that (as before asserted) it has distinct cheek callosities, though seemingly less developed than in Dr. S. Müller's figure. The beard, however, is scarcely less grown:—but the general colour of the hair is much darker, and more of a maronne-red; inclining to ferruginous upon the crown, and the beard is bright ferruginous contrasting strongly with the rest.* I incline to consider it identical with the *Mias Pappan* of Borneo, notwithstanding the comparative feebleness of the ramus of the lower jaw in this particular specimen; and I suggest that the old name Pithecus satyrus be now restricted to this species, and justly or with peculiar justice, as Sir J. Brooke remarks in his letter, "from the ugly face and disgusting callosities."†

The nearly perfect skeleton now presented to the Society by Mr. Nicholls is that of a fully mature Bornean female (?) of the *Mias Pappan*, in which the strongly developed lamdoidal ridges of the skull do not unite upon the vertex to form a single sagittal crest,

* This specimen is remarkable for having a well developed unguinal phalanx and nail to the hallux; a character of rare occurrence in the genus, and exhibited by no other specimen in the Society's collection.

† As the *Rambi* is neither Wurmb's nor Abel's animal, the names Wurmbii and Abelii are unsuitable for it, and had better be disused; while as Raja Brooke was the first to discriminate it from the *Pappan*, I would suggest that it now bear the designation of Pithecus Brookei. Should the second small Orang also prove a good species, the name Owenii bestowed on it would be a fitting compliment to the eminent zoologist, who has devoted so much attention to the study of the great anthropoid Apes.

but continue an inch apart where most approximated. The size of the skull is fully equal, or even somewhat superior, to that of our aged female skull of a *Mias Rambi* from Borneo; but is inferior to that of our Sumatran male of the *Mias Rambi*. The skull is perfect, except that part of the face appears to have been shot away, viz. the uppermost portion of the right superior maxillary from the orbit to the nasal orifice, with parts of the adjacent malar, lachrymal, and nasal bones of the same side; and the supra-orbital ridge of the left frontal is diseased, with portions of bone exfoliating away. The vertebral column is complete, excepting the two last small coccygeal bones. The ribs and sternal series are also complete, and the great bones of the limbs; but many of the smaller bones of the latter are unfortunately missing. Thus, of the right hand, there are wanting the scaphoid, and the five unguinal phalanges. Of the left hand, there also are wanting the five unguinal phalanges, the medial thumb-phalanx, and the cuneiform bone of the wrist. Of the right foot are wanting the *os calcis*, *astragalus*, and navicular bone, four unguinal phalanges (the terminal phalanx of the hallux remaining), the penultimate phalanx of the finger-toe next to the hallux, and the penultimate and ante-penultimate phalanges of that furthest from the hallux, corresponding to the human little toe. And of the left foot there are only the *astragalus*, and the digital bones excepting the metatarsal of the digit next to the *hallux*, and the unguinal phalanges of the outer three toes.* The *patellæ* are also lost.

This valuable skeleton affords us the means of demonstrating, from adult specimens in our museum, the existence of the three species of Bornean Orang-utan indicated by Sir J. Brooke; and most probably we possess a fourth in the mounted skin and complete skeleton of the adolescent female resembling Pithecus morio in size, but having a much shorter fore-arm and more anthropoid conformation of skull. We have also (provisionally) identified Dr. Clarke Abel's

* Accordingly, but one unguinal phalanx remains, which articulates with the digit next to the hallux of the left foot. The terminal phalanx of each hallux exhibits a peculiar structure, and represents the ordinary penultimate (and not the unguinal) phalanx; so that this Bornean *Pappan* differs herein from Abel's Sumatran *Pappan*, which possessed a well developed unguinal phalanx and nail to the opposable hallux or great toe.

Sumatran Orang-utan with the *Mias Pappan* of Borneo, to which the specific name SATYRUS is here proposed to be restricted; and we have referred Prof. Owen's P. WURMBII and P. ABELII to the *Mias Rambi* of Borneo, which also should therefore be common to the two islands. The small P. MORIO, so far as hitherto known, is peculiar to Borneo; and it now remains to ascertain whether there be not two small species confounded under this, two small as well as two large species of these animals. It is only recently that a great and a small species of Chimpanzee have likewise been discriminated and completely established by Prof. Owen and Dr. Kneeland.*

The three Bornean species of Orang of Sir J. Brooke (at least two of which would appear likewise to inhabit Sumatra) are more different from each other in the appearance of the adult skull than the Lion, Tiger, and Leopard are among cats; yet with the exception of the bony ridges, which in the MORIO are merely indicated (exhibiting the direction which they assume in the *Mias Pappan)*, I have been unable to detect any difference of structure between the skulls of the two great species which may denote other than slight individual variation. In general, the form and size of our *Mias Pappan* skull are intermediate to those of our (Sumatran) male and (Bornean) female *Mias Rambi* skulls; and the nasal orifice of the former is comparatively small. But how slight is the difference between the skulls even of the Lion and Tiger among cats,—confined to a straighter profile on the part of the Lion, and to the fact that the nasals extend back beyond the suture of the maxillaries in the Tiger skull, while they fall short of that suture in the Lion skull!†

* Vide *Trans. Zool. Soc.* III, 381, and *Ann. Mag. N. H.*, July, 1852, p. 23 *et seq.*

† An analogous diversity perhaps exists in the skulls of the *Mias Rambi* and *Mias Pappan*, which, if it prove constant, will be of service in enabling us to determine to which of these species immature skulls shewing large permanent molars should be referred. In our adult male and female *Mias Rambi* heads, and also in one juvenile skull taken from a stuffed specimen of a half grown male without a sign of cheek-callosities in our museum, the united nasal bones extend upward to the summit of the *glabella* between the supra-orbital ridges; whereas in our *Mias Pappan* skull, and also in both (species ?) of our *Mias Kassar*, the united nasal bones extend upward but little beyond the maxillary suture, and the same in

From the form of the pelvis, and from the inferior longitudinal extent of the molar series as compared with that of the lower jaw of Dr. Clarke Abel's Sumatran male *Pappan*, also from the inferior size of the hand and foot as compared with these members in Dr. Abel's specimen, I have considered the skeleton of a *Pappan* now presented by Mr. Nicholls to be that of a female animal; but not without considerable hesitation.* We have no male pelvis of an adult Orang for comparison; but two of undoubted females of the small species, and one of these (that of the animal which passed its life in close captivity) is singularly narrow, and probably differs little from a male pelvis. The skeletons of adult *Mias Rambi* and of adult of the small Chimpanzee figured by Prof. Owen in the first Volume of the 'Transactions of the Zoological Society' are also those of females; and Mr. Owen gives 5 in. 5 l. as the antero-posterior diameter and 4 in. as the transverse diameter of the pelvic aperture of his adult female *Mias Rambi*, the corresponding diameters of the pelvic aperture of our *Mias Pappan* being 5 in. and 4 in., in our aged female *Mias Kassar* $4\frac{1}{2}$ and $3\frac{1}{2}$ in., and in our adolescent female with the comparatively short fore-arms $4\frac{1}{2}$ and $2\frac{1}{2}$ in. (!); which last are probably the permanent male proportions, to which I

three immature skulls with large permanent molars in course of development, which should therefore represent the young of the *Mias Pappan*.

It remains however to ascertain how far this distinction may prove constant. We have, in all, five stuffed specimens of Orangs, viz.: 1, Dr. Clarke Abel's Sumatran male *Pappan*,—2, Mr. Apcar's adolescent female *Kassar (?)* with short fore-arm,—3, a young female *Kassar (?)* with small permanent grinders appearing, and similar proportion of arm and fore-arm to last,—4, a very young *Mias*—— *?*,—and 5, the young male *Mias Rambi (?)* before referred to. Colour of No. 5 a darkish ferruginous, deepest on the crown, paler and more rufous on the shoulders and back and also the whiskers; hands and feet small, as in the *Mias Kassar*. Colour of No. 3, a lightish ferruginous, deepening on the arms, and darkest on the crown and between the shoulders. It would seem that the various species, however distinct in form of skull, are not to be very readily distinguished when prepared as stuffed specimens, unless indeed we had *adults* of each for comparison.

* Mr. Nicholls states, in a letter,—"I obtained the skeleton which I sent, through others, and therefore cannot be certain about its sex; but, if I remember right, it was given me as that of a male *Pappan*, full grown but not aged, and with a very broad face."

suppose Dr. Kneeland refers when he mentions "the narrow elongated shape of the Orang's pelvis."*

I shall now follow the list of admeasurements furnished by Prof. Owen of the adult and young small Chimpanzee and adult and young Orang-utan, and would have cited those given by him of his adult Orang for convenience of comparison, had his specimen been clearly a *Mias Rambi*, as the large skulls are which he has figured; but this is rendered doubtful in a note.† Another table of comparison by the same naturalist we quote to give the dimensions of the following skulls.—1. *Mias Rambi*, Bornean male (Owen).—2. Ditto, Sumatran male.—3. Ditto, Bornean female.—4. Ditto, Sumatran female (Owen).‡—5. *Mias Pappan*, lower jaw of Abel's Sumatran male.—6. Ditto, Bornean female (?)—7. *Mias Kassar*, male (? Owen).—8. Ditto, female.—9. *Mias Kassar* (?), adolescent female, with comparatively short fore-arms.

* *Ann. Mag. N. H.*, July, 1852, p. 27.

† In which Mr. Owen remarks—"The admeasurements in this column are taken, by permission of the Board of Curators, from the skeleton in the museum of the Royal College of Surgeons, in which the absence of the cranial ridges, and some still separate *epiphyses*, would indicate the non-attainment of full growth." It may, therefore, prove to be an adolescent *Mias Pappan*.

‡ The measurements in this column are taken from Mr. Owen's published lithographs.

	* M.R.,B. M.(O) 1		M. R., S. M. 2		M. R., B. F. 3		M. R.,S. F. (O) 4		M. P.,S. M. (A) 5		M. P., B. F.(?) 6		M. K., M.(O) 7		M. K., F. 8		M.K.(?) 9	
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
Length of the skull from the vertex to the base of the occipital condyle,	4	6	4	4	3	8	4	1	..		3	6	3	7	3	4	3	5
Length of the skull from the posterior plane of the occiput to the margin of the incisors, ...	10	6	10	3(?)	9	5	9	3	..		9	7	7	10	7	7*	7	7
Length of the skull from the posterior plane of the occiput to the fronti-nasal suture, ...	5	3	5	0	5	0(?)	4	8	..		5	3	4	4	4	5	4	8
Length of the skull from the fronti-nasal suture to the margin of the incisors, ...	5	7	5	5(?)	4	9	4	7(?)	..		4	7	4	$1\frac{1}{2}$	4	0	3	$2\frac{1}{2}$
Greatest lateral diameter of the skull (at the post-auditory ridges,) ..	5	4	6	1	5	2	5	$3\frac{1}{2}$	..		5	7	4	8	4	9	4	9
Smallest lateral diameter of the skull (behind the orbits,) ..	2	9	2	6	2	7	2	$7\frac{1}{2}$	..		2	6	2	4	2	4	2	$7\frac{1}{2}$
Distance between temporal ridges, ...	..		2	5	2	2	..		..		2	3	,,	7(?)	2	1	2	3
Diameter of the skull at the zygomata, ..	6	9	6	8	6	3	6	0	..		6	6	5	1	5	2	5	1
Length of the zygomatic fossa (measured from below,) ..	2	6	2	5	2	2	2	0	..		2	2	1	9	1	8	1	5
Diameter of skull taken between the outsides of the orbits. ..	4	6	5	1	4	4	..		..		4	5	3	6	3	$7\frac{1}{2}$	4	0
Inter-orbital space, ...	,,	7	,,	6	,,	5	..		..		,,	$4\frac{1}{2}$	,,	4	,,	4	,,	5
Transverse diameter of orbital cavity, ...	1	6	1	5	1	5	..		..		1	4	1	3	1	$2\frac{1}{2}$	1	$3\frac{1}{2}$
Vertical diameter of orbital cavity, .. .	1	7	1	8	1	7	..		..		1	7	1	6	1	5	1	$3\frac{1}{2}$
Vertical diameter of nasal aperture, ...	1	6	1	5	1	4	..		..		1	2	1	1	1	2	1	0
Transverse diameter of nasal aperture, .. .	1	0	1	$2\frac{1}{2}$	1	0	..		..		,,	9	,,	9	,,	9	,,	9
Interspace between infra-orbital foramina, ...	2	0	2	3	1	9	..		..		1	9	1	7	1	7	1	5
Distance between the inferior margin of the nasal bone and the inferior margin of the intermaxillary bone, ...	3	3	3	1	2	$7\frac{1}{2}$	..		..		2	7	2	5	2	$2\frac{1}{2}$	1	$7\frac{1}{2}$
From the anteror margin of the occipital foramen to the posterior margin of the bony palate, ...	2	10	3	5	3	$2\frac{1}{2}$	2	8	..		3	$2\frac{1}{2}$	2	3	2	6	2	$6\frac{1}{2}$
Length of the bony palate along the mesial suture, ..	4	0	4	0	3	6	3	$2\frac{1}{2}$	..		3	$7\frac{1}{2}$	3	$1\frac{1}{2}$	2	6	2	8
From the anterior margin of the intermaxillary bones to the anterior palatal foramina, ...	1	3	1	$2\frac{1}{2}$	1	0	,,	8	..		1	2	,,	10	,,	7	,,	$7\frac{1}{2}$
Breadth of the crown of the first incisor, upper jaw, ..	,,	7		..	,,	6	,,	$5\frac{1}{2}$	..		,,	6	0	6	0	5†	,,	5
Breadth of the crown of the second incisor, upper jaw, .	,,	4		..	0	$3\frac{1}{2}$(?)	0	$3\frac{1}{2}$	..		0	$3\frac{1}{2}$	0	$3\frac{1}{2}$	0	$3\frac{1}{2}$(?)	,,	3
Breadth of the four incisors, *in situ*, upper jaw, ...	1	9		..	1	7	1	$6\frac{1}{2}$	..		1	7	1	6	1	5	1	7
Longitudinal extent of grinding surface of the *molares*, bicuspides included, of one side, upper jaw, ...	2	5	2	$2\frac{1}{2}$	2	$1\frac{1}{2}$	1	$7\frac{1}{2}$	..		2	$2\frac{1}{2}$	2	2	2	0	2	0
Length of the enamelled crown of the canine tooth, upper jaw, ..	1	0		..		..		..	..		1	2	0	$6\frac{1}{2}$		..	,,	7
Breadth of ditto, ...	,,	9	0	8	0	7	0	7	..		0	$6\frac{1}{2}$	0	5	,,	5	,,	6
Length of the lower jaw from the condyle to the anterior surface of the sockets of the incisors, ...	7	4	7	3	6	3	6	7	6	3	6	$7\frac{1}{2}$	5	7	5	5	5	2
Length of the *ramus* of the lower jaw, ...	4	$7\frac{1}{2}$	4	$7\frac{1}{2}$	3	$7\frac{1}{2}$	4	2	4	0	4	0	3	4	3	5	3	5
Greatest breadth of ditto, ...	3	1	2	8	2	$7\frac{1}{2}$	2	9	2	$3\frac{1}{2}$	2	$7\frac{1}{2}$	2	0	1	8	2	0
Interspace between the mental foramina, ...	2	1	2	5	2	0	..		2	1	2	0	1	8	2	0	1	7

* Incisors much worn. † Much abraded.

In the following table of admeasurements, the first column gives those of an adult female *Rambi* by Prof. Owen; the second are those of our adult female (?) *Pappan;* the third are those of our aged female *Kassar;* and the fourth are those of our adolescent small female Orang with short fore-arms:—

	Adult female Rambi.			Adult female Pappan.			Aged female Kassar.			Short-armed.		
	F.	*i.*	*l.*	*F.*	*i.*	*l.*	*F.*	*i.*	*l.*	*F.*	*i.*	*l.*
Length of the body from the *vertex* to the base of the *os calcis*,*	4	1	6	3	9	6	3	4	0	3	3	3
Length of the spinal column, ...	1	11	6	2	0†	5	1	8†	0	1	8	9
Length of *sternum* (not including the ensiform cartilage,)	,,	4	4½	,,	4	0	,,	4	0	,,	4	4
Length of the *manubrium sterni*, ..	,,	1	5	,,	1	2	,,	1	3½	,,	1	3
Breadth of the *manubrium sterni*, .	,,	2	4	,,	1	10½	,,	2	3	,,	1	9
Breadth of the *sternum* opposite the fifth rib, ...	,,	1	2	,,	1	4	,,	,,	10	,,	,,	11
Length of the first rib, ...	,,	2	7	,,	4‡	8	,,‡	3	9	,,‡	3	9
Length of the seventh rib, ...	1	4	6	1§	0	0	,,§	9	6	,,§	9	0
Length of the last rib (which is longer than in Man and has a cartilage,)	,,	6	2	,,	4	5	,,	3	0	,,	4	3
Length of *os innominatum*, ...	,,	9	10	,,	9	9	,,	8	6	,,	8	4
Breadth of *pelvis* from one antero-posterior spine of *ilium* to the other, ...	,,	9	10	,,	9	9	,,	8	6	,,	8	4
Breadth of *ilium*, ...	,,	4	9	,,	4	3	,,	4	0	,,	3	5
Breadth of *ischium*, ...	,,	3	7	,,	4	0	,,	3	5	,,	3	0
Breadth of *sacrum*, ...	,,	3	4	,,	3	1	,,	2	11	,,	2	9
Distance between the *acetabula*, ..	,,	5	5	,,	5	0	,,	4	7	,,	3	9
Length of the *clavicle*, .. .	,,	6	9	,,	6	9	,,	5	9	,,	5	5½
Length of the *scapula* along the base, ..	,,	5	5	,,	6	3	,,	5	5	,,	5	0
Breadth from the end of the *acromion* to the opposite part of the base, ..	,,	4	8	,,	4	6	,,	3	10	,,	3	6
From the root of the spine to the superior angle, ...	,,	1	4	,,	1	4	,,	,,	10	,,	,,	10

* In the second, third and fourth columns, the *height* of the skeleton is given, standing, *more humano*. In the second column 1 in. is allowed, and in the third ¾ in., for the height of the *astragalus* and *os calcis*. In the small Orang with short fore-arms, the height of these bones *in situbus* is ¾ in.

† The extremity of the *coccyx* is here allowed for.

‡ Measured round the curve from posterior articulation.

§ The osseous portion only.

	Adult female Rambi.			Adult female Pappan.			Aged female Kassar.			Short-armed.		
	F.	*i.*	*l*	*F.*	*i.*	*l.*	*F.*	*i.*	*l.*	*F.*	*i.*	*l.*
From the root of the spine to the inferior angle, ...	,,	4	3	,,	4	3	,,	3	8	,,	3	0
From superior to inferior angle, ..		..		,,	5	10	,,	4	7	,,	4	3
Greatest breadth of *scapula*, .. .		..		,,	4	3	,,	3	3	,,	2	9
Length of the *humerus*, ...	1	1	4	1	2	6	1	0	9	1	0	6
Circumference of middle of trunk of *humerus*,		..		,,	3	2	,,	2	3	,,	2	0
Length of the *radius*,..	1	1	7	1	2	0	1	1	1	,,	11	$2\frac{1}{2}$
Length of the *ulna*, ...	1	2	5	1	2	8	1	1	3	,,	11	$7\frac{1}{2}$
Length of the hand,*	,,	10	5		..			..		,,	8	,,
Length of fore-finger (metacarpal included†), ...	,,	8	5		..			..		,,	7	0
Length of metacarpal of middle finger, ..		..		,,	4	0		..		,,	3	$1\frac{1}{2}$
Length of first *phalanx* of middle finger,.		..		,,	2	11	,,	2	9	,,	2	3
Length of first *phalanx* of little finger, ..		..		,,	2	$5\frac{1}{2}$	,,	2	3	,,	2	0
Length of the inferior or sacral extremity (to the base of the *os calcis*), ..	1	9	3	1	9‡	0	1	6‡	9	1	6	9
Length of the *femur*, ...	,,	10	3	,,	10	8	,,	9	9	,,	9	6
Circumference of middle of trunk of *femur*,		..		,,	2	9	,,	2	$4\frac{1}{2}$	,,	2	$1\frac{1}{2}$
Length of the *tibia*, ...	,,	9	0	,,	9	2	,,	8	3	,,	8	3
Length of the *fibula*, ...	,,	8	7	,,	8	7	,,	7	$9\frac{1}{2}$	,,	7	$9\frac{1}{2}$
Length of the *patella*, ...	,,	,,	10	,,	,,	9	,,	,,	9	,,	,,	9
Breadth of the *patella*, ...	,,	,,	9	,,	,,	8	,,	,,	8	,,	,,	9
Length of foot,§	,,	,,	10		..			..		,,	9	3
Length of the *hallux*,..	,,	2	10		..			..		,,	2	$3\frac{1}{2}$
Length of the next toe, ...	,,	8	5		..			..		,,	6	10
Length of first *phalanx* of same, ..		..		,,	2	10	,,	2	9	,,	2	3
Length of second *phalanx* of same, ..		..			..		,,	1	6	,,	1	3
Length of the little toe, ...	,,	7	0		..			..		,,	5	9

So many years have now elapsed since the fact of a plurality of species of this genus was established by Prof. Owen and Sir J. Brooke, that it cannot but occasion much surprize that the several species have not by this time been long accurately determined, and more especially when the greatly increased intercourse with Borneo is taken into consideration. Yet it seems that no progress whatever has been made in the enquiry since the publication of Sir J. Brooke's letter; and probably there is no collection yet in Europe, which can boast of so fine and demonstrative a series of Orang crania as those which are now figured.

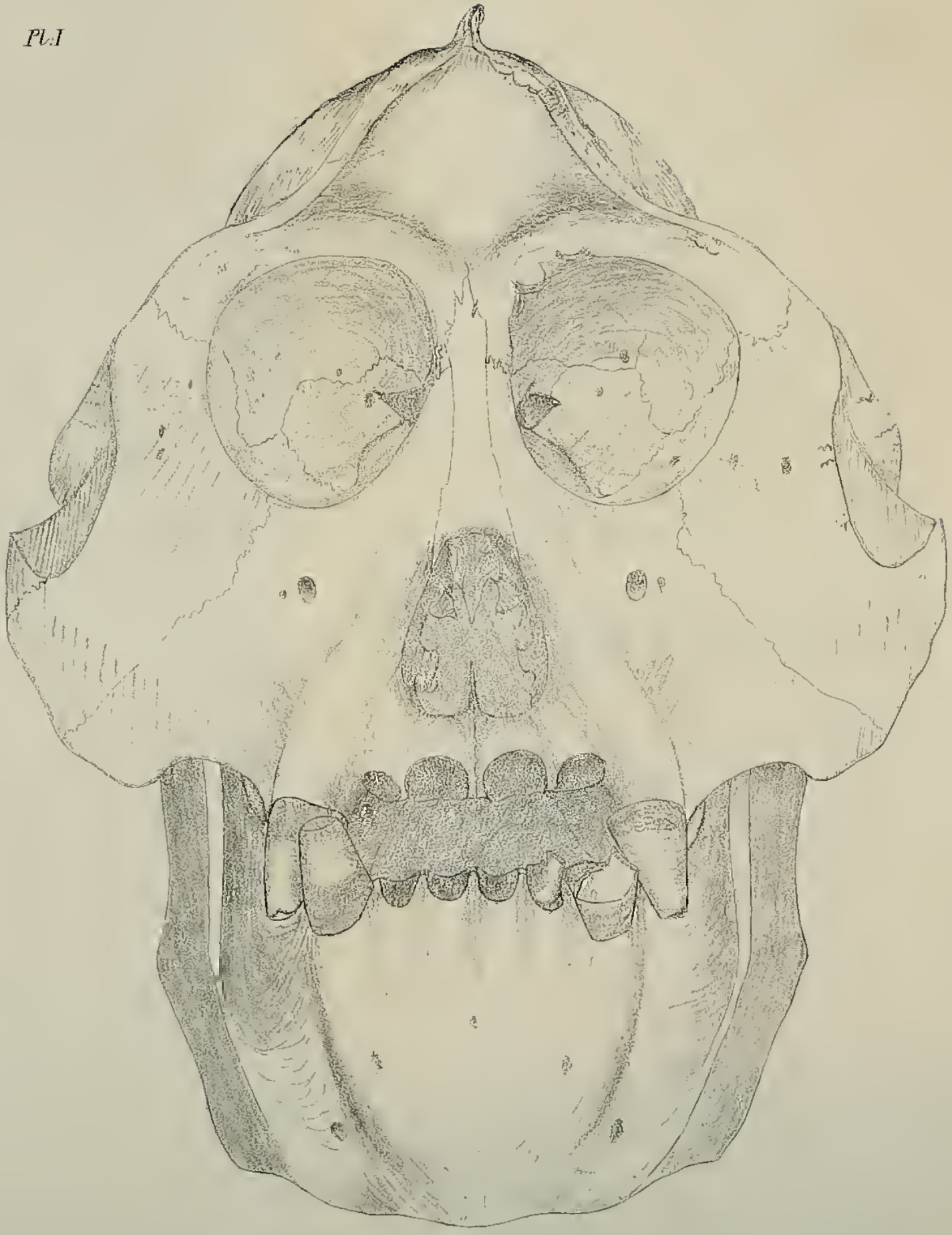
* In Dr. Clarke Abel's male *Pappan*, the hand is about 11 in. long.

† In Abel's *Pappan* about $9\frac{1}{2}$ in.

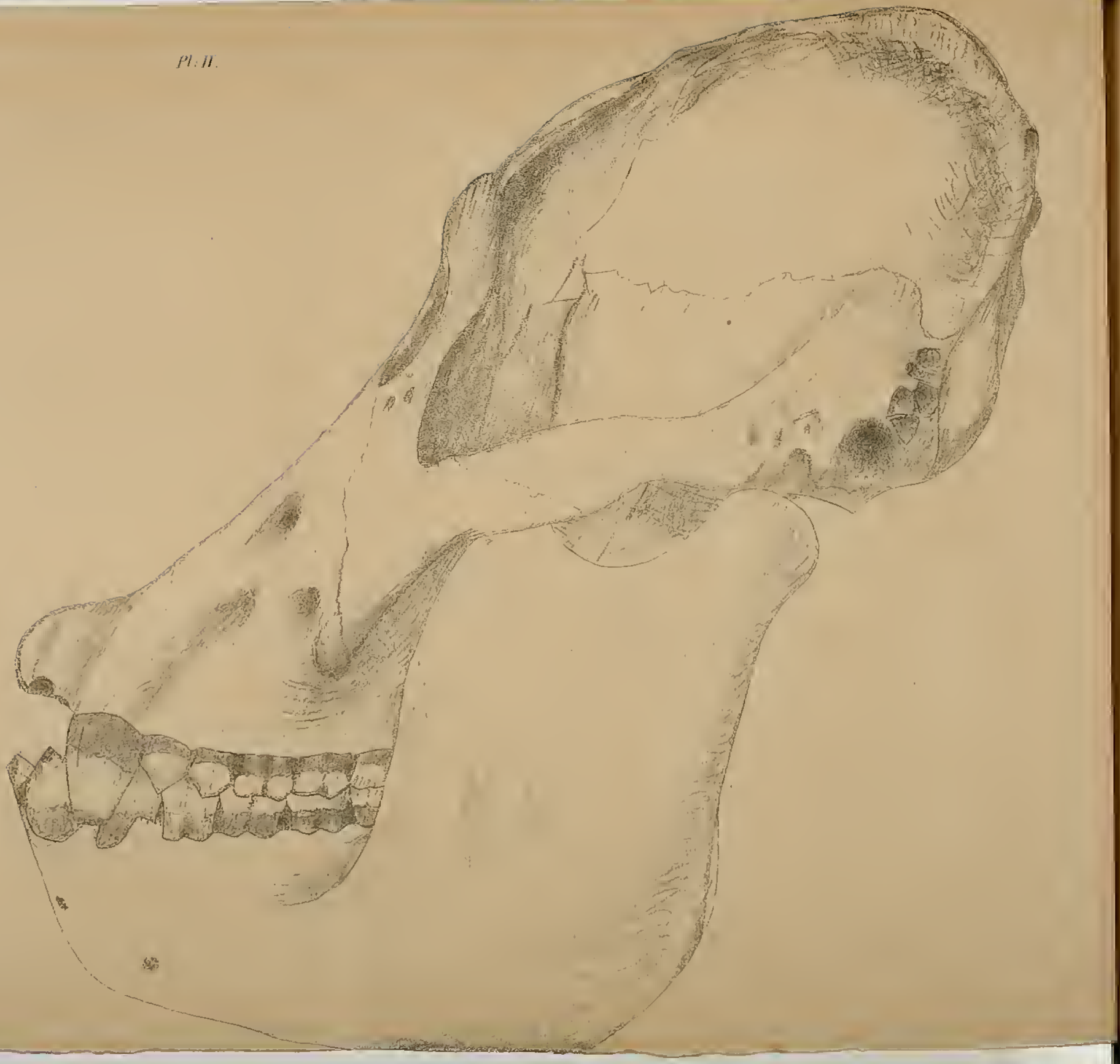
‡ An inch allowed in the second column, and $\frac{3}{4}$ in. in the third, for the *astragalus* and *os calcis*.

§ In Abel's *Pappan* about 13 in.

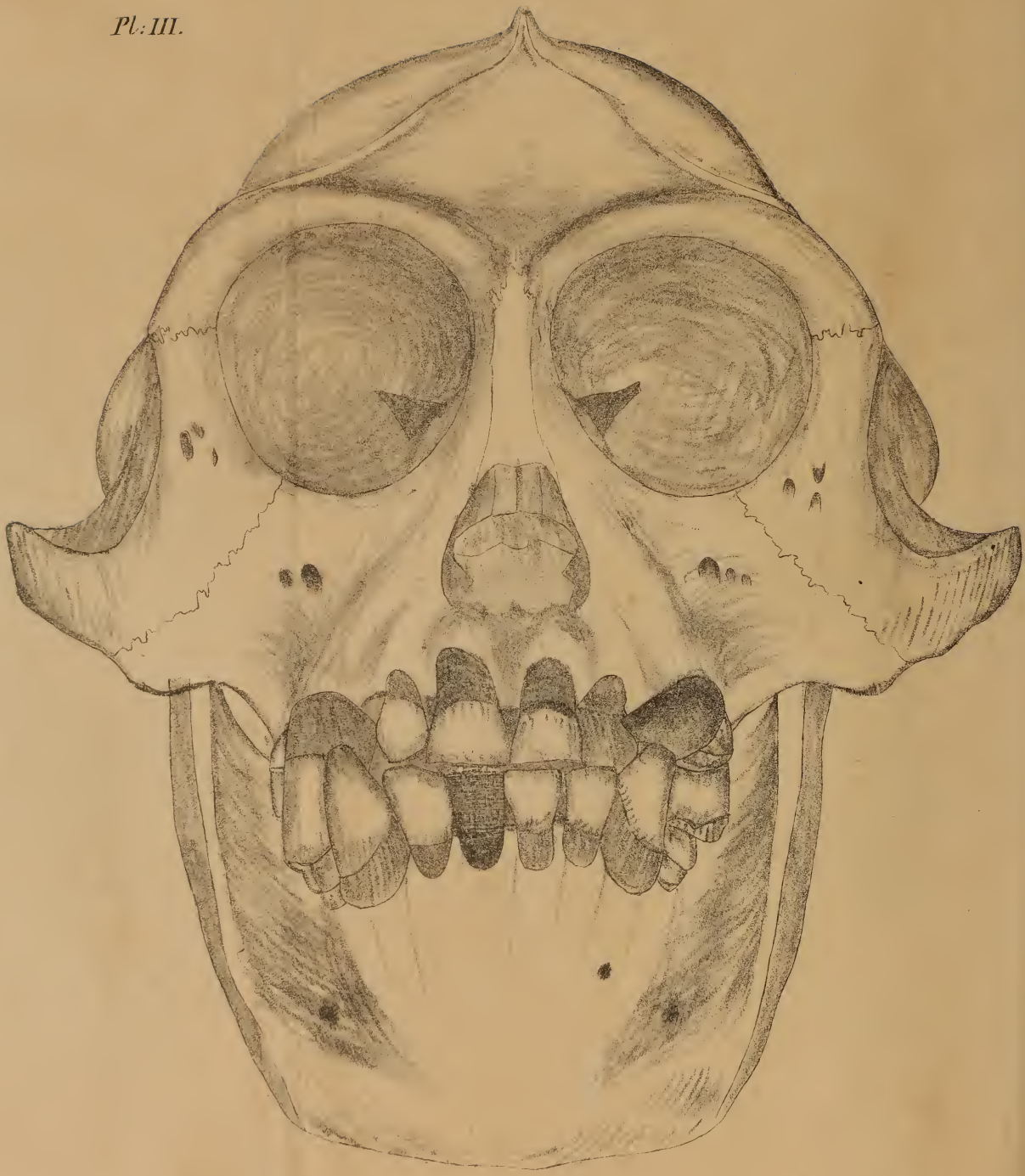
Pl. I



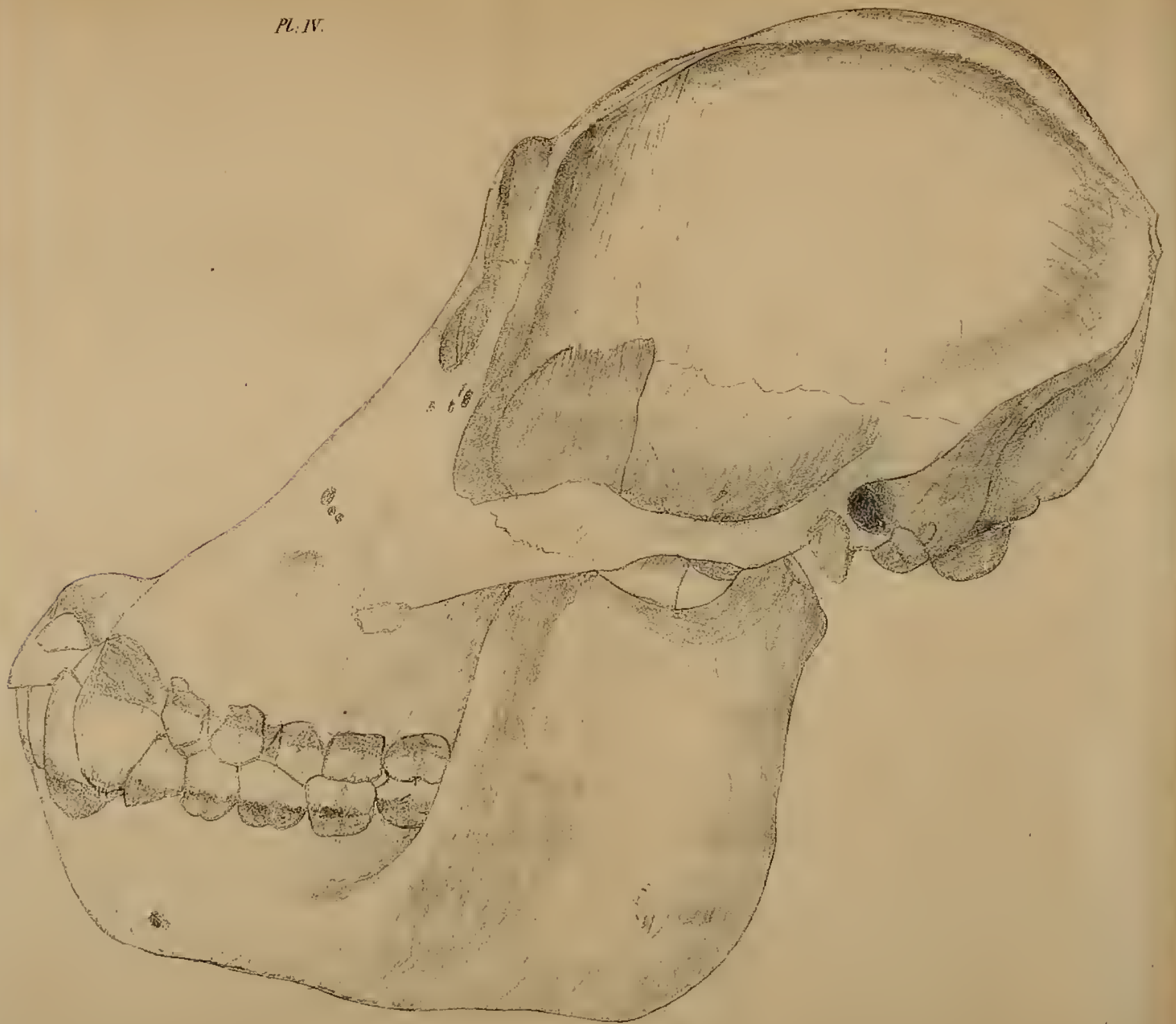
Pl. II.



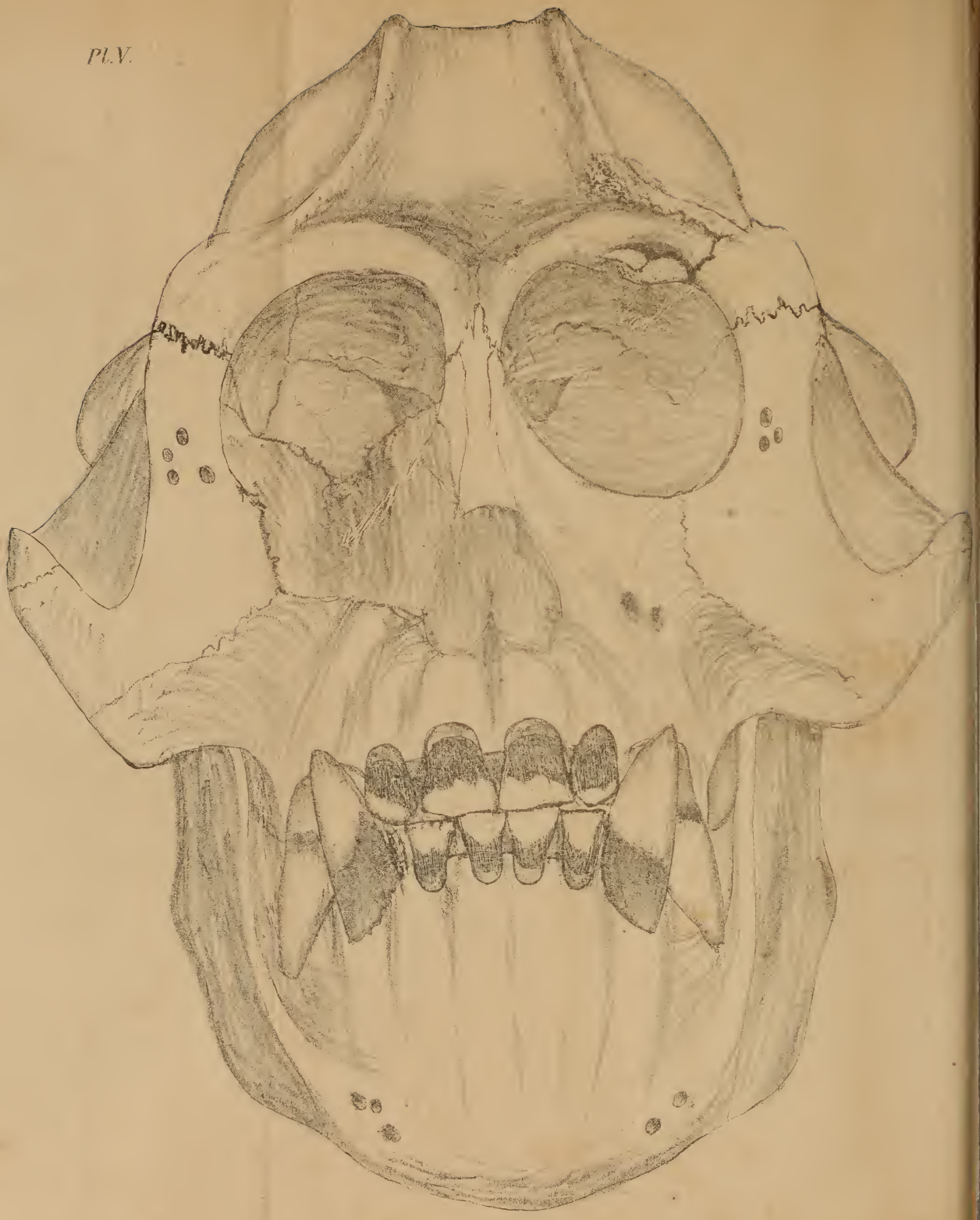
Pl: III.



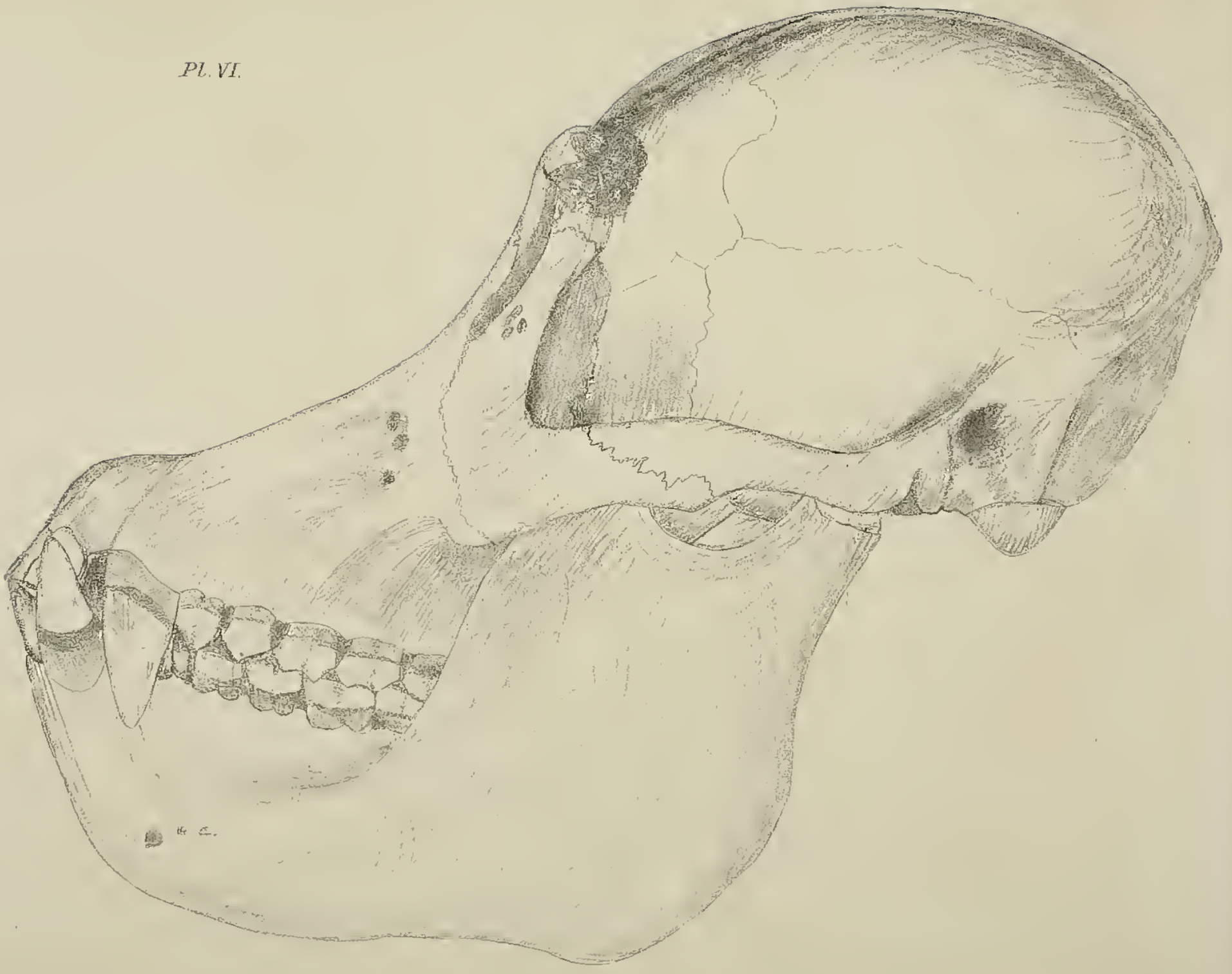
PL. IV.

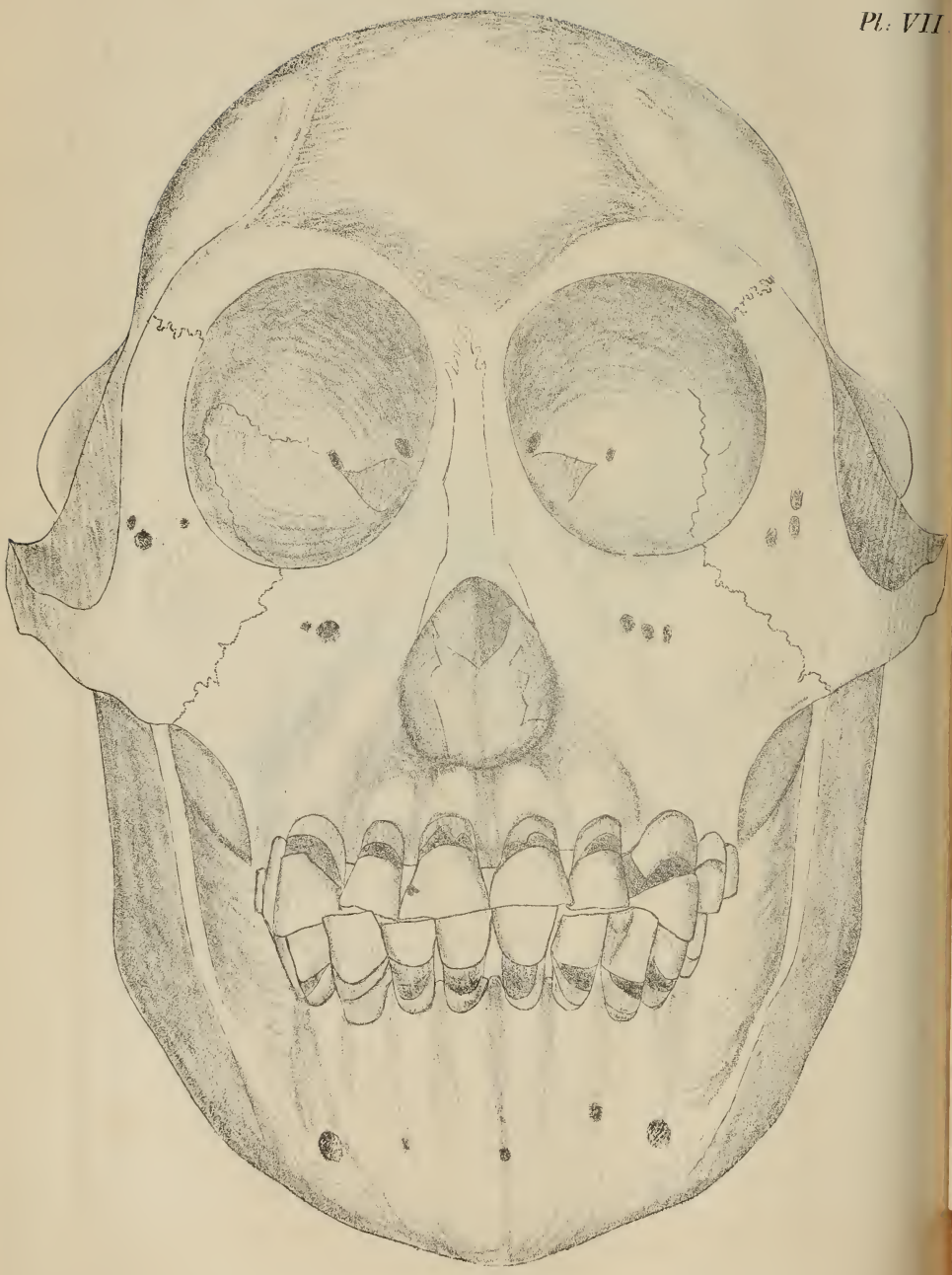


Pl. V.

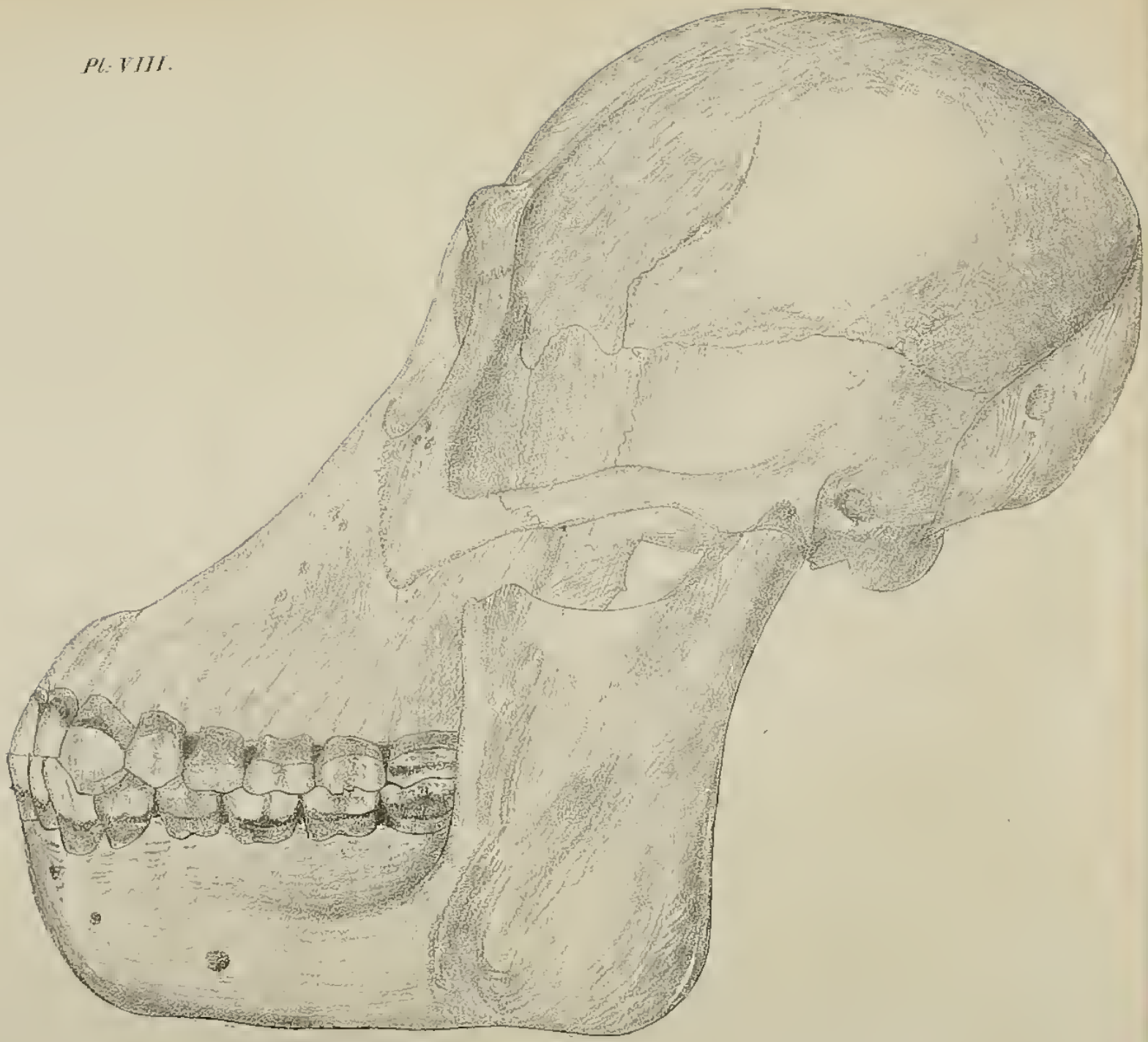


PL. VI.

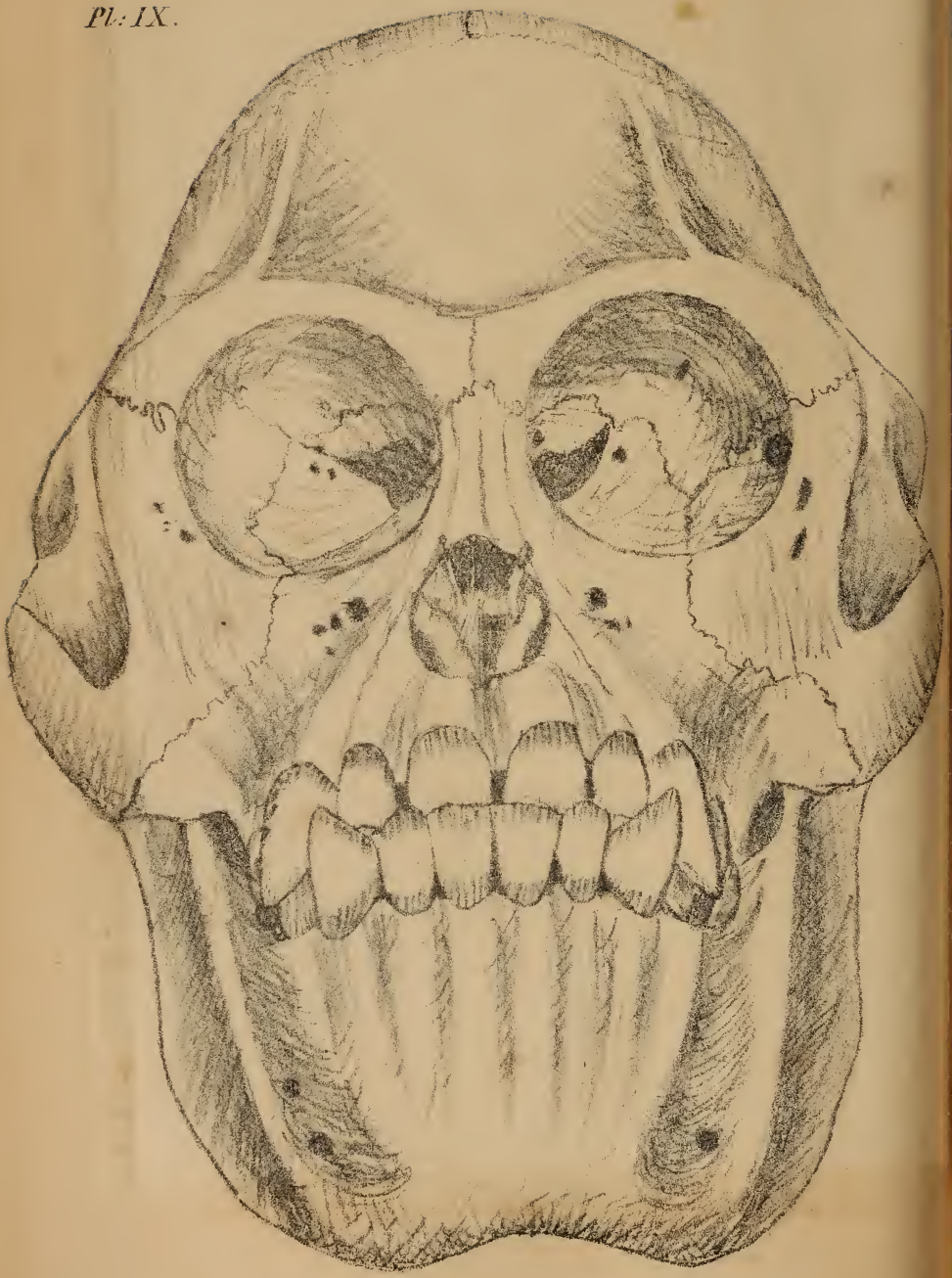




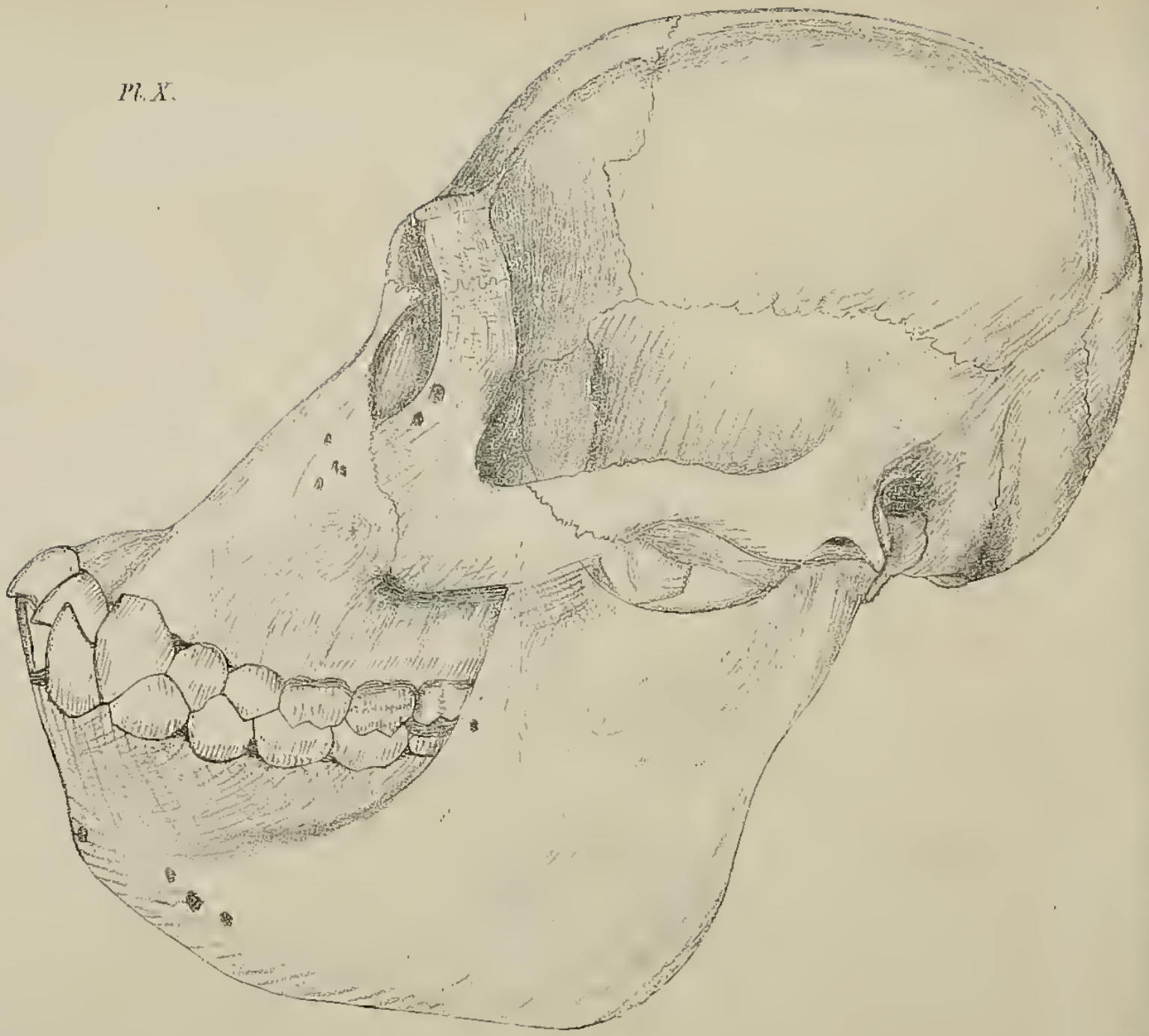
Pl. VIII.



Pl. IX.



Pl. X.



Explanation of Plates.

Pl. I, II.—Skull of PITHECUS BROOKEI, Bl: *P. Wurmbii* et *P. Abelii*, Owen (though neither the species described by Van Wurmb, nor that by Dr. Abel, a skull of which is figured in Pl. V, and VI); *Mias Rambi*, Brooke. Adult male, from Sumatra.

Pl. III, IV.—Ditto of aged female of the same, from Borneo.

Pl. V, VI.—Ditto of P. SATYRUS, (L.), apud Brooke, S. Müller, and others: *Mias Pappan*, Brooke. Adult female (?), from Borneo.

Pl. VII, VIII.—Ditto of P. MORIO, Owen: *Mias Kassar*, Brooke. Aged female, from Borneo.

Pl. IX, X.—Ditto of P. OWENII, Bl. Small Orang with short fore-arms. Adolescent female. Hab. unknown.

Description of Mohzarkhala in the Kohistan of the Western Huzara, extracted from the Journal of Mr. A. GARDINER. *By* M. P. EDGEWORTH, *Esq. B. C. S.*

On the 24th Feb. 1830, Mr. Gardiner started in company with Therman Shah, chief of the tribe of Khilzye, (a subdivision of the Huzara tribe Deh Kundi) and his brother, attended by a few followers, from Drohu the residence of the chief, in order to visit the spot called "the buried wealth of Moh" and certain caves in its neighbourhood.

They first descended about 2000 feet to the bottom of the valley, and crossed the deep and turbid torrent by means of a rope and withy bridge. Thence the path ascended north, and then north-east to the limit of the snow, crossed a bed of snow rather treacherous to the passenger, and came to a narrow gorge walled in with almost perpendicular rocks, but 15 to 20 feet wide, and lined with perpetual snow, on which no sun ever shines. Down this icy-bed the party let themselves slide as gently as they could in a sitting posture, avoiding the abrupt termination, out of which gushed a new-born torrent. Thence by a rocky path they reached an oval basin or small valley about 900—1000 yards long by 6—800 broad: all sides rapidly shelving towards the centre which contained a small pool about 150 yards in circumference, the traditional site of Moh's death.

This tarn is said to be unfathomable, but the most remarkable circumstance about it, is the bituminous nature of the water and its nauseously bitter taste. It imparts a stinging sensation to the naked skin, apparently similar to that felt from bathing in the Dead Sea. Mr. Gardiner imprudently waded into it, in a vain attempt to sound it, which he failed in doing with a line of 55 fathoms; and he suffered for sometime from the effect of the waters on his skin.

Occasionally balls of fire are said to play over the surface, which is probably owing to the escape of sulphuretted hydrogen gas. The waters, though intensely cold, have the appearance of ebullition, from the continual escape of gas. On one side was a deposit of sulphur.

Although fed from a glacier, the pool has no visible outlet, and is said never to change its level, save once during an earthquake when it rose several yards above its banks.

Proceeding to the south side of the valley they ascended a mound of loose debris, and found that the earthquake, that had occurred a few days before, had blocked up the mouth of two of the three caverns they went to see. The most westerly of them, however, was still accessible. The entrance, elevated a few feet above the ground on the face of a bluff rock, was nearly concealed by a veil of mossy vegetation fed by springs oozing from the rocks. On further examination, it proved to be of an irregular oval form, about $3\frac{1}{2}$ feet high by $2\frac{1}{4}$ broad. There were no marks of artificial labour visible on the rock, which seemed to be porphyritic, dark-red in colour, with black markings, and of extreme hardness. In position it rests on granite, and lies below primitive limestone. The glacis below is formed of a confused mixture of granite, greenstone and limestone.

Lighting their torches of split pine, they entered the cave. The first adit, for about 75 feet long, gradually enlarged, (they could only pass in a crouching posture), then it again contracted, but finally opened into an apartment 20×15, and eight feet high in the centre.

At the further end of this room was a rude image in high relief on a smoothed and squared surface, about $4\frac{1}{4}$ feet high. Two short and thick legs supported a large thick body surmounted by four extended arms, and two heads rising from one thick neck.

Over the head were some emblems which Mr. Gardiner supposes to mean the sun and moon, but which, from the sketch he gives, I

should rather describe as decrescents, one over the right head and two over the left. In size, the heads would be better suited to a colossus of 10 feet. The ears, eyes, nose and even the fingers were almost worn off. The figure had been originally highly polished; now a good deal worn and covered with a green vegetable scum.

The floor of the cave was level, except in one place, about 3 feet from the idol, where there was a hollow about two yards round. This was the spot where sacrifices used formerly to be made, and even then it was found filled with ashes and traces of recent fire.

On either side at about three yards from the great idol, were two smaller ones, both single-headed and two-armed, but otherwise, in rudeness and disproportion, resembling the chief idol.

The chief idol was said to represent Moh and his wife Mábún, formerly the gods of those regions, and even still reverenced by the half-converted Musalmáns of the country. No one dares enter the caves with shoes on, and the marks of recent fire show still stronger signs of remaining veneration.

The other two caves, whose mouths had been lately blocked up, were dedicated—one to Sheh or Seh, the destroyer, the other to Zhei, the god of fire.

About four miles further on, it is said, that there were two other caves since become inaccessible, dedicated to Hersh and Maul.

At each new moon a fire-offering is made before the cave of Zhei by some of the Therba tribe, who retain more of paganism than Islám; and these people reckon their time by moons, instead of years.

Descending to the western limit of the valley, the high cliff for the space of 2 or 300 yards was perforated with small holes, like a rabbit-warren. This was the site of Moh's treasure. The holes are made by the natives digging for it, and they frequently succeed in finding small beads of gold and stone known by the name of Solymani Dana, or Solomon's grain. The beads were for the most part agate or jasper, all more or less corroded and dimmed in colour, as if by fire; they were all bored. The golden grains had just the appearance of the little masses of gold which are made by gold-washers from the first melting of their amalgam and gold-dust; about the size of wheat grains.

This bank consists of a confused mass of boulders, granite, limestone, clay-slate and greenstone, all heaped upon a thick stratum of sandstone of varying quality, some argillaceous, some ferriferous of a deep red colour, and with some traces of lignite, alum earth and iron-pyrites. In this sandstone are the holes where the beads are found.

There are also found pieces of broken pottery in the neighbourhood and among the debris. Mr. Gardiner concludes that the tarn is the crater of an extinct volcano, and that former eruptions with earthquakes demolished some ancient place of abode.

The following is the legend of Moh. Moh created the earth, and his wife Mábún created the wilderness. From them sprung the first giant race. They slept alternately for 999 moons and reigned 450,000 moons. After this period three sons rebelled, viz. Sheh the life-destroyer, Zhei the fire-god, and Maul the earth-quaker, and by their combined efforts Moh was buried beneath the mountains. Confusion lasted 5000 moons—after which the three victors retired each to his own region for 10,000 moons.

Maul was lost in darkness of his own creating. Sheh fled with his family towards the sun, which so much enraged Zhei, that he caused fire to spread over the earth; this was quenched by the spirit of Mábún, but not till the whole giant race was destroyed and the earth remained a desert for 3000 moons. Then Hersh and Lethram, originally slaves of Moh and great magicians, emerged from the north, and settled in these mountains. By some Lethram is considered as the incarnate spirit of Mábún and the Queen to whom Hersh was vizier. Hersh had three sons Uz, Muz and All.* These he left in charge of all their families, while with a large army he travelled toward the sun in pursuit of Sheh, who was supposed to be still living.

So the three sons of Hersh and their descendants reigned happily for 18,000 moons till Khoor (Cyrus ?) invaded and conquered the country; but after many years' struggle they expelled the invader and retained the name Khoorkush (Cyrus-killer), now Khirghiz. The descendants of Hersh continued to reign for 10,000 moons more till Khoondroo (Alexander ?) invaded the country, after which no separate legend of them seems to be recollected.

* Whose names seem retained in the Uztagh, Muztagh and Altai mountains.

Contributions to the Statistics of Bengal,—Income, Expenditure and Food.—By J. R. Bedford, *Esq. Bengal Medical Staff.*

The relation between income and expenditure existing in any given community, affords a fair index to the soundness of its condition, and general prosperity. If the average rate of labour be such as to provide all able-bodied men and their families with a sufficiency of food, clothing and shelter, it must be conceded that such a population is in the possession of some of the primary, if not most important, elements of happiness, as applicable to a certain stage of civilization.

It has been, and is, the custom to represent the peasant-inhabitant of Bengal as weighed down by the pressure of land taxation to a point at which he can barely support life. That great suffering occasionally arises from the local deficiency of the staple article of food, must be conceded, but such is due to imperfect means of intercommunication, rather than inability to meet its average cost. As far as my own experience goes, the average income of the Bengal peasantry, by which term I desire to express, small landed proprietors, day-labourers, and the general mass of the people, suffices for all the necessary outlay of their position. It is an incontrovertible fact that debt largely prevails, but this would appear to be due rather to the enormous rate of interest which is taken and the comparatively excessive sums lavished on occasional ceremonies, than upon any actual necessity, in regard to the necessaries of life.

Desirous of attempting some analysis of the condition of the people, I constructed the following Table when in charge of the Civil Station of Chittagong. The subjects of inquiry were, patients attending the Dispensary. Their ailments were first attended to, and the facts tabulated below, obtained by inquiry immediately afterwards, through the zealous assistance of Bábu Buddináth Brimo, the Sub-Assistant Surgeon.

They are not offered as absolute truths. Those who have had any practical experience of the great difficulty of making statistical inquiries in Bengal, will fully understand how far they may deviate from correctness. But examining the facts here noted seriatim,

I think sufficient intrinsic evidence of their reliability will be found to confer upon them the character of approximate truths. The Table comprehends every ordinary item of expenditure, except that incurred on account of live-stock, which has been accidentally omitted, and the probable amount of which must of course be deducted from the balance when in favour.

With the view of rendering the questions and consequent information as clear as possible, it was agreed that the inquiry should embrace the condition of its subjects during the past twelve months only.

[*See* TABLE A.]

The above Table speaks for itself. To compute the mean of each item of expenditure would be useless labour. It may be remarked, however, that according to column 3, out of the one hundred men subjected to examination, seventy-seven were married, out of which number only four had more than one wife. By summing up column 4 we obtain a total of one hundred and twenty-one children or only 1.57 per marriage. This appears a very small number, but the source of error is difficult to detect, as all children of whatever age living in the house, must have been included.

The mean wages of the husbands amount to Co.'s Rs. 3-3-5, whilst those of the wives are 3as. 1p.; Columns 12 and 13 show us that whilst by far the largest proportion of the sums devoted to food is spent in rice, dhal is consumed in very small quantity. The outlay on salt exhibits a large figure in column 14, whilst col. 29 was formed with the view of ascertaining whether they obtained a sufficiency of this important condiment. Fish, as might naturally be expected at a sea-port, is universally consumed in preference to the meat, which constitutes a part of the Musulman's diet in the more inland districts. The outlay on fuel (column 20) is very small and by no means general. This circumstance is probably due to its having been procured for the most part by the hand-labour of some portion of the family. The almost universal use of tobacco and the proportionate sum devoted to it, bear an important relation to the fact of this necessary of life to a Bengali having been lately prohibited in our jails, as a too luxurious source of enjoyment.

TABLE A.

Table exhibiting the monthly income and expenditure of 100 *Families in Zillah Chittagong, Bengal,* 1849. *In Rupees, Annas and Pie.*

	Name.	1 Caste.	2 Employment.	No. of Dependents. 3 Wives.	4 Children.	5 Brothers, &c.	Income per Month. 6 Husband. R. A. P.	7 Wife. R. A. P.	8 Other Members of family. R. A. P.	9 Monthly produce of Land. R. A. P.	10 Total. R. A. P.	11 No. of livestock.	Monthly expenditure of whole Family. 12 Rice. R. A. P.	13 Dhal. R. A. P.	14 Salt. R. A. P.	15 Fish. R. A. P.	16 Meat. R. A. P.	17 Pepper and spices. R. A. P.	18 Vegetables. R. A. P.	19 Milk. R. A. P.	20 Fuel. R. A. P.	21 Tobacco. R. A. P.	22 Oil. R. A. P.	23 Clothing. R. A. P.	24 Schooling. R. A. P.	25 Rent of House. R. A. P.	26 Rent of Land. R. A. P.	27 Total. R. A. P.	28 Balance. R. A. P.	29 Is supply of salt sufficient ?
	Abdoolgooney, ...	M.	Rope-maker	1	0	2	5 0 0	0 0 0	0 0 0	0 0 0	5 0 0	2 Cows.	2 8 0	0 1 0	0 3 0	0 12 0	..	0 5 0	0 8 0	..	..	0 2 6	0 4 0	0 7 0	..	0 0 0	0 0 0	5 2 6	*0 2 6	Yes.
	Robomut ally,.....	M.	Ryot.	1	4	0	3 0 0	0 8 0	0 12 0	0 0 0	4 4 0	..	1 8 0	0 2 0	0 4 0	0 6 0	..	0 3 0	0 2 0	..	..	0 2 0	0 2 0	0 8 0	..	0 1 0	0 0 9	3 6 9	0 13 3	Ditto.
	Magun ally, ...	M.	Servant.	0	0	5	1 0 0	0 0 0	3 5 0	0 4 0	4 9 0	2 Cows.	2 0 0	0 1 0	0 3 0	0 2 0	..	0 4 0	0 3 0	..	..	0 1 6	0 2 0	0 4 0	..	0 0 3	0 0 3	3 5 0	1 4 0	Ditto.
	Cassim ally, ...	M.	Ryot.	2	4	0	4 0 0	0 2 0	0 0 0	0 10 6	4 12 6	5 Cows.	3 12 0	0 1 0	0 4 0	0 2 6	..	0 4 0	0 1 0	..	..	0 4 0	0 2 0	0 8 0	..	0 1 0	1 10 6	7 2 0	*2 5 6	Ditto.
5	Samud ally,.....	M.	Ditto.	1	1	0	1 0 0	0 3 0	0 0 0	1 14 0	3 1 0	2 Cows.	1 0 0	0 0 0	0 3 0	0 1 0	..	0 3 0	0 4 0	..	..	0 1 0	0 0 6	0 4 0	..	0 0 6	1 0 0	3 1 0	0 0 0	Ditto.
	Wozir ally,.....	M.	Peon.	0	0	4	1 0 0	0 0 0	0 3 0	2 0 0	6 3 0	..	1 8 0	0 1 0	0 2 0	0 2 0	..	0 3 0	0 3 0	..	0 2 0	0 1 0	0 1 6	0 3 0	..	0 0 0	0 4 0	2 15 0	3 4 0	Ditto.
	Callo, ...	M.	Ryot.	1	3	5	3 0 0	0 5 0	0 11 0	0 0 0	4 0 0	4 Cows.	2 0 0	0 0 0	0 8 0	0 2 0	..	0 3 0	0 0 0	..	..	0 1 0	0 0 6	0 4 0	..	0 1 0	1 4 0	4 7 6	*0 7 6	Ditto.
	Kistomungul, ...	H.	Ditto.	1	2	1	3 8 0	0 0 0	0 0 0	1 8 6	5 0 6	..	2 0 0	0 1 6	0 4 0	0 4 0	..	0 3 6	0 0 0	..	..	0 1 0	0 1 6	0 7 0	..	0 0 6	0 12 0	4 4 6	0 12 0	Ditto.
	Tunnu, ...	M.	Cooly.	1	0	3	3 0 0	0 4 0	2 0 0	0 3 0	5 7 0	..	1 4 0	0 3 0	0 2 0	0 4 0	..	0 4 0	0 4 0	..	..	0 0 0	0 2 0	0 4 0	..	0 0 6	0 3 0	2 14 6	2 8 6	Ditto.
10	Menhjan,.....	M.	Mangee.	1	0	0	3 0 0	0 4 0	0 0 0	0 4 0	3 8 0	12 Cows.	1 0 0	0 1 0	0 2 0	0 2 0	..	0 2 0	0 4 0	0 2 0	..	0 1 0	0 1 0	0 4 0	..	0 0 6	0 1 0	2 4 6	1 3 6	Ditto.
	Hyder ally,.....	M.	Cooly.	1	3	0	2 8 0	0 3 0	0 12 0	0 0 0	3 7 0	1 Cow.	1 8 0	0 0 0	0 2 0	0 2 0	..	0 2 0	0 2 0	..	..	0 1 0	0 1 0	0 3 0	..	0 0 6	0 6 0	2 11 6	0 11 6	Ditto.
	Dwan ally, ...	M.	Ditto.	1	2	1	4 0 0	1 2 0	0 6 0	0 2 6	5 10 6	..	1 8 0	0 0 0	0 2 0	0 8 0	..	0 2 0	0 8 0	..	..	0 3 0	0 1 0	0 3 0	..	0 0 6	1 0 0	4 3 6	1 7 0	Ditto.
	Azgur ally, ...	M.	Ditto.	1	1	1	0 0 0	0 4 0	0 3 0	1 3 6	1 10 6	..	1 0 0	0 0 0	0 1 0	0 1 0	..	0 1 0	0 1 0	..	..	0 0 0	0 0 0	0 2 0	..	0 0 6	0 12 0	2 2 6	*1 8 0	Ditto.
	Amud ally, ...	M.	Ryot.	1	0	2	2 0 0	0 0 0	4 0 0	0 0 0	6 0 0	2 Cows.	1 0 0	0 1 0	0 4 0	0 8 0	..	0 4 6	0 1 0	0 8 0	0 4 0	0 2 0	0 4 0	0 5 0	..	0 1 0	0 0 0	3 10 6	2 5 6	Ditto.
15	Ahamud ally, ...	M.	Tindal.	1	0	3	8 0 0	0 0 0	0 0 0	0 0 0	8 0 0	..	1 0 0	0 0 0	0 2 0	1 0 0	..	0 3 6	0 2 0	0 1 0	..	0 2 0	0 2 0	0 6 0	..	0 0 6	0 1 3	3 3 9	4 12 3	Ditto.
	Mahomed Hossen,..	M.	Ryot.	2	2	1	4 0 0	1 0 0	0 0 0	0 0 9	5 0 9	3 Cows.	2 4 0	0 0 6	0 4 0	1 0 0	..	0 6 0	0 4 0	0 6 0	..	0 1 0	0 4 0	0 2 0	..	0 1 0	0 0 3	5 0 9	0 0 0	Ditto.
	Robomut olla, ...	M.	Ditto.	1	0	7	7 0 0	0 8 0	0 0 0	0 0 0	7 8 0	..	3 0 0	0 0 0	0 2 0	0 2 0	..	0 10 0	0 4 0	..	..	0 2 0	0 4 0	0 5 0	..	0 1 0	0 9 0	5 7 0	2 1 0	Ditto.
	Suffer ally, ...	M.	Bhisty.	0	0	1	2 8 0	0 0 0	0 8 0	0 0 0	3 0 0	..	1 0 0	0 2 0	0 1 0	0 2 6	..	0 1 0	0 4 0	..	0 4 0	0 2 0	0 4 0	0 4 0	..	0 0 6	0 0 6	2 7 6	0 8 6	Ditto.
	Abdool ally, ...	M.	Rope-maker	1	1	3	5 0 0	0 4 0	0 0 0	0 9 0	5 13 0	..	2 0 0	0 2 0	0 2 0	0 8 0	..	0 1 0	0 4 0	0 8 0	..	0 4 0	0 3 0	0 6 0	..	0 0 6	0 2 0	4 0 6	1 12 6	Ditto.
20	Teluck, ...	H.	Dobey.	1	0	2	5 0 0	0 0 0	4 0 0	0 0 0	9 0 0	..	2 0 0	0 0 0	0 2 0	0 2 0	..	0 2 0	0 8 0	..	1 0 0	0 8 0	0 8 0	0 2 0	..	0 1 0	0 1 3	7 6 3	1 9 9	Ditto.
	Woomed ally,.....	M.	Cooly.	1	0	0	1 8 0	0 2 0	0 0 0	0 6 0	2 0 0	2 Cows.	1 4 0	0 0 0	0 1 0	0 4 0	..	0 2 0	0 1 0	..	..	0 0 0	0 0 6	0 2 0	..	0 0 0	0 0 9	1 12 0	0 4 0	Ditto.
	Annu, ...	M.	Ryot.	1	2	6	2 0 0	0 0 0	2 0 0	2 0 0	6 0 0	4 Cows.	2 0 0	0 1 0	0 4 0	0 4 0	..	0 8 0	0 4 0	..	0 1 6	0 2 0	0 2 0	0 5 0	..	0 2 0	1 4 0	5 5 6	0 10 6	Ditto.
	Cally Doss,.....	H.	Bearer.	1	0	5	2 0 0	0 0 0	2 0 0	2 10 0	6 10 0	Buffalo.	1 0 0	0 0 0	0 4 0	0 4 0	..	0 4 0	0 8 0	..	..	0 2 0	0 2 0	0 4 0	..	0 1 0	2 6 0	5 3 0	1 7 0	Ditto.
	Sooker Mahomed, ..	M.	Chowkidar.	1	1	0	2 8 0	0 8 0	0 0 0	0 1 0	3 1 0	..	1 0 0	0 0 0	0 1 0	0 4 0	..	0 4 0	0 2 0	..	0 1 0	0 1 0	0 5 0	0 1 0	..	0 0 6	0 0 9	2 4 3	0 12 9	Ditto.
25	Tazu, ...	M.	Shopkeeper.	0	0	2	2 0 0	0 0 0	2 0 0	1 8 0	5 8 0	..	1 8 0	0 1 0	0 2 0	0 8 0	..	0 4 0	0 2 0	..	0 4 0	0 1 6	0 1 6	0 8 0	..	0 0 9	0 0 0	3 8 9	1 15 3	Ditto.
	Sookloll, ...	H.	Priest.	1	1	1	15 0 0	0 0 0	0 0 0	0 0 0	15 0 0	1 Cow.	2 0 0	0 0 0	0 4 0	0 2 0	1 0 0	0 1 0	0 1 0	0 4 0	..	0 8 0	0 8 0	0 1 4	0	0 0 0	0 0 0	6 10 0	8 6 0	Ditto.
	Acbar ally,.....	M.	Bricklayer.	1	2	3	3 0 0	0 8 0	0 0 0	0 0 0	3 8 0	..	1 8 0	0 0 0	0 0 0	0 1 0	..	0 1 6	0 1 0	..	..	0 0 9	0 1 0	0 3 0	..	0 0 0	0 1 0	2 3 3	1 4 3	Ditto.
	Nazam ally, ...	M.	Ryot.	0	0	3	3 0 0	0 0 0	1 0 0	0 10 0	4 10 0	2 Cows.	2 8 0	0 0 0	0 2 0	0 4 0	..	0 2 6	0 2 0	..	..	0 0 6	0 1 0	0 4 0	..	0 0 6	0 8 0	3 11 6	0 14 6	Ditto.
	Latuah, ...	M.	Servant.	0	0	1	1 2 0	0 0 0	0 1 6	0 0 0	3 6 0	..	1 4 0	0 0 0	0 2 0	0 4 0	..	0 1 6	0 2 0	..	..	0 1 0	0 1 0	0 1 0	..	0 0 0	0 0 0	1 4 0	1 5 6	Ditto.
30	Maddunneah, ...	M.	Cooly.	0	0	1	1 0 0	0 0 0	0 1 0	0 1 0	3 0 0	..	1 0 0	0 0 0	0 2 0	0 1 0	..	0 1 6	0 2 0	..	..	0 1 0	0 1 0	0 1 0	..	0 0 3	0 8 0	2 1 3	0 14 9	Ditto.
	Hasseneah, ...	M.	Ditto.	1	3	0	3 0 0	0 2 0	0 0 0	0 0 0	3 2 0	..	1 0 0	0 0 0	0 1 0	0 4 0	..	0 1 6	0 4 0	..	..	0 0 9	0 1 0	0 4 0	..	0 1 0	0 0 6	2 1 9	1 0 3	Ditto.
	Samud ally,.....	M.	Shopkeeper.	1	0	0	4 0 0	0 0 0	0 0 0	0 0 0	4 0 0	..	1 0 0	0 1 0	0 1 0	0 1 0	..	0 7 0	0 2 0	..	0 2 0	0 2 0	0 8 0	0 8 0	..	0 2 0	0 0 6	3 6 6	0 9 6	Ditto.
	Hassan ally, ...	M.	Syce.	1	0	4	3 0 0	0 0 0	1 8 0	0 2 0	4 10 0	..	2 0 0	0 1 6	0 4 0	0 4 0	..	0 3 0	0 2 0	..	..	0 2 0	0 2 0	0 5 0	..	0 1 0	0 0 6	3 9 0	1 1 0	Ditto.
	Mahomed Cassim, ..	M.	Chowkidar.	1	1	2	3 8 0	0 4 0	0 0 0	0 0 6	4 2 9	..	2 0 0	0 1 0	0 2 0	0 6 0	..	0 1 3	0 4 0	..	0 3 0	0 2 0	0 4 0	0 4 6	..	0 1 0	0 6 0	4 2 9	0 0 0	Ditto.
35	Samud ally, ...	M.	Ryot.	1	4	7	4 0 0	0 0 0	1 0 0	0 8 0	5 8 0	3 Cows.	3 0 0	0 4 0	0 6 0	0 2 0	..	0 4 0	0 8 0	.	0 4 0	0 8 0	0 1 0	0 10 0	..	0 2 6	0 2 0	6 3 6	*0 11 6	Ditto.
	Hamza, ...	M.	Syce.	0	0	4	5 0 0	0 0 0	0 4 0	1 4 0	6 8 0	4 Cows.	1 12 0	0 4 0	0 2 0	0 4 0	..	0 2 0	0 3 0	..	..	0 2 0	0 5 0	0 12 0	..	0 1 3	0 9 0	4 8 3	1 15 9	Ditto.
	Chunder Sing,.....	H.	Burcundaz.	1	1	0	4 0 0	0 4 0	0 0 0	0 0 0	4 4 0	..	1 0 0	0 4 0	0 2 0	0 2 0	..	0 2 0	0 2 0	..	..	0 0 0	0 1 0	0 4 0	..	0 1 6	0 10 0	2 12 6	1 7 6	Ditto.
	Cally Doss, ...	H.	Cooly.	1	0	3	2 0 0	0 3 0	0 0 0	0 0 0	2 11 0	2 Cows.	2 0 0	0 0 0	0 3 0	0 0 0	..	0 2 0	0 2 0	..	..	0 1 0	0 2 0	0 4 6	..	0 0 6	0 4 0	3 3 0	*0 8 0	Ditto.
	Ramkanno, ...	H.	Ditto.	0	0	4	2 0 0	0 0 0	4 0 0	0 2 0	6 2 0	..	1 8 0	0 0 0	0 4 0	0 3 0	..	0 4 0	0 2 0	..	..	0 0 9	0 1 0	0 4 0	..	0 0 9	0 1 6	2 13 6	3 4 6	Ditto.
40	Futtey ally,.....	M.	Ditto.	1	3	0	3 0 0	0 4 0	0 0 0	0 2 0	3 6 0	..	2 0 0	0 0 0	0 2 0	0 0 0	..	0 4 0	0 2 0	..	..	0 2 0	0 1 0	0 4 0	..	0 0 9	0 1 6	3 0 9	0 5 3	Ditto.
	Toofan ally,.....	M.	Servant.	1	4	0	3 0 0	0 0 0	0 0 0	0 8 0	3 8 0	..	1 4 0	0 1 0	0 2 0	0 2 0	..	0 4 0	0 1 0	..	..	0 1 0	0 1 0	0 6 0	..	0 2 0	0 2 0	2 10 0	0 14 0	Ditto.
	Muttey jan,.....	M.	Ryot.	0	0	5	4 0 0	0 0 0	3 11 0	0 0 0	7 11 0	2 Cows.	2 8 0	0 1 6	0 2 0	1 0 0	..	0 12 0	0 2 0	0 4 0	..	0 2 0	0 4 0	0 4 0	..	0 4 0	0 0 0	3 5 7	2 3 3	Ditto.
	Hassen beck, ...	M.	Servant.	1	0	0	3 0 0	0 0 0	0 0 0	0 0 0	3 0 0	..	1 0 0	0 0 0	0 4 0	0 2 0	..	0 9 0	0 4 0	0 4 0	..	0 0 0	0 4 0	0 2 0	..	0 2 0	0 0 0	9 2 11	0 4 3	No.
	Amzut ally,.....	M.	Ditto.	1	1	6	3 0 0	0 12 0	4 0 0	0 4 0	8 0 0	1 Cow.	1 10 0	0 0 0	0 2 6	0 4 0	..	0 6 0	0 4 0	..	0 1 0	0 2 0	0 6 0	0 12 0	..	0 4 0	0 1 0	4 4 6	3 11 6	Yes.
45	Assud, ...	M.	Ryot.	1	1	1	3 0 0	0 5 0	0 0 0	1 14 0	5 3 0	3 Cows.	1 8 0	0 0 0	0 0 0	0 4 0	..	0 6 0	0 2 0	..	..	0 5 0	0 2 0	0 5 0	..	0 1 0	0 9 0	3 10 0	1 9 0	Ditto.
	Wally, ...	M.	Burkundaz.	1	0	5	2 12 0	0 0 0	1 8 0	0 4 0	4 5 3	..	2 0 0	0 0 0	0 2 0	0 0 0	..	0 5 0	0 0 0	..	..	0 1 6	0 4 0	0 5 0	..	0 2 0	0 1 0	3 5 3	1 2 9	Ditto.
	Abdool ally, ...	M.	Boatman.	0	0	3	5 0 0	0 0 0	8 0 0	0 0 1	13 1 0	3 Cows.	2 0 0	0 0 0	0 2 0	0 8 0	..	0 8 0	0 1 0	..	..	0 1 0	0 4 0	0 5 0	..	0 2 0	0 0 3	3 15 3	9 1 9	Ditto.
	Noor Mahomed,.....	M.	Servant.	1	5	0	2 8 0	0 2 0	0 0 0	0 0 0	2 10 0	..	1 0 0	0 0 0	0 1 0	0 6 0	..	0 2 0	0 2 0	..	..	0 4 0	0 8 0	0 2 0	..	0 0 0	0 0 0	2 9 0	0 1 0	Ditto.
	Fakir Mahomed,.....	M.	Ryot.	1	0	3	6 0 0	0 4 0	0 0 0	1 0 0	7 4 0	6 Cows.	2 0 0	0 0 0	0 4 0	0 2 0	..	0 4 0	0 4 0	..	0 8 0	0 2 0	0 4 0	0 4 0	..	0 0 6	0 8 0	4 8 6	2 11 6	Ditto.
50	Ramdoss,.....	H.	Fisherman.	1	2	1	4 8 0	0 0 0	0 0 0	0 0 0	4 8 0	..	1 8 0	0 4 0	0 4 0	0 4 0	..	0 3 0	0 4 1	..	0 4 0	0 2 0	0 4 0	0 4 0	..	0 1 6	0 2 0	3 4 6	1 3 6	Ditto.
	Ramdhun, ...	H.	Shopkeeper.	0	0	2	6 0 0	0 0 0	0 0 0	0 0 0	6 0 0	..	1 0 0	0 0 0	0 2 0	0 4 0	..	0 1 0	0 4 0	..	0 6 0	0 8 0	0 0 0	0 4 0	..	0 1 0	0 2 0	3 0 0	3 0 0	Ditto.

* Balance against.

Table exhibiting the monthly income and expenditure of 100 *Families in Zillah Chittagong, Bengal,* 1849. *In Rupees, Annas and Pie—Continued.*

	Name.	1 Caste.	2 Employment.	No. of Dependents. 3 Wife.	4 Children.	5 Brother, &c.	Income per Month. 6 Husband. R. A. P.	7 Wife. R. A. P.	8 Other Members of family. R. A. P.	9 Monthly produce of Land. R. A. P.	10 Total. R. A. P.	11 No. of live stock.	Monthly expenditure of whole Family. 12 Rice. R. A. P.	13 Dhal. R. A. P.	14 Salt. R. A. P.	15 Fish. R. A. P.	16 Meat. R. A. P.	17 Pepper and spices. R. A. P.	18 Vegetables. R. A. P.	19 Milk. R. A. P.	20 Fuel. R. A. P.	21 Tobacco. R. A. P.	22 Oil. R. A. P.	23 Clothing. R. A. P.	24 Schooling. R. A. P.	25 Rent of House. R. A. P.	26 Rent of Land. R. A. P.	27 Total. R. A. P.	28 Balance. R. A. P.	Is salt sufficient?
	Abilool, ...	M.	Ryot.	..	..	3	2 8 0	..	2 0 0	1 2 0	5 10 0	4 Cows.	2 0 0	..	0 2 0	0 2 0	..	0 3 0	0 2 0	..	..	0 1 6	0 1 6	0 3 0	..	0 1 0	0 8 0	3 8 0	2 2 0	Yes.
	Runjan, ...	M.	Ditto.	1	3	1	2 8 0	..	.	3 4 0	5 12 0	5 Cows.	1 8 0	..	0 2 0	0 4 0	..	0 1 6	0 2 0	..	..	..	0 1 0	0 4 0	..	0 0 9	2 8 0	4 15 3	0 12 9	Ditto.
	Brojonath, ...	M.	Fisherman.	..	..	2	2 0 0	..	0 8 0	..	2 8 0	..	1 8 0	..	0 1 0	0 0 0	..	0 2 0	0 2 0	..	..	0 3 0	0 1 0	0 1 0	..	..	0 0 6	2 2 6	0 5 6	Ditto.
55	Puncharam, ...	H.	Chowkidar.	1	1	1	3 0 0	..	..	0 2 0	3 2 0	2 Cows.	1 0 0	0 2 0	0 2 0	0 4 0	..	0 2 0	0 2 0	..	0 4 0	0 2 0	0 4 0	0 4 0	..	0 0 6	0 6 0	3 0 6	0 1 6	Ditto.
	Mealjau, ...	M.	Peon.	1	1	2	3 0 0	0 8 0	..	2 12 0	6 4 0	3 Cows.	1 8 0	0 4 0	0 4 0	0 4 0	..	0 4 0	0 8 0	..	..	0 2 0	0 8 0	0 4 0	..	0 1 0	2 0 0	5 15 0	0 5 0	Ditto.
	Tholseyram, ...	H.	Weaver.	1	3	..	4 0 0	..	..	..	4 0 0	..	1 0 0	0 2 0	0 1 0	0 4 0	..	0 2 0	0 4 0	..	0 2 0	0 1 0	0 4 0	0 6 0	..	0 1 0	0 1 6	2 12 6	1 3 6	Ditto.
	Raj chunder, ...	H.	Peon.	..	..	8	4 0 0	..	7 0 0	..	11 0 0	8 Cows.	3 0 0	0 8 0	0 6 0	0 8 0	..	0 6 0	0 8 0	..	1 0 0	0 4 0	0 6 0	2 0 0	..	..	0 2 0	9 0 0	2 0 0	Ditto.
	Bashugazy, ...	M.	Ryot.	1	1	9	3 0 0	0 8 0	4 0 0	1 4 0	8 12 0	8 Cows.	1 0 0	..	0 8 0	0 8 0	..	0 8 0	0 8 0	..	..	0 8 0	0 8 0	0 8 0	..	0 1 0	1 0 0	8 8 0	0 4 0	Ditto.
60	Mohomed Rokey,	M.	Ditto.	1	5	2	6 8 0	0 8 0	..	2 8 0	9 8 0	2B. 4 C.	4 0 0	0 1 0	0 8 0	0 8 0	..	0 6 0	0 4 0	..	..	0 2 0	0 2 0	0 8 0	..	0 1 0	2 8 0	9 0 0	0 8 0	Ditto.
	Torraleu, ...	M.	Cooly.	..	.	1	1 4 0	..	..	..	1 4 0	..	0 12 0	..	0 1 0	0 1 0	..	0 1 0	0 2 0	..	..	0 1 0	..	0 2 0	..	..	..	1 4 0	..	Ditto.
	Kurimbux, ...	M.	Ryot.	1	..	2	3 0 0	0 4 0	1 4 0	0 4 0	4 12 0	2 Cows.	1 8 0	..	0 2 0	0 4 0	..	0 3 0	0 4 0	..	..	0 2 0	0 1 0	0 3 0	..	0 1 0	0 4 0	3 0 0	1 12 0	Ditto.
	Dhongazy, ...	M.	Ditto.	2	3	2	4 0 0	0 4 0	2 8 0	0 8 0	7 4 0	3 Cows.	2 8 0	..	0 6 0	0 8 0	..	0 6 0	0 4 0	..	..	0 4 0	0 2 0	0 4 0	..	0 1 0	1 0 0	5 11 0	1 9 0	Ditto.
	Hurrihur, ...	H.	Ditto.	1	1	2	3 0 0	0 2 0	1 4 0	0 4 0	4 10 0	2 Cows.	2 0 0	..	0 4 0	0 4 0	..	0 3 0	0 4 0	..	0 2 0	0 2 0	0 2 0	0 4 0	..	0 1 0	0 6 0	4 0 0	0 10 0	Ditto.
	Rohim Khan, ...	M.	Cooly.	1		1	2 0 0	0 4 0	..	..	2 4 0	..	1 8 0	..	0 2 0	0 2 0	..	0 2 0	0 3 0	..	..	0 1 0	..	0 2 0	..	..	..	2 4 0	..	Ditto.
	Jenat olla, ...	M.	Ditto.	..	..	2	1 4 0	..	1 4 0	..	2 8 0	..	1 8 0	..	0 2 0	0 3 0	..	0 3 0	0 2 0	..	..	0 2 0	0 0 6	0 2 0	..	0 0 6	0 1 0	2 8 0	..	Ditto.
	Cummer ally, ...	M.	Ryot.	1	1	3	3 0 0	..	2 0 0	0 8 0	5 8 0	4 Cows.	2 8 0	0 2 0	0 4 0	..	..	0 4 0	0 4 0	..	..	0 3 0	0 2 0	0 4 0	..	0 1 0	0 6 0	4 12 0	0 12 0	Ditto.
	Suker Mahomed, ..	M.	Peon.	1	2	..	3 0 0	0 4 0	..	..	3 4 0	1 Cow.	1 8 0	..	0 2 0	0 4 0	..	0 2 0	0 4 0	..	0 2 0	0 4 0	0 2 0	0 4 0	..	0 0 6	0 1 6	3 0 0	0 4 0	Ditto.
	Basseyram, ...	H.	Ditto.	1	1	1	4 0 0	..	..	0 4 0	4 4 0	2 Cows.	2 0 0	..	0 4 0	0 4 0	..	0 3 0	0 8 0	..	0 2 0	0 2 0	0 2 0	0 4 0	..	0 1 0	0 2 0	3 14 0	0 6 0	Ditto.
70	Buker olly, ...	M.	Cooly.	..	.	1	2 0 0	..	1 4 0	..	3 4 0	..	1 4 0	..	0 2 0	0 4 0	..	0 2 0	0 4 0	..	..	0 1 0	0 1 0	0 2 0	..	0 0 6	0 1 6	2 2 6	0 5 6	Ditto.
	Mahomed Hossen,	M.	Ryot.	1	2	2	3 8 0	0 3 0	2 0 0	2 8 0	8 3 0	4 Cows.	2 8 0	0 2 0	0 6 0	0 8 0	..	0 6 0	0 8 0	..	..	0 6 0	0 4 0	0 6 0	..	0 0 6	0 1 6	3 0 6	0 1 6	Ditto.
	Prosaudram, ...	H.	Ditto.	1	1	2	4 0 0	..	2 8 0	0 12 0	7 4 0	3 Cows.	2 8 0	..	0 6 0	0 8 0	..	0 5 0	0 8 0	..	..	0 4 0	0 2 0	0 4 0	..	0 1 0	0 10 0	5 4 0	2 0 0	Ditto.
	Cassim olly, ...	M.	Cooly.	1	1	..	2 8 0	0 2 0	..	..	2 10 0	..	1 8 0	..	0 3 0	0 4 0	..	0 3 0	0 2 0	..	..	0 1 0	0 0 6	0 2 0	..	0 0 6	0 1 0	2 9 0	0 1 0	Ditto.
	Womed ally, ...	M.	Ryot.	1	2	3	3 0 0	..	1 4 0	1 8 0	5 12 0	5 Cows.	2 8 0	..	0 5 0	0 8 0	..	0 4 0	0 8 0	..	..	0 3 0	0 2 0	0 6 0	..	0 1 0	0 8 0	5 5 0	0 7 0	Ditto.
	Dil Mahomed, ...	M.	Ditto.	..	2	2	3 8 0	..	3 8 0	2 12 0	9 12 0	8 Cows.	2 8 0	..	0 6 0	0 8 0	..	0 4 0	0 8 0	..	..	0 5 0	0 3 0	0 8 0	..	0 1 0	0 1 6	6 9 0	3 3 0	Ditto.
	Currim olla, ...	M.	Peon.	1	..	2	3 0 0	0 4 0	1 4 0	..	4 8 0	..	2 0 0	..	0 4 0	0 4 0	..	0 3 0	0 4 0	..	0 2 0	0 2 0	0 1 0	0 6 0	..	0 1 0	0 1 0	3 12 0	0 12 0	Ditto.
	Buxu, ...	M.	Cooly.	..	1	1	2 8 0	..	2 0 0	..	4 8 0	1 Cow.	1 8 0	..	0 2 0	0 8 0	..	0 4 0	0 8 0	..	..	0 2 0	0 4 0	0 4 0	..	0 0 6	0 1 6	3 2 0	0 6 0	Ditto.
	Assen olla, ...	M.	Tailor.	1	..	3	2 0 0	..	..	3 0 0	5 0 0	1 Cow.	1 0 0	0 2 0	0 1 0	0 8 0	..	0 4 0	0 8 0	..	..	0 2 0	..	0 4 0	..	0 0 6	0 1 6	3 2 0	0 6 0	Ditto.
	Bacur ally, ...	M.	Cooly.	..	.	2	3 0 0	..	2 0 0	1 4 0	6 4 0	2 Cows.	2 0 0	0 2 0	0 4 0	0 8 0	..	0 6 0	0 8 0	..	..	0 1 0	0 1 0	0 5 0	..	0 5 0	0 1 8	0 4 5	0 11 0	Ditto.
80	Futtay ally, ...	M.	Ditto.	1	..	9	2 8 0	1 0 0	0 12 0	3 0 0	8 4 0	2 Cows.	2 0 0	0 1 0	0 6 0	0 2 0	..	0 7 0	0 8 0	..	..	0 3 0	0 2 0	0 4 0	..	0 2 0	0 4 0	4 5 0	1 15 0	Ditto.
	Tuffun ally, ...	M.	Ryot.	1	2	1	3 0 0	..	..	0 2 0	3 2 0	..	2 0 0	0 0 0	0 6 0	0 2 0	..	0 8 0	0 4 0	1 0 0	..	0 4 0	0 4 0	0 4 0	..	0 3 0	0 8 0	5 15 0	2 5 0	Ditto.
	Bussarut ally, ...	M.	Ditto.	1	..	..	..	0 4 0	..	3 0 0	3 4 0	3 Cows.	1 0 0	..	0 2 0	0 4 0	..	0 4 0	0 4 0	..	..	0 4 0	0 4 0	0 4 0	..	0 3 0	..	3 14 0	0 12 0	* No.
	Hyder ally, ...	M.	Servant.	1	..	1	2 0 0	0 2 6	..	0 10 0	2 12 6	1 Goat.	1 8 0	..	0 2 0	0 2 0	..	0 1 6	0 4 0	..	..	0 1 6	..	0 2 6	..	0 0 9	0 4 0	2 10 3	0 2 3	Ditto.
	Ramjoy, ...	H.	Maugy.	1	2	.	3 0 0	1 0 0	..	..	4 0 0	2 Cows.	1 0 0	0 2 0	0 2 0	0 4 0	..	0 5 0	0 4 0	..	..	0 3 0	0 6 0	0 4 0	..	0 1 0	0 1 6	3 0 6	0 15 6	Ditto.
	Allif Khan, ...	M.	Ryot.	1	4	2	..	0 4 0	..	5 8 0	5 12 0	2 G. 4 C.	2 0 0	..	0 5 0	..	..	0 8 0	0 8 0	..	..	0 4 0	0 3 0	0 4 0	..	0 2 0	2 10 0	6 12 0	1 0 0	Ditto.
	Munsur ally, ...	M.	Peon.	1	2	1	3 0 0	0 2 6	..	0 4 0	3 6 6	..	1 0 0	..	0 1 6	..	..	0 2 9	0 1 0	..	..	0 1 0	0 1 6	0 2 0	..	0 0 6	..	1 10 3	1 12 3	Ditto.
	Allif Khan, ...	M.	Gardener.	1	..	3	2 8 0	0 1 0	0 1 0	6 8 0	9 2 0	2 Cows.	2 2 0	..	0 4 0	0 9 0	..	0 1 0	0 1 0	..	..	0 12 0	0 1 0	0 2 0	..	0 1 0	0 12 0	5 10 0	3 8 0	Ditto.
	Hassen ally, ...	M.	Cooly.	1	..	..	3 0 0	..	..	..	3 0 0	..	1 0 0	..	0 2 0	0 4 0	..	0 5 0	0 1 0	..	..	0 4 0	0 2 0	0 4 0	..	0 2 0	0 6 0	2 11 0	0 5 0	Ditto.
	Shriram, ...	H.	Ditto.	1	..	..	3 8 0	..	..	..	3 8 0	..	1 0 0	..	0 1 0	0 1 0	..	0 4 3	0 2 0	..	..	..	..	0 8 0	..	..	..	3 2 6	0 5 9	Ditto.
90	Annu, ...	M.	Lascar.	1	..	..	7 0 0	..	..	..	7 0 0	..	1 0 0	..	0 1 0	0 0 0	..	0 6 0	0 6 0	..	..	..	0 4 0	0 3 0	..	0 3 6	..	3 7 6	3 8 6	Ditto.
	Mahomed ally, ...	M.	Chaprassy.	1	5	..	3 0 0	0 4 0	8 0 0	0 3 0	11 7 0	..	3 0 0	0 8 0	0 4 0	0 8 0	..	0 0 0	0 1 0	..	..	1 0 0	1 0 0	0 8 0	..	0 3 0	0 1 3	9 0 3	2 6 9	Ditto.
	Bucker ally, ...	M.	Peon.	..	..	..	2 0 0	..	..	..	2 0 0	..	0 8 0	0 0 2	0 1 0	0 2 0	..	0 4 0	0 1 0	..	0 2 0	0 4 0	0 2 0	0 4 0	..	0 2 0	0 1 3	1 13 0	0 3 0	Ditto.
	Chamra, ...	H.	Ditto.	..	3	2	2 0 0	..	..	1 15 0	3 15 0	3 Cows.	1 8 0	..	0 2 0	0 2 0	..	0 3 0	0 3 0	..	0 2 0	0 2 0	0 1 0	0 5 0	..	0 1 0	0 1 3	3 13 0	0 2 0	Ditto.
	Sonaram, ...	H.	Bearer.	1	5	..	2 8 0	..	..	1 12 0	4 4 0	2 Cows.	2 0 0	0 0 6	0 2 0	0 2 0	..	0 3 0	0 2 0	..	..	0 1 0	0 0 6	0 4 0	..	0 1 0	1 4 0	4 5 6	0 1 6	* Ditto.
	Bux ally, ...	M.	Ryot.	1	..	..	3 0 0	0 2 6	..	0 2 0	3 4 6	..	0 12 0	..	0 1 0	0 8 0	..	0 5 0	0 2 0	..	0 1 0	0 1 0	0 1 0	0 4 0	..	0 1 0	1 5 0	4 5 6	0 1 6	Ditto.
	Mahomet Ropey, ..	M.	Cooly.	2	4	..	3 8 0	0 4 0	..	1 0 0	4 12 0	2 Cows.	1 8 0	..	0 3 0	0 8 0	..	0 8 0	0 2 0	..	0 1 0	..	0 1 0	0 2 6	..	0 2 0	0 1 0	2 3 6	1 1 0	Ditto.
	Cummer ally, ...	M.	Ditto.	1	..	..	3 0 0	..	..	..	3 0 0	..	1 0 0	..	0 2 0	0 2 0	..	0 4 0	0 4 0	..	..	0 2 0	0 4 0	0 4 0	..	0 2 0	0 1 6	3 10 6	1 1 6	Ditto.
	Kutub, ...	M.	Ditto.	1	6	..	3 0 0	..	1 12 0	0 4 6	5 0 6	1 Cow.	2 0 0	..	0 6 0	0 8 0	..	0 8 0	0 8 0	..	0 1 0	0 3 0	0 4 0	0 4 0	..	0 1 6	0 5 0	5 0 6	0 0 0	Ditto.
	Abdool Rohim, ..	M.	Ditto.	1	2	2	3 0 0	0 4 0	2 0 0	..	5 4 0	..	2 0 0	..	0 4 0	0 8 0	..	0 6 0	0 6 0	..	..	0 3 0	0 2 0	0 4 0	..	0 2 0	0 1 0	4 4 0	1 0 0	Ditto.
100	Calla gazy, ...	M.	Ditto.	1	1	..	2 8 0	0 2 0	0 4 0	..	2 14 0	..	1 8 0	..	0 2 0	0 2 0	..	0 3 0	0 2 0	..	..	0 1 0	0 0	0 3 0	..	0 1 0	0 1 0	2 8 0	0 6 0	Ditto.

* Balance against.

The absence of all entry under the head of "schooling" (column 24,) would not imply the entire absence of education, as such may have been paid for in kind. Column 28 exhibits the balance for, or against. When the latter occurs, it is shewn by asterisks, but, according to the Table, this unfavourable condition only existed in eight cases out of the hundred.

The sums contained in this Balance Column, however, it must be remembered are still chargeable with the heavy demands consequent upon pujas, Marriage and Burial ceremonies, as well as the possible interest of debts. It is to be regretted that I did not ascertain the current outlay due to the latter. Putting debt aside, however, which ought to form but an unimportant item in a healthy state of society, the foregoing Table offers a favourable view of the resources, and adaptations of income to expenditure in a native of Bengal.

Having thus endeavoured to determine the average income and expenditure of one hundred families, who may be regarded as types of the great mass of the inhabitants of Bengal, it became a point of interest to ascertain the actual quantity and quality of food consumed daily by the same class. No opportunity for effecting this inquiry occurred during my subsequent stay at Chittagong. As soon as I became sufficiently acquainted with Rajeshye, however, I put it in operation. Forms of inquiry regarding the separate daily consumption of food of twenty men were accordingly placed in the hands of six Darogahs attached to the same number of separate Thannahs of Rajeshye. These were accompanied by full instructions to the effect that twenty inhabitants of the nearest village should be individually and separately questioned as to the amount and kind of food daily consumed by each. On my receipt of these detailed tables the Totals for every five men were tabulated as below, and from their total again the mean quantity was computed. The fact of six returns, made by as many separate inquiries, differing so little from each other in mean results, and approximating so closely to the table formed by myself, on which I bestowed considerable care, gives them a claim to reliability which in the absence of such checks they would have failed to possess.

Table B.

Shewing the average quantity of Food consumed daily by four Classes of Adult men in Zillah Rajshahye, in the Month of March, 1852. *N. B. In kutcha weight, seers, chittacks and kachas.*

1	2	Total quantity and kind of food consumed daily by Hindoo Ryots.																							
		3			4			5			6			7			8			9			10			11			12		
No. of men subjected to inquiry.	Names of Thannas and Ghatees at which inquiry was made.	Rice.			Dhal.			Salt.			Fish.			Meat.			Spice.			Vegetable.			Milk.			Oil.			Total.		
		s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k	s.	c.	k.
5	Bauleah, ...	5	6	0	1	5	0	0	5	1	0	0	0	0	0	0	0	1	1	1	2	0	0	0	0	0	4	2	0	0	0
5	Tanore, ...	5	0	0	1	4	0	0	2	2	0	0	0	0	0	0	0	2	2	1	4	0	0	0	0	0	3	3	0	0	0
5	Bhobaneegunge, ...	4	11	0	1	2	0	0	1	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	2	0	0	0
5	Godagary, ...	5	0	0	1	4	0	0	2	2	0	0	0	0	0	0	0	1	1	0	12	0	0	0	0	0	2	2	0	0	0
5	Ghatee Surda, ...	6	14	0	1	4	0	0	5	0	0	0	0	0	0	0	0	1	1	0	10	0	0	0	0	0	5	0	0	0	0
5	Do. Pooteah, ...	6	0	0	1	4	2	0	4	0	0	0	0	0	0	0	0	1	0	1	6	2	0	0	0	1	2	0	0	0	0
	Total,..	32	15	0	7	7	2	1	4	1	0	0	0	0	0	0	0	8	1	7	2	2	0	0	0	1	2	1	0	0	0
	Daily means for each man, ...	1	1	2	0	4	0	0	0	2	0	1	0	0	0	0	0	0	1	0	3	3	0	1	0	0	0	2	1	12	2

Table C.

1	2	Total quantity and kind of food consumed daily by Moosulman Ryots.																							
		3			4			5			6			7			8			9			10			11			12		
No. of men subjected to inquiry.	Names of Thannas and Ghatees at which inquiry was made.	Rice.			Dhal.			Salt.			Fish.			Meat.			Spice.			Vegetable.			Milk.			Oil.			Total.		
		s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.
5	Bauleah, ...	5	6	0	1	4	0	0	5	0	0	0	0	0	0	0	0	1	1	1	2	0	0	0	0	0	4	2	0	0	0
5	Tanore, ...	6	0	0	0	15	0	0	3	3	0	0	0	0	0	0	0	1	1	1	4	0	0	0	0	0	5	0	0	0	0
5	Bhobaneegunge, ...	4	11	0	1	2	0	0	1	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	2	0	0	0
5	Godagary, ...	5	0	0	1	2	0	0	2	2	0	0	0	0	0	0	0	1	1	0	10	0	0	0	0	0	2	2	0	0	0
5	Ghatee Surda, ...	7	8	0	1	4	0	0	5	0	0	0	0	0	0	0	0	1	1	0	6	0	0	0	0	0	5	0	0	0	0
5	Do. Pooteah, ...	5	13	0	1	4	1	0	3	3	0	0	0	0	0	0	0	2	1	1	5	3	0	0	0	0	2	2	0	0	0
	Total,..	34	6	0	6	15	1	1	5	0	0	0	0	0	0	0	0	8	1	6	11	3	0	0	0	1	4	0	0	0	0
	Daily means for each man, ...	1	2	1	0	3	2	0	0	2	0	1	0	0	0	2	0	0	1	0	3	2	0	1	0	0	0	2	1	13	0

Table D.

1	2	Total quantity and kind of food consumed daily by Hindoo Coolies.																											
		3			4			5			6			7			8			9			10			11			12		
No. of men subjected to inquiry.	Names of Thannas and Ghatees at which inquiry was made.	Rice.			Dhal.			Salt.			Fish.			Meat.			Spice.			Vegetable.			Milk.			Oil.			Total.		
		s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k	s.	c.	k.
5	Bauleah, ...	5	6	0	1	2	0	0	5	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	4	3	0	0	0
5	Tanore, ...	5	0	0	1	4	0	0	2	2	0	0	0	0	0	0	0	2	2	1	4	0	0	0	0	0	3	3	0	0	0
5	Bhobaneegunge, ...	5	0	0	2	0	0	0	5	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	3	0	0	0
5	Godagary, ...	5	0	0	1	4	0	0	2	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	2	0	0	0
5	Ghatee Surda, ...	6	14	0	1	4	0	0	5	0	0	0	0	0	0	0	0	1	1	0	10	0	0	0	0	0	5	0	0	0	0
5	Do. Pooteah, ...	5	11	0	1	2	2	0	3	2	0	*	0	0	*	0	0	4	0	1	5	2	0	*	0	0	2	1	0	0	0
	Total,..	32	15	0	8	0	2	1	7	2	0	0	0	0	0	0	0	10	0	7	3	2	0	0	0	1	3	0	0	0	0
	Daily means for each man, ...	1	1	2	0	4	1	0	0	3	0	1	0	0	0	0	0	0	1	0	3	3	0	1	0	0	0	2	1	13	0

Table E.

1	2	Moosulman Coolies.																							
		4			4			5			6			7			8			9			10			11			12		
No. of men subjected to inquiry.	Names of Thannas and Ghatees at which inquiry was made.	Rice.			Dhal.			Salt.			Fish.			Meat.			Spice.			Vegetable.			Milk.			Oil.			Total.		
		s.	c.	k.	s.	c.	k	s.	c.	k.	s.	c.	k	s.	c.	k.	s.	c.	k.	s.	c.	k	s.	c.	k.	s.	c.	k.	s.	c.	k.
5	Bauleah, ...	5	6	0	1	5	0	0	5	0	0	0	0	0	0	0	0	1	1	1	2	0	0	0	0	0	5	0	0	0	0
5	Tanore, ...	5	0	0	0	10	0	0	2	2	0	0	0	0	0	0	0	1	1	0	10	0	0	0	0	0	2	2	0	0	0
5	Bhobaneegunge, ...	5	0	0	2	0	0	0	5	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	3	0	0	0	0
5	Godagary, ...	5	4	0	1	3	0	0	2	2	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	2	2	0	0	0
5	Ghatee Surda, ...	7	8	0	1	4	0	0	5	1	0	0	0	0	0	0	0	1	1	0	10	0	0	0	0	0	5	0	0	0	0
5	Do. Pooteah, ...	5	9	0	0	15	1	0	3	0	0	*	0	0	*	0	0	3	2	1	5	0	0	*	0	0	2	1	0	0	0
	Total,....	33	11	0	7	5	1	1	7	1	0	0	0	0	0	0	0	8	1	6	5	0	0	0	0	1	2	0	0	0	0
	Daily means for each man.	1	2	0	0	3	3	0	0	3	0	1	0	0	0	2	0		1	0	3	1	0	1	0	0	0	2	1	13	0

* The mean quantities of Fish, Meat and Milk are derived from statements accompanying the detailed Tables. In calculating "Totals" and "means" small fractions are omitted. Columns 6, 7 and 10 are left unfilled in consequence of the articles of food therein referred to, being consumed only occasionally, and their insertion in a Table shewing daily consumption thus becomes difficult. The note appended to the Table will however shew how the means have been obtained. The Meat generally consumed by the Moosulmans in this zillah, is Cow-beef.

I am not disposed to place any great faith in the statistical accuracy of the Darogahs, but the fact of the totals from separate Thannahs of the district, between the officers of which no intercommunication on the subject is at all likely to have taken place, exhibiting no great discrepancy, is intrinsic evidence in favour of the average arrived at, being a fair exposition of the daily food of the people.

With the view of correcting any inaccuracy, however, which might arise from careless inquiry, I personally instituted a similar one amongst twenty men in the Sudder Sation, which I give in detail in the following Tables.

TABLE F.

Shewing the average quantity of food consumed daily by 20 Moosulman Coolies in Rampore Bauleah, March, 1852.

N. B. In kutcha weight. Coolies working in private Compound.

1	3	4	5	6	7	8	9	10	11	12
Number.	Rice.	Dhal.	Salt.	Fish.	Meat.	Spice.	Vegetable.	Milk.	Oil.	Total.
	s. c. k.	s. c. k.	s. c. k	s. c. k.	s. c. k	s. c. k.	s. c. k.	s. c. k.	s. c. k.	s. c. k.
1	1 0 0	0 4 0	0 0 2	0 4 0	0 4 0	0 0 2	0 2 0	0 8 0	0 1 0	0 0 0
2	1 0 0	0 4 0	0 1 0	0 2 0	0 2 0	0 1 0	0 4 0	0 8 0	0 0 2	0 0 0
3	1 4 0	0 4 0	0 0 2	0 4 2	0 8 0	0 1 0	0 1 0	0 0 0	0 1 0	0 0 0
4	1 0	0 4 0	0 0 2	0 4 0	0 4 0	0 1 0	0 1 0	0 8 0	0 1 0	0 0 0
5	1 0 0	0 2 0	0 0 2	0 1 0	0 2 0	0 0 2	0 2 0	0 0 0	0 0 2	0 0 0
6	1 0 0	0 4 0	0 0 3	0 4 0	0 4 0	0 0 0	0 4 0	0 0 0	0 0 2	0 0 0
7	1 0 0	0 8 0	0 1 2	0 4 0	0 4 0	0 1 0	0 4 0	0 8 0	0 1 0	0 0 0
8	1 0 0	0 4 0	0 0 3	0 4 0	0 4 0	0 0 1	0 4 0	0 8 0	0 0 2	0 0 0
9	1 0 0	0 4 0	0 0 3	0 4 0	0 4 0	0 1 0	0 1 0	0 4 0	0 1 0	0 0 0
10	1 0 0	0 2 0	0 0 2	0 2 0	0 2 0	0 0 1	0 2 0	0 4 0	0 0 2	0 0 0
Total.	10 4 0	0 0 0	0 7 1	0 0 0	0 0 0	0 6 2	0 0 0	0 0 0	0 7 2	0 0 0
Daily means.	1 1	0 1 0	0 0 3	0 1 0	0 3 0	0 0 3	0 1 2	0 1 0	0 0 3	1 7 0

Table G.

Coolies Working in Silk Filature.

1 Number.	3 Rice.			4 Dhal.			5 Salt.			6 Fish.			7 Meat.			8 Spice.			9 Vegetable.			10 Milk.			11 Oil.			12 Total.		
	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.	s.	c.	k.
1	0	0	0	0	2	0	0	0	2	0	4	0	0	2	0	0	0	½	0	2	0	0	1	0	0	1	1	0	0	0
2	1	0	0	0	2	0	0	0	2½	0	4	0	0	4	0	0	0	2	0	2	0	0	0	0	0	0	2	0	0	0
3	1	0	0	0	4	0	0	0	2	0	3	0	0	0	0	0	1	0	0	2	0	0	8	0	0	1	0	0	0	0
4	1	0	0	0	2	0	0	0	1	0	2	0	0	4	0	0	0	2	0	2	0	0	8	0	0	0	2	0	0	0
5	0	12	0	0	2	0	0	0	2	0	1	0	0	0	0	0	0	2	0	1	2	0	2	0	0	0	2	0	0	0
6	1	0	0	0	4	0	0	0	2	0	1	2	0	3	0	0	0	1	0	1	0	0	8	0	0	0	2	0	0	0
7	1	0	0	0	2	0	0	0	1	0	2	0	0	3	0	0	2	0	0	2	0	0	8	0	0	0	2	0	0	0
8	0	12	0	0	2	0	0	0	½	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	2	0	0	0
9	1	0	0	0	4	0	0	0	1	0	2	0	0	0	0	0	2	0	0	2	0	0	8	0	0	0	1	0	0	0
10	0	10	0	0	2	0	0	0	1	0	1	0	0	0	0	0	0	1	0	1	0	0	4	0	0	0	2	0	0	0
Total.	8	12	0	1	10	0	0	3	3	0	0	0	0	0	0	0	7	½	1	0	2	0	0	0	0	6	0	0	0	0
Daily means.	0	14	0	0	2	2	0	0	1	0	1	0	0	2	0	0	0	3	0	1	3	0	1	0	0	0	2	1	6	1

In Columns 4, 6, 7, 9, 10, of Tables F. and G. the quantities noted were only consumed at varying intervals and from a calculation based on these, the mean has been computed.

Owing to the steady demand for labour in the silk filatures in, and around, Rampore Bauleah, the standard of wages is high. It is probable therefore that the results above shewn, exhibit the maximum of food consumed by the labouring population of Bengal. By comparing the two sets of tables, it will be seen that the mean daily quantity indicated by the 4 tables containing the results of the Darogahs' inquiries exceeds that obtained by my own. The former amounts to 1 seer, 12 chittaks, and 3 kachas, kutcha weight, which is equivalent to 1 seer, 5 chittaks, and 2 kachas pucka weight, or about 43 oz. English, whilst the latter is 1 seer, 6 chittaks, 2 kachas, kutcha, equivalent to 1 seer, 3 kachas pucka weight, or about 34 oz. English.

With the view of testing what quantity a man could possibly consume at one time, I directed five coolies working in my compound to obtain whatever they pleased for the morning meal. The supply was brought and carefully weighed in my presence, before and after cooking, with the following results, and was subsequently eaten before me.

Table H.

Shewing the quantity of Food consumed at their morning meal by five Moosulman Coolies, April 3d, 1852, *in kutcha weight seers, chuttaks and kachas.*

Articles.	Weight before Cooking.			Weight after Cooking.			Price.		
	s.	c.	k.	s.	c.	k.	r	a.	p.
Rice,	3	2	0	10	2	0	0	1	3
Dhall,	0	8	0	2	12	0	0	0	3
Salt,	0	3	0	0	3	0	0	0	3
Fish,	0	3	0	0	0	0	0	0	6
Vegetables,	0	6	0	1	7	0	0	0	3
Spice,	0	2	2	0	2	2	0	0	1½
Oil,	0	2	1	0	2	1	0	0	3
Dhye,	1	0	0	1	0	0	0	0	6
Total,	5	10	3	15	12	3	0	3	4½
Evening meal said to be ⅔ of above,	3	14	0	0	0	0	0	2	8
Grand Total,	9	8	3	0	0	0	0	6	½
Mean,	1	15	0	0	0	0	0	1	2½

Taking the mean of all the above Tables then, it may thus be pretty safely admitted, that the adult male population of Rájshahye consumes about 1 seer, 3 chittaks of food per man per day, which amounts in English weight to about 38 oz.

Comparing the quantity with that consumed in England, it will be seen that the Bengal peasant of this district and time, labours under no comparative disadvantage.

In the Report of the Commissioners for inquiring into the administration and operation of the Poor Laws (1834) Mr. Chadwick gives the following statement of the average consumption of solid food per week by different classes.

An independent labourer, ...	122	oz. per week.
A soldier, ...	168	„ „ „
An able-bodied pauper, ...	151	„ „ „

Now taking the mean of the above Tables, we get a daily allowance of 1 seer, 3 chittaks, or about 266 oz. per week, for the Rajeshye peasant.*

So much for the quantity, but taking quality also into our consideration it will again be found in a perusal of the following extract from Mr. Senior's "Statement of the provision for the poor, and of the condition of the labouring classes in a considerable portion of America and Europe," that the Bengal peasant stands in a very favourable position in that respect also.

"Quantity of food used by an agricultural labourer having a wife and four children."

"*America, New York.*—Tea, coffee, meat, twice a-day. *Massachusetts.*—Poultry, meat, or fish, twice or thrice a-day.

"*Mexico.*—Maize, prepared either in porridge or thin cakes, and beans, with chilly a hot pepper, of which they eat large quantities as seasoning.

"*Carthagena de Columbia.*—Chiefly animal food.

"*Venezuela.*—Maize, vegetables, and fruit.

"*Uruguay.*—Animal food.

* This excess in quantity over the English diet roll is of course due to the want of concentration of the nutritive elements.

"*Hayti.*—Plantains, sweet-potatoes, and other vegetables.

"*Norway.*—Herrings, oatmeal porridge, potatoes, coarse oatmeal bread, bacon and salt-beef perhaps twice a week, fish on the sea and river. Brandy in general use.

"*Sweden.*—In the south, potatoes and salt fish; in the north, porridge and rye bread.

"*Russia* (general return).—Rye-bread, buck-wheat, and sour cabbage, soup seasoned with salt and lard.

"*Denmark, Copenhagen.*—Rye-bread, inferior coffee, cheese and butter.

"*Elsinore.*—Rye-bread, groats, potatoes, coffee, butter, cheese and milk.

"*Hanseatic Towns, Lubeck.*—Rye-bread and potatoes, bacon seldom, peas-porridge, groats, cheap fish.

"*Bremen.*—Potatoes, beans, buck-wheat, groats, rye-bread, meat about twice a-week.

"*Mecklenburg.*—Good sound food, occasionally meat.

"*Danzig.*—Chiefly rye-bread and potatoes, meat once or twice weekly.

"*Würtemberg.*—Soup, potatoes, bread, meat once or twice a-week.

"*Frankfort.*—Soup, potatoes, vegetables, bread, coffee, and beer daily, meat on one or two days.

"*Holland* (general return).—Rye-bread, cheese, potatoes, vegetables, beans and pork, butter-milk, buck-wheat, meal, &c.

"*Belgium, Boom.*—Bread, potatoes, and milk.

"*Ostend.*—Potatoes and bread in the towns; in the country a little butter, vegetables, and sometimes a piece of pork.

"*Goesbek.*—Rye-bread, cheese, butter or fat bacon, vegetables, coffee, and weak beer.

"*France. Hâvre.*—Bread, vegetables, cider, very rarely animal food; coffee and treacle are also used.

"*Brittany.*—Buck-wheat, barley-bread, potatoes, cabbages, and about 6lbs of pork weekly.

"*La Loire Infericure.*—Bread and vegetables, bacon or other meat now and then.

"*Bordeaux.*—Rye-bread, millet-soup, Indian-corn, sometimes salt provisions, butchers' meat very rarely.

"*Marseilles.*—Vegetables, bread, farinaceous substances made into soup, meat-soup or bouillie probably once a-week.

"*Piedmont.*—No meat, little wine, twice as much maize as wheat-flour.

"*Portugal.*—Salt-fish, vegetable-soup, with oil or lard, maize-bread.

"*The Azores.*—Maize-bread, vegetables, potatoes, and fruit, meat seldom, fish when abundant.

"*Greece; Patras.*—Maize or wheaten bread, olives, pulse, vegetables, salt-fish, meat occasionally.

"*European Turkey.*—Bread, rice, greens, dried beans and peas, olives and onions, meat about once a-week.

"*Malta* (from a communication).—Barley-bread, cheese, carob, or other beans, and soup of maize or millet with herbs, when in employ, when out of employ, a little bread and soup only."

With the view of estimating the relation between the consumption of food, and the necessary outlay, it seems desirable to add the following Table shewing the average Bazar prices for each kind of food during the year of observation in Rájshahye.

Table I.

Table Shewing the Bazar rate per Sicca Maund of Articles of Food in Rampoor Bauleah, for each Month of 1852. *In Rupees, Annas, Gundas.*

Names of the Months.	Rice.	Dall.	Vegetable.	Fish.	Salt.	Oil.	Tobacco.	Mussala.	Wood.
	Rs. As. G.	Rs. As. G.	Rs. As. G.	Rs. As. G.	Rs. As. G.	Rs. As. G.	Rs. As. G.	Rs. As. G.	Rs. As. G.
January,	0 15 10	1 9 0	0 4 12	4 9 13	4 0 0	5 5 6¾	2 8 0	2 3 16	0 2 0
February,	0 15 8	1 8 11¾	0 4 12	5 2 10	4 0 0	5 0 6½	2 8 0	2 5 0	0 2 0
March,	1 0 4¼	1 9 2¼	0 4 11½	3 13 18¾	4 0 0	5 0 6¾	2 8 0	2 6 0	0 2 0
April,	0 15 17½	1 3 19	0 4 1¾	4 6 7	4 0 0	5 0 6½	2 8 0	2 5 6¾	0 2 0
May,	1 0 3¼	1 3 19	0 5 13¼	4 4 14	4 0 0	5 14 0	2 8 0	2 1 7½	0 2 0
June,	1 13 1¾	1 4 0	0 9 0	4 4 0	4 0 0	5 7 17	2 8 0	1 12 2	0 2 0
July,	1 1 0	1 4 0	0 7 2	4 3 13	4 0 0	5 8 16	2 8 0	1 13 8	0 2 0
August,	1 1 14½	1 3 19	0 7 2	6 1 0	4 0 0	5 6 15	2 8 0	1 9 3¼	0 2 0
September,	1 2 18¾	1 6 2¾	0 5 13¼	6 0 0	4 0 0	5 6 14¾	2 8 0	1 6 0	0 2 0
October,	1 6 10	1 7 5	0 4 7	6 13 0	4 0 0	5 6 18¾	2 8 0	1 8 8	0 2 0
November,	1 2 0	1 6 6	0 5 13	4 13 10	4 0 0	5 9 6	2 8 0	1 14 13	0 2 0
December,	1 4 0	1 7 5	0 2 16½	4 4 0	4 0 0	5 14 15	2 8 0	1 12 0	0 2 0
Average of the year,	1 1 14	1 16 2¼	0 5 8	4 14 7	4 0 0	5 6 15¾	2 8 0	1 14 15¼	0 2 0

Sufficiency of Food and Income in excess of necessary expenditure constitute two important elements of the Public weal, and these would certainly appear to have been in existence in the portion of Bengal from which my observations are derived. That many and various social evils yet exist cannot be doubted, but want of means to procure a sufficiency of food for the retention of life and health would not appear to be one of them, except in special famine years, and so far Bengal may be considered to exhibit as small an average deficiency of the comforts of life, as any modern nation.

Literary Intelligence.

In a preface to the Catalogue des Manuscrits et Xylographes Orientaux contained in the Imperial Public Library of St. Petersburgh, a copy of which was lately presented to our Society by the Directors of that Institution, the compiler has sketched the progress of the collection, the foundation of which was laid after the capture of Warsaw by the Russians, in 1795. The celebrated Zalusky Library was then carried to St. Petersburgh, and to this nucleus was added, in 1805, a number of MSS. collected by Doubrowsky, an employé in the foreign office who had made the most, apparently, of the opportunities which fell in his way during the revolutionary wars, and had gathered a "riche moisson" which he subsequently presented to the Emperor Alexander. In 1813, however, the Oriental Department of this Institution could only produce 183 MSS. The bulk of the present collection is formed of the spoils of Turkey and Persia. The Ardébil Mosque containing the Sséfy Mausoleum and mentioned by Morier, furnished 166 vols. to the Russian General Suchtelen in 1828, and the Ahmed Mosque of Akhaltisk, containing 148 Turkish and Arabic works, gave up its Library to Paskévitch in 1829.

The present collection consists of the following MSS.

Arabic,	247	Georgian,	15	Pali,	4
Persian,	255	Mantchoo,	35	Goojeratee,	1
Turkish,	100	Chinese,	151	Hindee,	1
Hebrew,	6	Mongol,	5	Bengali,	1
Ethiopian,	9	Calmuc,	1	Malayalam,	1
Syriac,	5	Tibetan,	10	Tamul,	10
Coptic,	8	Japanese,	14	Siamese,	1
Armenian,	11	Sanskrit,	8	Javanese,	1

As was to be expected its riches consist mainly in Arabic, Persian and Turkish works. The Chinese department too obtained some valuable acquisitions from Kamensky when at the head of the Russian Mission which visited Pekin in 1823. In Indian MSS. the Library is lamentably poor, the solitary specimen being in one or two cases the publication of some Mission Press.

The Catalogue is in French, and of a raisonné character. The typography is most creditable to the Press maintained at the Imperial Academy of Sciences. Not more than 300 copies have been

printed, the work being intended only for distribution among Scientific Institutions and eminent orientalists. The descriptions of the Turkish, Arabic and Persian MSS. which compose the bulk of the volume are by Dorn; they are very complete, embracing the notices given of the Ardébil and Akhaltisk MSS. by Frâhn in 1829 and 1830. The Indian MSS. were all taken to London for examination, and the notices of these are by a young German Doctor, Reinhold Rost.

The Qurán alsa'dayn, a Dilly periodical in Hindustany, announces the publication at Dilly, of the first volume of a Persian Dictionary which has the title مصطح حات بهارعجم; it comprizes 817 pages of 28 lines. The author of this important work is *T*ék Chand, whose takhalluç was Bahár—a Khatry of Dilly. He flourished in the second half of the last century, after he had completed the first copy of his work, continued his lexicographical labours and made numerous additions and improvements, and found himself compelled to write out a second copy, but even here his lexicographical researches did not stop. He made successively seven copies or editions of his work, of which the last is of course the most perfect. At the time of his death the autograph of the seventh edition was in the hands of one of his pupils, whose name is Inderman, and he made an abridgment of it, and it is this abridgment which is now generally known in India as the Baháre 'ajam, and is considered the best Persian Dictionary that exists. Yet it is only the shadow of the work of which now the first volume has been published. *T*ék Chand had critically studied the whole Persian literature, and had travelled in Persia in order to make himself fully master of the Persian language and its dialects. The spoken language of Persia is simple enough, and so are some of their prose writers. To understand these writers, or the 'urf of the language, almost any dictionary is sufficient, but in their great poets there occur many verses which are perfectly unintelligible, and though the copies of their works agree generally very well, you find almost in every copy a different reading. We have very few ancient commentaries on Persian poets (the only very valuable books on this subject are the جواهر الاسرار by *A*dzory, and Abú-l-*H*asan's commentary on Anwary, few other commentaries known in India have much critical value), and it is therefore only

by very extensive and critical reading that these difficulties can be cleared up. They consist, sometimes in allusions which have become hackneyed among poets, like نعل در آتش; sometimes in the use of rare and obsolete words, and sometimes in the use of strange idioms. All doubt on these subjects can only be removed when we have critical editions of the principal Persian authors; in the mean time however the Bahár Dictionary is, by far, the most valuable book of reference on these points, because, as the term مصطلاحات in the title implies, it is expressly designed to meet these difficulties, and his immense reading and intercourse with the most learned Persian scholars both in India and Persia, enabled him to collect and make bear on the difficulties a number of passages from classical Persian authors. For a European lexicographer this Dictionary will not only be valuable in furnishing him with explanations which he finds nowhere else, but, what is much more valuable, it enables him to strike out many absurd meanings, which are given to words in Richardson and even in the Burháne Qátí, and which rest on misunderstood passages of poets.

Very few Sanskríta works have appeared since we last had occasion to advert to the publications of the native press of Calcutta. Paṇdita Ánanda Chandra Vedántavágísa of the Tattwabodhiní Society has lately published some of the standard works of the Vedánta system of philosophy, and among them we find excellent editions in the Bengali character of the *Vedántasára* of Sadánanda, with the commentaries of Nrisiñha Saraswati and Rámatírtha Yati, and of the *Panchadasi*, or the Fifteen Chapters on the Principles of the Vedánta, by Vidyáraṇya, with the commentary of Rámakrishṇa. The learned Paṇdita is now engaged in carrying through the press, the *Adhikaranamálá of* Bhárati Tirtha with a commentary: the work is to appear in monthly parts, and seven fasciculi have been already published.

The new edition of the Raghu Vañsa, which was adverted to some time ago, has just issued from the Sanskrita Press of Calcutta.

Of Bengali works we have to record,

1. বাহ্য-বস্তুর সহিত মানব-প্রকৃতির সম্বন্ধ-বিচার; or the Relation of the Mind to external objects. By Bábu Akshayakumára Datta. Tattwabodhiní Press, 1852-3, 2 vols. 12mo. Besides two original essays, these volumes include a reprint of a series of papers published under

the above title in the Tattwabodhiní Patriká, the organ of the Calcutta Vedántists. The author has taken Combe's *Constitution of Man* for his guide, and most ably advocated the opinions of those who maintain that the best food of man is derived from the vegetable kingdom. The style of writing is remarkably pure and elegant, and affords an excellent instance of the facility with which Sanskrita vocables may be introduced into Bengáli to the utter exclusion of all foreign elements, which constitute so material a portion of the Indian vernaculars.

2. Lamb's Tales of Shakespeare, translated into Bengáli by Bábu Udayachandra Ádya, Purnachandrodaya Press, 1853, 1 vol. 8vo. Another version of these tales is, we are informed, now in the press, and will, ere long, be published by the Vernacular Literature Committee.

3. Bhaktamála or the Garland of the Faithful, being a resumé of the works of Nábháji, Náráyana Dása and Krishṇa Dása. 1853, 8vo. The work includes notices of nearly three hundred Vaishṇava saints, and abounds in a variety of insipid and extravagant legends. "It exercises," says Professor Wilson, "a powerful influence in Upper India on popular belief, and holds a similar place in the superstitions of this country, as that which was occupied in the dark ages of the Roman Catholic faith by the Golden Legend and Acts of the Saints."

4. Macaulay's Life of Lord Clive, translated into Bengáli by Bábu Harachandra Datta, and published by the Vernacular Literature Committee, Calcutta, 1852, 8vo. This work has been very well received by the Hindu community, and, it is said, a second edition will be published immediately.

5. An Essay on the Sanskrit language and literature; by Pandit Isvarachandra Vidyáságara, read at a meeting of the Bethune Society on the 13th of April, 1853.—Sanskrita Press, 1853.

As a writer the Paṇdit has a happy facility in expressing his meaning with perspicuity in the simplest and most polished language. Clearness, indeed, is the leading character of his composition, which is a fair specimen of the best prose of the Bengal vernacular. His remarks on the Sanskrita poets are generally very judicious.

The Essay is a laudable attempt to raise the Bengáli to be an instrument of literary criticism—a task of which the writer more than once owns the difficulty.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL,

For May, 1853.

The Society met on the 4th instant at the usual hour.

Sir James Colvile, Knight, President, in the Chair.

The proceedings of the last monthly meeting were read and confirmed.

The presentation, by Lieut. A. Robertson, of a large slab of stone closely inscribed on both faces with Páli characters, found in a heap of rubbish on the upper terrace of the Great Pagoda at Rangoon, was announced.

The following gentlemen, duly proposed and seconded at the last meeting, were balloted for, and elected ordinary members.

C. W. Cunliffe, Esq., C. S.

D. Grant, Esq., C. S.

Shah Kabir-uddeen.

The following gentlemen were named for ballot at the next meeting.

Rev. K. M. Banerjya,—proposed by the Rev. W. Kay and seconded by the President.

W. S. Halsey, Esq., C. S.,—proposed by Mr. Grote and seconded by the President.

The Council submitted a report, requesting the sanction of the Society to an outlay of a sum not exceeding Rs. 1,500 for repairs of, and additions to, the Society's premises.

The recommendation, on being put to the meeting, was adopted unanimously.

Read Letters—

1st. From Mr. Blyth, enclosing the first part of a paper, by Dr. Jerdon, on the Reptiles of Southern India.

2nd. From Dr. Fayrer, Rangoon, forwarding Meteorological Registers, from that place, for the months of November, December and January last.

3rd. From W. Muir, Esq., Secretary to the Government N. W. Provinces, enclosing a Meteorological Register kept at the Secretariat Office, Agra, for the month of March, 1853.

4th. From S. Bowring, Esq., sending two copies of an inscription from Pehewa near Thaneswur.

5th. From C. Allen, Esq., Officiating Secretary to the Government of India, forwarding a Geological Map of the Salt Range prepared by Dr. Fleming.

6th. From W. G. Young, Esq., Officiating Under-Secretary to the Government of Bengal, communicating a report, by the Commissioners of Assam, on the deposits of gold sand on the Banks of the Jugloo River, in Assam.

7th. From W. Elliott, Esq., Vizagapatam, communicating three lists of Canarese and Telegu works published at the Telegu Press of Vizagapatam, the Tamul Press of the Propaganda at Pondicherry and the Presses of the German Mission on the Malabar Coast.

The Curator in the Zoological Department and the Librarian submitted reports of additions made to their Departments in course of the last month.

Read and confirmed, *June* 1*st*, 1853.

(Signed) J. W. Colvile.

Report of Curator, Zoological Department.

Sir,—In the present Report, I have found it convenient to combine several unpublished Reports, and thus to notice under single headings the various successive donations for which we are indebted to Capt. Sherwill, Capt. Berdmore, Dr. Kelaart and others.

1. Capt. W. S. Sherwill. An extensive collection of sundries from Darjiling, consisting of skins of mammalia and birds, and numerous entire specimens of small mammalia, birds, and reptiles, taken out of spirit and transmitted in closed tins; an excellent mode of forwarding moist specimens to great distances, which originated with Capt. Thos. Hutton of Masuri: also some interesting species of land-shells.

Of mammalia, are sent entire specimens of HIPPOSIDEROS ARMIGER, Hodgson (distinct from H. NOBILIS), RHINOLOPHUS PEARSONII, Horsfield,* LASIURUS PEARSONII, Horsf., SCOTOPHILUS FULIGINOSUS, Hodgson, PLECOTUS AURITUS ? (in bad condition), and skin of RHINOLOPHUS PERNIGER (LUCTUS ?)—SOREX NEMORIVAGUS, Hodgson (found also in Sylhet and Arakan), and CORSIRA NIGRESCENS, Gray (v. *Sorex soccatus*, Hodgson),—NEODON SIKIMMENSIS, Hodgson, and a MUS affined to M. FLAVESCENS, and another which seems to accord with M. DUBIUS, Hodgson.

The only bird new to the museum is YUHINA NIGRIMENTA, Hodgson (a fine pair); and there is also a much finer specimen than we possessed previously of ALCEDO EURYZONA, Temminck (of which species *A. grandis*, nobis, from Darjiling, represents the adult, and *A. nigricans*, nobis, from Malacca, appears to be merely the young). An example of PARUS RUBIDIVENTRIS, nobis, occurs, confirming that species, of which we had previously seen but one specimen. Capt. Sherwill has also favoured us with a fine skeleton of NEOPHRON PERCNOPTERUS.

Of reptiles, he has sent CALOTES TRICARINATUS, *n. s.* (young), MOCOA SIKIMMENSIS, *n. s.*,—CALAMARIA FUSCA, *n. s.*, C. TENUICEPS, *n. s.*, COLUBER RADIATUS, C. KORROS, C. FASCIOLATUS,—C. NIGROMARGINATUS, *n. s.*,—DIPSAS MACRODON, *n. s.*, D. SHERWILLII, *n. s.*, DRYINUS NASUTUS, TROPIDONOTUS GRACILIS, *n. s.*, BUNGARUS CANDIDUS, VIPERA (?) SIKIM-

* Very distinct from RH. TRAGATUS, Hodgson. To Dr. Horsfield's description of it may be added that the lower lip has but one medial groove; whereas in RH. TRAGATUS the lower lip is conspicuously divided by three grooves into two medial and two lateral lappets, the former more narrow and elongated than the latter. The same structure recurs in RH. AFFINIS, Horsfield *(apud nos)*, from Ceylon; the species which, in the Society's collection, most approximates RH. TRAGATUS in structure. RH. MITRATUS, nobis, appears to have but one groove on the lower lip, so far as can be judged from stuffed specimens the lips of which had been relaxed by moisture; and this species is well and strongly distinguished by the much greater comparative development of the raised nasal follicle, and also the much greater lateral expansion of the vertical projection above it.

MENSIS, *n. s.*,—MEGALOPHRYS GIGAS, *n. s.*, ("edible frog" of Sikim), BOMBINATOR SIKIMMENSIS, *n. s.*, and other species of anourous BATRACHIA.

Of fishes, one small Cyprin.

2. W. Theobald, Esq., Panjab Salt Range Survey, Pind Dádan Khan. Various small animals taken out of spirit, and sent down moist in a tin canister. Of Bats are sent RHINOPOMA HARDWICKEI, (Gray), upwards of 270 individuals of which species were caught in one day at a place called Bhera, near Pind Dádan Khan;—also DYSOPUS PLICATUS, (B. Ham.);—SCOTOPHILUS COROMANDELIANUS, (F. Cuv.); and

HIPPOSIDEROS CINERACEUS, nobis, *n. s.* Similar to H. MURINUS, (Elliot), in structure, but larger and of a different colour. The entire under-parts are greyish-white; and the basal three-fourths of the piles of the upper fur are the same, the terminal fourth being of a dusky grey, but shewing the whitish hue beneath, especially on the head and neck. Length of fore-arm $1\frac{3}{10}$ in.; of ear posteriorly $\frac{5}{8}$ in.

An apparently new Mouse may be designated

MUS GERBILLINUS, nobis. Entire length of male 5 in., of which the tail is $2\frac{7}{8}$ in. Tarsus with toes and claws, $\frac{3}{4}$ in.; ear-conch (anteally) barely $\frac{1}{2}$ in. Female rather smaller. Fur of mean length, of a sandy-brown colour on the upper-parts, white below and on the limbs, which latter have a faint tinge of the colour of the back. About twenty-five caudal vertebræ. Tail thinly clad with minute setæ.

Of reptiles, are sent—MONITOR DRACÆNA, juv.,—HEMIDACTYLUS COCTÆI,—GYMNODACTYLUS GECKOIDES, Spix *(Stenodactylus scaber*, Rüppell*), CHARASIA DORSALIS, Gray,—UROMASTYX HARDWICKEI, Gray,—and two specimens of CABRITA LESCHENAULTII, (D. and B.),—also VIPERA ECHIS, Ind. var., of which Mr. Theobald writes—"This Viper is very common here in rocky places under the hills. It and an almost hoodless Cobra are the only poisonous snakes I have seen. The Viper is rarely of any size, the largest examined measuring—body $10\frac{7}{8}$ in., tail $1\frac{1}{8}$ in. = 12 in. It was well gorged with a large grasshopper. Forced to bite a fowl on each leg, no effect became visible for fifteen or twenty minutes; after which a lethargy came on very gradually, and in an hour the fowl was unable to stand, but did not die till two hours after the bite. The fowl seemed to derive much benefit by being dashed with cold water. Among the Lizards, the most curious is the herbivorous one (UROMASTYX HARDWICKII). It is eaten up here, and is I believe esteemed as an aphro-

* Perhaps a distinct species, though very closely affined. It is of a greyish colour, spotted rather than banded above with blotches of a darker hue, variegated by some of the tubercles being of a whitish colour.

disiac. These Lizards make burrows in sandy and stony places to the depth of 2 ft. or more. There are always several in one place, like the burrows of Rabbits. They are not much out in the cold weather, but in the hot weather are seen roaming about near their burrows, morning and evening. They appear as the sun is getting up, and stay grazing near the holes till almost mid-day, and are out also in the evening. Towards dusk they retire, and carefully close the holes with sand, so that it is not easy to find them. They offer no resistance when caught."

3. From E. F. Kelaart, Esq., M. D., Ceylon Medical Service. A fine collection of Cinghalese reptiles chiefly, in spirit, comprising several species new to the Society's museum. The species now sent are Emyda punctata (head and limbs of a large specimen),—Monitor dracæna, Hydrosaurus salvator,—Hemidactylus triedrus, H. Pieresii, Kelaart, H. Coctæi, H. frænatus, Boltalia sublævis, Piripia Peronii, and Gymnodactylus timoriensis? (*G. Kandianus*, Kelaart),—Lyriocephalus scutatus, Salea Jerdoni (from Newera Elia), Calotes Rouxi? (from do.; C. mystaceus, agreeing with Burmese specimens, having before been sent from that locality), C. versicolor, C. ophiomachus (one example not differing from the others in structure, having a black-edged white streak extending on each side from the neck to the coloured part of the tail, on which latter it breaks into spots and disappears), Sitana ponticeriana, —Tiliqua rufescens, Riopa Hardwickei,—Argyrophis braminus, Uropeltis (apparently a new species, of which examples have been sent to the Chatham museum, where they will probably have been described by Dr. A. Smith),—Calamaria scytale, Xenodon purpurascens, Coluber korros, Leptophis ornatus—(var., of a clay-brown colour, the upper-parts marked throughout with a series of black transverse bands, the head marked as usual), Dryinus nasutus, Vipera Russellii, Trigonocephalus nigromarginatus (specimen 27½ in. long, with the black markings much more developed than in Dr. Schlegel's figure),—Ichthyophis glutinosus,—Polypedates cruciger, P. leucomystax, Lymnodytes lividus, *n. s.*, L. macularius, *n. s.*, Rana Leschenaultii?, R. robusta, *n. s.*, Pyxicephalus fodiens, Jerdon, Engystoma rubrum, Jerdon, and Bufo melanostictus.

4. From Capt. Berdmore, Mergui. A large collection of sundries in spirit, and also various skins. The mammalia sent are Galæopithecus volans, Pteropus javanicus, Cynopterus marginatus, Nycticejus Temminckii, Scotophilus coromandelianus, Felis bengalensis, Paradoxurus typus, P. leucotis (vide Horsfield's *Catal.*), Tupaia ferru-

GINEA (var. *Belangeri*), SOREX SERPENTARIUS, SCIURUS CHRYSONOTUS (dark var.), MUS (vide XXI, 433*), and TRAGULUS KANCHIL.

Of the birds, the most worthy of notice are GECINUS DIMIDIATUS, LYNCORNIS CERVINICEPS, CORVUS SPLENDENS (unknown in Arakan, save of late years partially to the northward, and of the dark variety inhabiting also Ceylon), CALORNIS CANTOR (nec COLUMBINUS, v. *affinis*, nobis, of Arakan), MUNIA RUBRONIGER (having less black on the belly than in Bengal specimens, while some which we have seen from Penang want it altogether), PYCNONOTUS JOCOSUS (similar to Penang specimens, in which the crimson ear-tuft is constantly shorter and of a more intense crimson than in Indian specimens, and this bird is unknown in Arakan), CARPOPHAGA BICOLOR, ARGUS GIGANTEUS, ARDEA SUMATRANA (*A. rectirostris*, Gould),† and CASARCA LEUCOPTERA, nobis.

Of reptiles, skins of EMPAGUSIA FLAVESCENS and HYDROSAURUS SALVATOR; and examples in spirit of GECKO VERUS (triple-tailed), BOLTALIA SUBLÆVIS, PIRIPIA PERONII, and LEIURUS BERDMOREI, *n. s.*,—DRACO MACULATUS, ACANTHOSAURA ARMATA, CALOTES EMMA,—ASPRIS BERDMOREI, *n. s.*, RIOPA ALBOPUNCTATA,—XENOPELTIS UNICOLOR, PYTHON RETICULATUS, LYCODON AULICUS, LEPTOPHIS PICTUS, L. ORNATUS, L. RUFESCENS (*Dipsas rufescens*, Gray, Hardw. *Ill. Ind. Zool.*) COLUBER RADIATUS, C. FASCIOLATUS, TROPIDONOTUS UMBRATUS (2 var.), TR. STOLATUS, TR. ZEBRINUS, *n. s.*, HOMOLOPSIS PLUMBEA, BUNGARUS FASCIATUS, B. CANDIDUS, NAIA TRIPUDIENS,—POLYPEDATES LEUCOMYSTAX, LYMNODYTES ERYTHRÆUS (Schl.), RANA ASSIMILIS (XXI, 355), R. (young of several species), ENGYSTOMA (affined to E. MALABARICUM, Jerdon), HYLÆDACTY-

* In a male sent, the lower parts are white as in M. FLAVESCENS, in a female brown, like the upper parts.

† Upon examination of a fine collection of Australian birds from the Port Philip district, and comparing certain of them with specimens in the Society's museum, we found that OREOCINCLA LUNULATA, (Lath.), seems to be identical with *O. nilgiriensis*, nobis, of the mountains of S. India (No. 930 of catalogue); though Gould's figures of it are more like the Asiatic O. DAUMA, (Lath., v. *Whitei*, Eyton). A single Australian male of *Synoicus chinensis* is considerably deeper-coloured than any Indian or Malayan example examined, with the black markings more developed on the back, and scarcely a trace of rufous on the wings; but this would seem to be merely an individual variety. Of two SITTELLÆ, otherwise similar, one has the crown and cheeks fuscous, with pale supercilia; the other has the entire head dull white with faint dark striæ. They seem to be varieties merely of S. CHRYSOPTERA, and Gould's S. LEUCOCEPHALA from Pt. Essington and Morton Bay respectively are probably but analogous varieties.

LUS (affined to H. MONTANUS, Jerdon), and BUFO MELANOSTICTUS (?), var.?—having the skin much less warty than usual, especially on the sides of the body and under-parts generally, which last are throughout speckled with black.

Likewise a small Goby (PERIOPTHALMUS); a crustacean affined to HOMARUS; specimens of a THELPHEUSA Crab, imbedded in hard desiccated mud (as if fossilized); and many sundries.

CALOTES EMMA, Gray. Affined to ACANTHOSAURA, Gray, not only by the pit anterior to the shoulder being more strongly developed than in C. MYSTACEUS and C. ROUXI, and black internally, as in AC. ARMATA, but by the greater elevation of the orbit, which however is less than in ACANTHOSAURA, though it bears a similar spine posteriorly. The scales, however, are those of typical CALOTES, but less obliquely disposed; and they are but very slightly keeled. A series of spines above the tympanum, each having one longer than the rest, and that of the anterior series longest, exceeding the orbital spine. A nuchal crest of moderately elevated spines, but the back is simply keeled. Longest hind-toe reaching to the eye. Length 13 in., of which the tail measures $8\frac{1}{2}$ in. Colour brown, variegated with darker brown and with pale brown. A black line passes through the eye to the ear, commencing a little behind the nostrils, and there are four black orbital rays above and two below it. Sides of the face speckled with black, and the head and throat are more or less suffused with ruddy, indicative of the male sex in breeding condition.*

* This species agrees so well in structure with Mr. Gray's description, that there can be little hesitation in identifying it. He states it, however, to be from Afghanistan, as also two other new species, his C. MINOR and C. MARIA, both of which latter he gives from Afghanistan *and* the Khásya hills. Now the late Dr. Griffith collected extensively in both regions, and transmitted all his specimens to the India House; and we find that those described by Mr. Gray were presented to the British Museum by the Hon'ble E. I. Company. It therefore follows, as *extremely probable*, that Dr. Griffith's Afghan and Khásya specimens had become mixed and confused; whilst it is most improbable that the same species should inhabit both the Khásyas and Afghanistan and not be observed elsewhere, and it is equally improbable that so many as four species of the tropical genus CALOTES (besides also the affined SALEA HORSFIELDI, Gray,) should inhabit Afghanistan, the common C. VERSICOLOR being also noted from thence by Mr. Gray. Again, the affinities of the Burmese C. EMMA here described are with the Burmese and Cinghalese C. MYSTACEUS and C. ROUXI, and with the Burmese and Malayan ACANTHOSAURA; and these Burmese forms and species may well extend up to the Khásyas, but are most unlikely to occur in Afghanistan. C. MARIA has also the

5. From Capt. T. Sparkes, Ramri. The two *rami* of the lower jaw of the Whale (or Rorqual, BALÆNOPTERA), which was stranded last year upon Juggoo or Amherst Island, (S. of Ramri island,) as noticed in XXI, 359; but they prove to be larger by one-half than Capt. Sparkes had supposed, measuring 21 ft. in length, minus an inch or two. This magnificent specimen is now fixed up in the museum, as experience has shown that such bones cannot, in this country, be permanently exposed to the weather with impunity.* The length of the left radius of this Rorqual measures 37 in.; the body of a sacral vertebra is 15 in. deep, by 16 in. broad, and nearly 14 in. in extreme length. A lumbar vertebra is somewhat smaller, with spinal apophyses measuring 27 in.; expanse of lateral apophyses, from tip to tip, 40 in.; and extreme height of the tip of the dorsal apophysis from the ground, 37 or 38 in.

6. From Mr. W. W. Nicholls, Sarawak. The nearly perfect skeleton of an adult wild Orang-utan, of the peculiar species indicated by Sir J. Brooke by the name *Mias Pappan*. In a memoir founded upon this and other specimens, the existence of four distinct specific types of the genus Orang-utan is rendered extremely probable, if not absolutely proved; and our museum contains adult female skeletons of three of these species, and skulls of adults of both sexes of the fourth species.

7. Dr. Fayrer, attached to the Hospital Staff, Rangoon. Several specimens of a Bat, TAPHOZOUS LONGIMANUS, (Hardwicke), the only two adult males having a strong rufous tinge. Also an example of SCIURUS LOKROIDES, Hodgson, var., with no decided rufous tinge on the back. Of birds, ATHENE CUCULOIDES, (Vigors), and some others of common occurrence. Of reptiles, GECKO VERUS,—CALOTES MYSTACEUS,—C. VERSICOLOR,—and BUNGARUS FASCIATUS.

8. From Lieut. Hitchison, I. N., of the 'Mozuffer' S. V. Three small specimens of a Water Snake, of the supposed variety of HOMOLOPSIS LEUCOBALIA described by Dr. Cantor, and which is *Hipsirina Hardwickii*, Gray, of Hardwicke's 'Illustrations.'

9. Walter Elliot, Esq., Madras C. S. Two skins of HYSTRIX HIRSUTIROSTRIS, Brandt (*H. leucura*, Sykes), from Vizagapatam; obligingly sent for comparison with examples from other parts of the country.

shoulder-pit but not the orbital spine, and C. MINOR the orbital spine but not the shoulder pit, which are combined in C. EMMA; while the pit before the shoulder occurs in C. MYSTACEUS and C. ROUXI of Burma and Ceylon, and also in two species of S. India obtained by Mr. Jerdon.

* A varnish might, however, be tried with probable advantage.

10. Mr. E. Wellend, of the Sailor's Home. A fine specimen of the 'Wattle-bird' of N. Zealand, CALLŒAS CINEREA, (Forster).

11. Capt. R. Tytler, 38th Light Infantry. Some bird-skins from Dacca, including perhaps a new CISTICOLA, not uncommon in that vicinity;* also MALACOPTERON ABBOTTI, nobis, there far from rare, though previously known only from the Burmese provinces. Capt. Tytler remarks that SCIURUS PALMARUM, so extremely common about Calcutta, is replaced at Dacca by Sc. LOKROIDES, Hodgson (a skin of which is sent); and among the common birds, MEGALAIMA LINEATA similarly replaces M. ASIATICA, and MICROPTERNUS PHAIOCEPS replaces BRACHYPTERNUS AURANTIUS, &c. The skin of a Pelican shot near Dacca, is that of the true P. ONOCROTALUS, L., of which we never before saw an Indian specimen. A Hare supposed by Capt. Tytler, to be distinct, appears to be the common LEPUS RUFICAUDATUS of all Lower Bengal; but L. HISPIDUS he described to be also there not uncommon.

12. H. W. Bennet, Esq. The body of a young *Ursus malayanus.*

13. C. Chapman, Esq., C. S. Skin of a melanoid CERVUS AXIS, L., procured in Mymunseng. General colour very dark brown, paler below, and nigrescent along the spine; the ordinary spots barely traceable. In this phase of colouring, the species illustrates the *Cervus nudipalpebra.* Ogilby, P. Z. S. 1831, p. 136; founded on a specimen in the museum of the Zoological Society.

14. A. Campbell, Esq., Darjiling. Skin of a female CERVUS WALLICHII, in addition to the male presented on a former occasion;† and also two skins of a small Jackal-like animal from Tibet, the VULPES FERRILATUS, Hodgson.

* Quite distinct from the common C. CURSITANS, (Franklin,) an example of which also is sent in breeding phase of plumage, wherein the pale lateral margins to the coronal feathers have all but disappeared, leaving the crown streakless blackish-brown: but it closely approximates C. ERYTHROCEPHALA, Jerdon, nobis, *J. A. S.* XX., 523, from which it differs in having the crown, breast and flanks, and lower tail-coverts, of a subdued white or dull yellowish-white faintly tinged with rufous, instead of being deep ferruginous,—and there is no rufous tinge on the upper-parts except very faintly on the rump and upper tail-coverts. In both the tail is much less deeply graduated than in C. CURSITANS, and of a dusky or blackish hue, with only an exceedingly slight pale edge at tip. Of several specimens procured, all were quite similar.

† Here may be mentioned, that we have just seen a superb pair of *Wapiti* antlers, which much exceed in size the finest yet obtained of those of the *Shou*, and have the crowns further subdivided.

15. From Raja Radakhant Deb. A Shark taken in the river.

16. Mr. Andrew DeCruz. A fresh specimen of VIVERRICULA MALACCENSIS.

17. Thos. Briden, of the 'Rose of Sharon' merchant vessel. Skeletons of two species of Albatross.

18. O. Toogood, Esq., C. S. A dead Turtle, CHELONIA VIRGATA.

19. A. Grote, Esq., Joint Secretary of the Society. Two skins of CORYDON SUMATRANUS.

20. Babu Rajendra Mállika. Dead specimens of a S. African Monkey (CERCOPITHECUS PYGERYTHRUS); and of a Lark, from middle Asia, MELANOCORYPHA CALANDRA (*M. torquata*, nobis, *passim*).

21. F. Skipwith, Esq., C. S. Four skins of HIPPOSIDEROS LARVATUS, —one of NYCTICEJUS LUTEUS, a hill specimen of TALPA LEUCURA,—two skins of TURTUR ORIENTALIS,—and, in spirit, a young TROPIDONOTUS, ARGYROPHIS BRAMINUS, specimens of POLYPEDATES LEUCOMYSTAX, var., and of RHICOPHORUS REINWARDTII (?), D. and B., or a closely affined species.

22. B. Heritage, Esq. Skin of DIOMEDEA EXULANS.

23. J. Payter, Esq. An albinoid specimen of MUS FLAVESCENS.

24. Alex. Mitchell, Esq. A collection of British specimens in various classes. Among the skins of mammalia and birds, a few may be selected for our museum, but we were previously well supplied with all the species sent. The same remark applies to the reptiles in spirit, consisting of a Viper and some Newts. Of British fishes in spirit, Mr. A. Kerr has contributed three specimens of CALLYONYMUS LYRA, three of MURÆNOIDES GUTTATA; and from the Montrose museum, we have received a specimen of RANICEPS TRIFURCATUS, and one of AMMODYTES TOBIANUS. Also skins of COTTUS BUBALIS, ASPIDOPHORUS EUROPŒUS, SALMO TRUTTA, two of S. FARIO, AMMODYTES LANCEA, and a fine skin of the Sun-fish, ORTHOGORISCUS MOLA,—the whole of which are exceedingly acceptable. Mr. Mitchell has further enriched our museum with a fine collection of British shells, comprising several species which we did not previously possess; and with 109 species of insects named, collected in the county of Forfarshire. Also with two large specimens of the remarkable northern crab, LITHODES ARCTICA.

25. From T. C. Jerdon, Esq., Mhow. A collection of reptiles and small fresh-water fishes from S. India; also a skin of MALACOCERCUS SOMERVILLEI, Sykes (verus). The reptiles are LYCODON AULICUS, XENODON PURPURASCENS, COLUBER PICTUS (Russell, I, pl. 29*), HERPETODRYAS MA-

* A true COLUBER, not LYCODON BALIODERA, as suggested by Dr. Cantor.

LABARICUS, Jerdon, *n. s.*, and NAIA TRIPUDIENS. The fishes have not yet been minutely examined.

E. BLYTH.

April 29th, 1853.

LIBRARY.

The following books have been added to the Library since the last meeting.

Presented.

Selections from the Records of the Government of India. No. 1, Papers on the proposed Railway in Bengal. Calcutta 1853, 8vo.—BY THE GOVERNMENT OF INDIA.

Report of the Inspector of Prisons, on the Management of the Jails from 1845 to 1851. Agra 1852, foolscap folio.—BY THE GOVERNMENT OF THE NORTH WESTERN PROVINCES.

Transactions of the Royal Irish Academy, for the year 1851-52, Vol. XXII. Pl. III.—IV.—BY THE ACADEMY.

Proceedings of ditto, Vol. V. Pl. II.—BY THE SAME.

Selections from the Public Correspondence of the Board of Administration for the affairs of the Punjab. No. 3, Lahore 1853. Royal 8vo. (4 copies).—BY THE BOARD.

Transactions of the Meteorological Society of Mauritius. Mauritius 1853, 8vo. Pamphlet.—BY THE SOCIETY.

Notes on the Winding and Dying Branches of the Silk Trade of Kurrachi. By Lieut. Stewart. Lahore 1853. Folio Pamphlet.—BY THE AGRICULTURAL and HORTICULTURAL SOCIETY OF THE PUNJAB.

Memorandum on the State of the Silk Trade and Manufacture of Peshawar. By Capt. H. James. Pamphlet.—BY THE SAME.

Bye-Laws of the Agri-Horticultural Society of the Punjab, (2 copies).—BY THE SAME.

Quarterly Journal of the Geological Society, No. 33.—BY THE SOCIETY.

Journal Asiatique 5m. serie, No. I.—BY THE SOCIE'TE' ASIATIQUE.

The Sixteenth Report of the Calcutta School Book Society.—BY BA'BU RA'JENDRALA'L MITTRA.

Zeitschrift der Deutschen morgenländischen Geselschaft. VII. Band I. heft.—BY THE SOCIETY.

The Missionary, for March and April, 1853.—BY THE EDITOR.

Calcutta Christian Observer, for May, 1853.—BY THE EDITORS.

Journal of the Indian Archipelago, for November and December, 1852. 2 copies each.—BY THE GOVERNMENT OF BENGAL.

A Sheet Almanack in Bengali for the Bengali year 1260. By Bábu Nilakamala Basáka.—By the Author.

Upadeshaka, No. 77.—By the Editor.

The Oriental Baptist, No. 77.—By the Editor.

The Citizen newspaper for April last.—By the Editor.

The Indian Charter, No. for April.—By the Editor.

Bibidhártha Sangraha, No. 16.—By the Editor.

Tattwabodhiní Patriká, No. 115.—By the Tattwabodhiní Sabha'.

Purnachandrodaya for April 1853.—By the Editor.

Jahrbucher der Literatur, Nos. 3, 27, 37, 38, 39, 40, 77 and 79.—By the Baron von Hammer-Purgstall.

Exchanged.

The Calcutta Review, No. 37.

The Athenæum for January and February, 1853.

Purchased.

Comptes Rendus, No. 1 to 7, for 1853.

Annals and Magazines of Natural History for March 1853, two copies.

Edinburgh Review, No. 197.

Phillip's Introduction to the Sontal Language.

Gutzlaff's Life of Taou Kwang. 2 Vols.

Ra'jendrala'l Mittra.

May 4th, 1853.

For June, 1853.

The Society met on the 1st instant, at half-past 8 p. m.

Sir James Colvile, Kt., President, in the Chair.

The minutes of the last month's proceedings were read and confirmed.

The following presents were received:

1st. From E. Thomas, Esq. Copies of his papers on ancient Indian coins, to complete the series in the Society's Library.

2nd. From W. G. Young, Esq., Officiating Under-Secretary to the Government of Bengal. Lieut. Baird Smith's Work on Italian Irrigation.

3rd. From Capt. Harris. Two Mummies brought from Egypt, and also five small Turkish copper coins found in the cases of the

Mummies. The thanks of the Society were voted to Capt. Harris, which were conveyed to him by the President.

The following gentlemen duly proposed and seconded at the last meeting, were balloted for, and elected ordinary members.

Professor K. M. Banerjya.

W. C. Halsey, Esq., C. S.

W. J. Herschel, Esq., C. S., was proposed by Capt. Thuillier, as a candidate for election at the next meeting, seconded by the Rev. W. Kay.

The Philological Committee having recommended the acceptance of Dr. Sprenger's offer to edit the Biographical Dictionary of Ascalany, which has the title اصابة of Capt. Hayes's offer to edit an Arabic work on Ethics, called "*Tiharat ul Nafs*," and of Mr. Hall's offer to edit the Sanskrita text of *Vásavadatta*, the Council requested the sanction of the meeting to their acting on that recommendation.

Ordered that the recommendation of the Philological Committee be adopted.

Read Letters—

1st. From W. G. Young, Esq., Officiating Under-Secretary to the Government of Bengal, transmitting copies of correspondence regarding discovery of Coal near the Chawa Nuddee, a tributary of the Teesta. This is the correspondence, extracts from which are embodied in the report of the Curator of the Museum of Economic Geology, read at the April meeting.

2nd. From Lieut. G. Pearce, Assistant Commissioner, Hazara, forwarding, for the Society's inspection, a drawing by the Rev. Anand Messiah, Senior, of a Hindu Astronomical Instrument called the "Jantra Raj," or King of all Astronomical Instruments.

3rd. From H. Piddington, Esq., a Twenty-Second Memoir on the Law of Storms.

4th. From E. Blyth, Esq., a paper entitled Notices and Description of various Reptiles—new or little known.

The Librarian submitted his usual monthly report.

Read and confirmed, *July 6th*, 1853.

(Signed) J. W. Colvile.

Library.

The following additions have been made to the Library since the last meeting.

Presented.

Italian Irrigation, being a report on the Agricultural Canals of Piedmont and Lombardy. By R. Baird Smith, Edinburgh, 1852. 2 vols. 8vo. with a folio volume of plates.—By the Government of India.

Journal of the Bombay Branch of the Royal Asiatic Society, No. XVII. —By the Society.

An Essay on the Arabic language. رساله در فضیلت عربیت بر زبان‌ع‌جمیه 8vo. pamphlet.—By Syad Keramat Ali.

The Epoch of the Shah Kings of Shaurástra. By E. Thomas, Esq. London 1848.—By the Author.

On the Coins of the Hindu Kings of Cabul.—By the same.

On the Coins of the Kings of Ghazni.—By the same.

Supplement to the series of the Patán Kings of Hindustan.—By the same.

Notes on Col. Stacey's Ghazni Coins.—By the same.

A Remarkable Indo-Sassanian Coin.—By the same.

On Arsacidan and Partho-Persian Coins.—By the same.

Tattwabodhiní Patriká, No. 118.—By the Tattwabodhini' Society.

Calcutta Christian Observer, for June, 1853.—By the Editors.

The Oriental Baptist, No. 78.—By the Editor.

The Oriental Christian Spectator, Nos. for March and April, 1853.—By the Editor.

Upadeshak, No. 78.—By the Editor.

The Missionary, for June, 1853.—By the Editor.

The Bibidhártha Sangraha, No. 17.—By the Editor.

Purchased.

The Edinburgh Review, No. 198.

The Annals and Magazine of Natural History, for April, 1853.

Exchanged.

Journal of the Agri-Horticultural Society of India, Vol. VIII. part 3.

Ra'jendrala'l Mittra.

June 1st, 1853.

Abstract of the Meteorological Register for January, 1853.

Rangoon, 1st February, 1853.

	Thermometer Sunrise.			Thermometer 9 A. M.			Thermometer Noon.			Thermometer 3 P. M.			Thermometer Sunset.			Thermometer 9 P. M.			Remarks.
	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	
Wet....	67	59	63.24	72	65	67 71	78	68	71.34	75	68	71.64	72	69	70	76	63	68.95	Rain showers on the 23rd, 24th and 26th.
Dry....	69	62	66.11	79	68	74	92	81	85.02	92	84	88.33	82	75	78.75	79	67.5	74.5	Mornings in the early parts of the month Foggy.
	Barometer Sunrise.			Barometer 9 A. M.			Barometer Noon.			Barometer 3 P. M.			Barometer Sunset.			Barometer 9 P. M.			Prevailing winds from N. E. occasionally N. W.
	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	
No instruments.																			Weather generally fine and clear.
	Of 17 observations.			Of 15 observations.			Of 25 observations.			Of 21 observations.			Of 8 observations.			Of 11 observations.			

J. Fayrer, M. D. *Asst. Surg. Field Hospital, Rangoon.*

Meteorological Observations for the month of January, 1853.

Date.	Sunrise.					9 a. m.					Noon.				
	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.
	Wet.	Dry.				Wet.	Dry.				Wet.	Dry.			
1	..	..	..	....	....	65	70	..	N. W. lt.	Clear.	70	81	,,	N b. E. lt.	Cum.-cir.
2	..	..	..	....	....	..	..	..	....	....	72	82	,,	Ditto.	Ditto.
3	64.5	69	..	N. W. lt.	Hazy.	72	68	..	N. W. lt.	Clear.	72	83	,,	Ditto.	Cumuli.
4	65	67	..	Ditto.	Ditto.	69	73	..	Ditto.	Ditto.	72	86	,,	N. W. stdy.	Cir.-cuml.
5	64.5	65.5	..	Calm.	Dense fog.	..	..	..	Ditto.	....	73	85	,,	Ditto lt.	Cumuli.
6	60	62	..	....	Hazy.	..	..	..	Ditto.	....	67	81	,,	Ditto f.	Clear.
7	59	62	..	Calm.	Ditto.	..	..	..	Ditto.	....	69	86	,,	Ditto lt.	Ditto.
8	60	64	..	Ditto.	Ditto.	65	75	..	Ditto.	Clear.	..	..	,,	....	....
9	60	63	..	Ditto.	Calm.	67	78	..	Ditto.	Ditto.	67	86	,,	N. W. lt.	Clear.
10	..	..	..	....	....	..	..	..	....	....	69	85	,,	Ditto.	Ditto.
11	65	62	..	Calm.	Hazy.	..	..	..	....	....	70	88	,,	Ditto.	Ditto.
12	65	68	..	Ditto.	Ditto.	..	..	..	....	....	..	..	,,	....	....
13	63	65	..	Ditto.	Ditto.	..	..	..	....	....	72	87	,,	N. W. lt.	Cumuli.
14	..	..	..	....	....	67	72	..	N. W.	Clear.	72	90	,,	Ditto.	Ditto.
15	65	70	..	N. W.	Cloudy.	..	78	..	....	....	..	..	,,	....	....
16	67	67	..	....	....	68	73	..	N. W.	Cir.-cuml	71	86	,,	N. W. lt.	Cumuli.
17	..	..	..	....	....	70	78	..	....	....	73	87.5	,,	Ditto.	Ditto.
18	..	..	..	....	....	71	75	..	N. W.	Cirri.	73	90	,,	Ditto.	Ditto.
19	65	68	..	N. E.	Cir.-cum.	..	..	..	....	....	74	87	,,	Ditto.	Ditto.
20	..	..	..	....	....	..	..	..	....	....	72	85	,,	Ditto.	Ditto.
21	64	66	..	N. E.	Hazy.	..	..	..	....	....	73	79	,,	Ditto.	Ditto.
22	..	..	..	....	....	69	79	..	N. W.	Cirri.	72	86	,,	Ditto.	Ditto.
23	..	..	..	....	....	..	..	..	....	....	..	..	,,	....	....
24	62	67	..	N. E. f.	Cumuli.	67	76	..	N. E. f.	Clear.	68	77	,,	N. W. f.	Cloudy.
25	62	64	..	N. W. lt.	Cir.-strati.	65	68	..	N. E. lt.	Ditto.	68	75	,,	Ditto.	Ditto.
26	64	65	..	N. do.	Cumuli.	67	75	..	Ditto.	Ditto.	73	87	,,	Ditto.	Ditto.
27	..	..	..	....	....	66	72	..	Ditto.	Ditto.	..	..	,,	....	....
28	..	..	..	....	....	..	..	..	....	....	..	..	..	....	....
29	..	..	..	....	....	..	..	..	....	....	78	92	,,	N. W. lt.	Cumuli.
30	..	..	..	....	....	..	..	..	....	....	73	86	,,	Ditto.	Ditto.
31	..	..	..	....	....	..	..	..	....	....	70	88	,,	Ditto.	Ditto.
Total.	10.75	1124.5	..	....	....	94.8	11.10	..	. ..	....	1783.5	2125.5	..	....	....

Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Remarks.
Wet.	Dry.				Wet.	Dry.				Wet.	Dry.				
72.5	84	..	N. E. lt.	Cirri.											
71	87	..	Ditto.	Ditto.	70	75	..	N. E. lt.	Cirri.						
72	88	..	Ditto.	Ditto.	70	80	..	E.	Clear.	64	70	N. E.	Light.	Rain.	Decrease Fog.
68	85	..	Ditto.	Ditto.	..	79	..	Calm.	Ditto.	65	73	Do.	Ditto.	Ditto.	Hazy.
..	..	..	N. W.	..	..	..	..	..	..	..	..	..	..	..	Ditto.
68	88	..	Ditto.	Cirri.	70	81	..	Calm.	Clear.	76	74	N. W.	Light.		
68	86	..	Ditto.	Cloudy.											
70	87	..	Ditto.	C.-cum.	..	..	..	..	..	70	78	N. W.	Light.	..	Hazy in Evening.
71	90.5	..	Ditto f.	Ditto.	..	..	..	..	..	70	79	Do.	Ditto.		
73	89	..	Ditto.	Cloudy.	72	82	..	Calm. }	Close and						
..	..	..	....	..	70	76	..	Ditto. }	sultry.	..	..	..	..	..	Cool.
70	89	..	Ditto.	Cloudy.	..	..	..	..	..	66	72	N. W.	Cloudy.		
73	88	..	Ditto.	Ditto.											
73	91.5	..	Ditto.	Ditto.											
74	91	..	Ditto.	Ditto.	..	..	..	..	..	72	79	N. W.	Cloudy.		
73	90	..	Ditto.	Ditto.	..	..	..	..	..	76	77	Do.	Ditto.		
72	90	..	Ditto.	Ditto.	69	82	..	Calm.	Close and						
71	92	..	Ditto.	Ditto.					sultry.						
70	91	..	Ditto f.	Ditto.	..	..	..	..	..	..	..	..	..	..	Shower last night.
..	..	..	....	..	..	..	..	..	..	63	67.5	N.W.f	Cloudy.	..	Light showers, cold, cloudy.
73	87	..	N. E. f.	Cloudy.	..	..	..	..	..	..	..	..	..	..	Light rain last night cold.
73	87	..	N. lt.	Cumuli.	..	..	..	..	..	69	76	N.E lt.	Cirri.		
..	..	..	....	..	69	75	..	N. E. lt.	Clear.	67	74	Do.	Ditto.		
75	91	..	N. W. lt.	Cumuli.											
74	91.5	..	Ditto.	Ditto.											
1504.5	1863.5	..	....	..	49.0	63.0	..	..	..	75.8	819.5				
71.64	88.33	..	....	..	70.00	78.75	..	..	..	68.95	74.5				

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of February 1853.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.465	62.0	62.0	52.0	..	..	W.	Clear.
2	29.419	61.6	61.6	53.5	..	..	Ld.	_ in zenith.
3	29.456	63.4	63.0	55.4	..	..	S. E.	\ in zenith.
4	29.403	64.9	64.4	57.0	..	..	E.	∩ scattered.
5	29.326	66.0	66.0	61.4	..	..	S. E.	Clear.
6	29.469	62.0	62.0	56.0	..	..	W.	Ditto.
7	29.490	60.0	60.5	52.5	..	..	W.	Ditto.
8	29.497	61.0	61.5	53.4	..	..	N.	Ditto.
9	29.513	63.4	63.8	54.4	..	..	N.	Ditto.
10	29.475	64.0	64.7	56.5	..	..	W.	Ditto.
11	29.455	65.0	65.0	57.0	..	..	W.	\ a few in zenith.
12	29.449	67.8	68.0	60.0	..	..	E.	Clear.
13	29.417	69.5	71.3	58.5	..	..	N.	\ scattered all over.
14	29.448	69.0	70.0	58.4	..	..	W.	Clear.
15	29.372	69.0	70.0	58.2	..	..	W.	Ditto.
16	29.372	69.7	71.0	58.2	..	..	W.	Ditto.
17	29.358	69.0	70.1	56.5	..	..	N.	\ a very few in zenith.
18	29.421	71.0	70.6	59.0	..	..	S.	∩ scattered.
19	29.523	68.0	69.2	58.9	..	..	N.W.	Clear.
20	29.472	69.0	69.5	59.5	..	..	W.	\ a very few in zenith.
21	29.413	66.6	67.5	56.0	..	..	N.	Clear.
22	29.433	67.3	67.5	55.1	..	..	W.	Ditto.
23	29.449	68.0	69.0	54.5	..	..	W.	∩ scattered.
24	29.482	67.5	69.2	54.5	..	..	W.	\ ditto.
25	29.525	68.0	68.5	54.5	..	..	N.W.	Clear.
26	29.558	66.0	66.9	54.0	..	..	W.	Ditto.
27	29.535	67.0	67.5	52.2	..	..	N.	\ a very few in zenith.
28	29.563	68.0	68.0	55.0	..	..	N.	\ scattered all over.
Mean.	29.456	66.2	66.7	56.2	..	..	..	

NOTE. The symbols used for Aspect of the sky are

Symbols, ... { \ Cirrus. _ Cirro-strati. ∩ Cumuli. ∩_ Cumulo-strati. \∩_ Nimbi or Nimbus.

The Barometer readings have all been reduced to 32° Farh. and corrected for Capillary Action.

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of Feb. 1853. LATITUDE.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.406	65.8	64.6	54.2	..	..	W.	Clear.
2	29.374	63.0	62.2	53.9	..	..	S.	\— in zenith.
3	29.407	64.0	63.0	55.0	..	..	S.	\ ditto.
4	29.345	65.4	64.7	57.4	..	..	S.	∩ a few scattered.
5	29 257	67.4	67.4	61.7	..	..	S.	∩ scattered.
6	29.447	63.9	64.0	55.5	..	..	W.	Clear.
7	29.403	64.0	64.5	52.5	..	..	N.	\ in zenith.
8	29.421	64.0	64.0	55.0	..	..	S.	Clear.
9	29.450	66.0	66.8	56.5	..	..	S.W.	Ditto.
10	29.422	66.5	67.5	57.5	..	..	W.	Ditto.
11	29.411	68.0	68.9	56.7	..	..	W.	\ a few in zenith.
12	29.368	70.0	70.1	59.0	..	..	S.	Clear.
13	29.357	73.7	76.0	58.9	..	..	N.W.	\ scattered all over.
14	29 382	72.0	72 5	59.0	..	..	N.W.	Clear.
15	29.327	74.0	74.5	59.4	..	..	N.W.	Ditto.
16	29.312	73.0	74.5	59.4	..	..	N.	Ditto.
17	29.326	72.2	73.2	57.5	..	..	N.W.	\ a very few in zenith.
18	29.391	72.5	74.0	60.5	..	..	S.	∩ towards horizon.
19	29.480	72.0	72.0	60.3	..	..	N.	Clear.
20	29.432	72.0	70.2	56.5	..	..	N.	Ditto.
21	29.358	70.5	71.6	56.5	..	..	S.	Ditto.
22	29.370	70.0	70.5	56.5	..	..	N.W.	Ditto.
23	29.411	71.0	72.0	55.0	..	..	N.	∩ scattered.
24	29.437	71.0	71.9	54.1	..	..	S.	\ a very few scattered.
25	29.470	70.0	70.4	54.9	..	..	S.	Clear.
26	29.532	69.9	69.0	55.5	..	..	W.	Hazy.
27	29.490	70.4	70.4	54.0	..	..	N.	\ scattered.
28	29.546	69.6	67.0	55.0	..	..	N.	\— scattered all over.
	29.405	69.0	69.2	56.7	..	..	..	

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of Feb. 1853. LONGITUDE.

Maximum pressure observed at 4 P. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.	Rain Gauges.		
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.		3 Feet 2 Inches from the ground.	Direction of the Wind.	
1	29.352	69.0	70.0	56.5	68.3	55.5	61.9	Clear.	..	W.	
2	29.287	65.0	63.7	54.2	63.4	56.0	59.7	⌣ in zenith.	..	N.	
3	29.333	65.0	64.3	55.9	64.0	59.0	61.5	Ditto.	..	N.	
4	29.260	68.6	68.0	60.0	67.5	62.0	64.75	∩ a few scattered.	..	N.W.	
5	29.182	68.1	68.0	63.5	67.5	62.0	64.75	⌣ all over.	..	E.	Hail.
6	29.422	66.0	65.5	57.5	65.0	58.5	61.75	Clear.	26.4	N.	
7	29.376	66.0	66.0	55.5	65.3	56.0	60.15	Ditto.	..	N.	
8	29.373	67.0	67.0	56.5	66.3	56.0	61.15	Ditto.	..	N.	
9	29.403	68.5	67.5	57.8	68.5	58.0	63.25	Ditto.	..	W.	
10	29.353	71.0	71.5	58.5	70.2	58.9	64.55	Ditto.	..	N.	
11	29.353	71.3	71.3	58.1	70.6	60.0	65.3	⌣ scattered.	..	W.	
12	29.307	73.7	74.1	59.5	72.3	64.0	68.15	Clear.	..	S.W.	
13	29.278	77.5	77.6	60.6	76.0	63.5	69.75	⌣ scattered all over.	..	W.	
14	29.317	78.0	78.0	61.1	76.5	63.0	69.75	Clear.	..	N.	
15	29.307	77.0	77.5	60.8	76.2	63.0	69.6	Ditto.	..	W.	
16	29.236	76.6	76.8	60.1	75.2	63.0	69.1	Ditto.	..	N.	
17	29.266	73.5	73.5	59.3	72.6	63.0	67.8	∩ scattered.	..	N.	
18	29.326	75.5	75.9	61.1	74.8	67.8	71.3	∩ a very few in zenith.	..	S.	
19	29.397	75.5	76.7	59.5	75.0	62.2	67.6	Clear.	..	N.	
20	29.333	75.0	75.0	58.0	73.3	63.0	68.15	Ditto.	..	N.	
21	29.275	74.0	74.0	57.5	73.0	60.0	66.15	\ scattered in zenith	..	N.	
22	29.297	74.0	74.4	57.6	73.0	60.0	66.5	Clear.	..	W.	
23	29.368	73.5	75.2	55.5	74.0	60.0	67.0	\ scattered.	..	N.	
24	29.375	75.5	77.1	55.2	75.0	59.0	67.0	Clear.	..	N.	
25	29.396	73.0	73.9	58.1	72.3	60.0	66.15	Ditto.	..	E.	
26	29.421	71.0	70.5	57.6	70.0	59.3	64.65	Ditto.	..	N.	
27	29.425	74.0	73.6	56.2	72.0	58.3	65.15	\ scattered.	..	N.	
28	29.458	72.7	72.7	56.4	71.5	62.6	67.05	⌣ scattered all over.	..	N.	
	29.338	72.0	72.1	58.1	71.0	60.5	65.75		42.6		

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of March, 1853.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.593	65.0	67.0	50.5	..	..	N W.	Clear.
2	29.520	66.0	66.8	54.0	..	..	W.	Ditto.
3	29.482	67.5	67.8	54.2	..	..	W.	Ditto.
4	29.396	67.5	68.4	54.8	..	..	W.	Ditto.
5	29.356	70.0	70.4	57.4	..	..	W.	Ditto.
6	29.281	73.5	75.0	61.0	..	..	S.	Ditto.
7	29.406	76.6	74.2	63.1	..	..	E.	∩ scattered all over.
8	29.387	75.0	74.9	64.7	..	..	S.W.	Clear sky.
9	29.421	74.0	74.6	62.4	..	..	N.	Clear.
10	29.506	70.0	71.8	59.7	..	..	N.	Ditto.
11	29.480	73.0	73.5	57.0	..	..	W.	Hazy.
12	29.355	71.0	71.5	59.0	..	..	N.	Ditto.
13	29.382	73.0	73.5	65.0	..	..	Ld.	∿ all over.
14	29.430	72.0	73.0	63.3	..	..	W.	Clear.
15	29.443	71.0	71.7	59.5	..	..	N W.	Ditto.
16	29.436	73.0	74.7	60.7	..	..	N W.	\ towards S.
17	29.407	73.5	74.5	63.5	..	..	N W.	\ few in zenith.
18	29.441	74.0	75.5	60.3	..	..	W.	Clear.
19	29.437	75.0	75.9	61.3	..	..	N W.	Ditto.
20	29.364	82.0	82.7	63.5	..	..	W.	Ditto.
21	29.345	78.0	80.2	63.5	..	..	N W.	Ditto.
22	29.323	81.5	86.0	65.6	..	..	S.W.	Ditto.
23	29.338	78.8	81.5	62.6	..	..	W.	Ditto.
24	29.265	79.8	80.0	62.6	..	..	W.	Ditto.
25	29.219	77.0	77.7	63.9	..	..	W.	\ in horizon to S.
26	29.247	81.5	83.8	64.0	..	..	S. E.	∼ in zenith.
27	29.301	82.0	82.0	66.5	..	..	W.	∼ ditto.
28	29.290	82.8	84.5	66.6	..	..	S.W.	∼ scattered.
29	29.285	84.0	84.9	68.4	..	..	N.	Clear.
30	29.305	84.5	85.0	70.5	..	..	N W.	∿ all over.
31	29.354	79.3	79.8	70.0	..	..	N W.	Clear.
Mean.	29.380	75.15	76.54	61.91	..	..	..	

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of March, 1853. LATITUDE.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.552	68.9	70.5	53.5	..	..	N.W.	Clear.
2	29.472	70.0	71.2	55.0	..	..	N.W.	Ditto.
3	29.443	71.0	71.5	55.0	..	..	N.	Ditto.
4	29.358	70.5	71.2	55.3	..	..	N.W.	Ditto.
5	29.310	72.0	72.5	58.4	..	..	N.	Ditto.
6	29.241	76.0	77.9	63.5	..	..	S.	Ditto.
7	29.401	75.6	75.6	63.9	..	..	E.	∩ in horizon to N.
8	29.352	76.0	77.0	65.1	..	..	S.W.	Clear sky.
9	29.394	75.9	76.6	61.5	..	..	N.	Clear.
10	29.490	73.1	74.1	58.6	..	..	N.	Ditto.
11	29.430	73.6	73.9	57.0	..	..	W.	Hazy in horizon.
12	29.312	73.1	74.0	59.6	..	..	N.	⌣ all over.
13	29.349	75.0	75.0	65.4	..	..	S.	∩ all over.
14	29.413	74.9	75.4	61.2	..	..	W.	Clear.
15	29.405	74.0	75.4	60.2	..	..	N.	Ditto.
16	29.406	76.0	75.0	61.9	..	..	N.W.	\ few in zenith.
17	29.382	76.0	74.9	62.6	..	..	N.W	Clear.
18	29.407	78.0	79 6	61.4	..	..	W.	Ditto.
19	29.404	77.5	76.6	62.0	..	..	N.W.	Ditto.
20	29.305	84.5	85.0	65.5	..	..	W.	Ditto.
21	29.327	80.0	79.5	64.0	..	..	N.W.	Ditto.
22	29.279	81.0	79.0	65.0	..	..	W.	Ditto.
23	29.314	82.1	80.5	63.4	..	..	W.	Ditto.
24	29.233	83.8	81.6	63.8	..	..	W.	Ditto.
25	29.203	80.9	80.5	64.6	..	..	W.	∩ few scattered.
26	29.194	83.0	81.8	65.3	..	..	E.	∩ scattered.
27	29.268	82.8	82.6	67.0	..	..	W.	∩ in zenith.
28	29.195	84.2	83.6	67.5	..	..	W.	..
29	29.240	86.0	86.9	69.0	..	..	N.	Clear.
30	29.308	85.0	85.0	72.0	..	..	N.	⌣ all over.
31	29.300	82.8	82.9	70.0	..	..	N.W.	Clear.
	29.345	77.52	77.64	62.52	..	..	..	

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of March, 1853. LONGITUDE.

Maximum pressure observed at 4 P. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the sky.	Rain Gauges.	
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.		3 Feet 2 Inches from the ground.	Direction of the Wind.
1	29.472	73.0	73.3	55.2	72.0	54.5	63.25	Clear.	..	N.W.
2	29.384	74.5	75.5	57.3	74.0	58.0	66.0	Ditto.	..	N.W.
3	29.351	74.0	74.0	56.9	72.6	60.3	66.45	Ditto.	..	N.
4	29.260	72.7	72.7	57.1	72.0	60.5	66.25	Ditto.	..	N.
5	29.174	75.5	76.0	60.2	74.9	65.0	69.95	Ditto.	..	N.
6	29.168	81.5	83.2	65.3	81.5	65.0	73.25	⌒ a few scattered.	..	S.E.
7	29.370	76.0	75.5	63.6	75.0	65.6	70.3	∩ a few scattered.	..	E.
8	29.273	80.0	79.5	64.9	78.6	68.9	73.75	Clear sky.	..	W.
9	29.322	79.0	79.6	61.0	78.9	66.5	72 7	Ditto.	..	W.
10	29.393	74.9	74.4	59.0	73.6	63.5	68.55	⌒ ⅓ heavens.	..	N.
11	29.354	76.2	76.6	58.9	76 0	61.9	68.95	Clear.	..	W.
12	29.214	76 0	76·0	59.9	75.2	61·7	68.45	⌣ all over.	..	Ld.
13	29.292	78.5	79·3	67.4	78.0	71·0	74.5	⌒ all over.	..	S.W.
14	29.355	75.0	74.5	61.6	73.6	66·3	69.95	Clear.	..	W.
15	29.324	78.5	78·5	61.7	77.5	64·9	71.2	Ditto.	..	N.
16	29.326	76.0	75.6	62.5	76.2	67·0	71.6	Ditto.	..	N.
17	29.300	76.0	81.0	63.1	76 0	67·0	71.5	Ditto.	..	W.
18	29.331	81.0	82·0	61.9	80.5	67·0	73.75	Ditto.	..	W.
19	29.311	77.2	77·6	62.8	77.2	69.0	73.1	Ditto.	..	N.W.
20	29.204	85.7	86·0	66.0	85.5	70.5	78.0	Ditto.	..	W.
21	29.203	82.4	85.0	65.9	82.0	71.5	76.75	\ a few scattered.	..	W.
22	29.189	83.5	85.4	66.9	85.0	74.7	79.85	Clear.	..	W.
23	29.224	86.0	89.5	65.0	88.0	74.0	81.0	Ditto.	..	W.
24	29.147	84.0	90.5	65.0	85.5	73.8	79.65	Ditto.	..	W.
25	29.105	82.0	82.3	64.6	86.8	78.9	82.85	Few ⌒scattered.	..	W.
26	29.128	86.1	86.1	65.8	86.8	75.6	81.2	⌒ in zenith.	..	E.
27	29.156	86.0	86.4	69.2	85.5	75.5	80.5	⌒ scattered.	..	N.W.
28	29.161	87.5	94.4	68.5	92.6	78.9	85.75	Clear.	..	W.
29	29.133	93.9	94.9	71.0	93.0	79·5	86.25	∩ in zenith.	..	N.
30	29,262	84.8	84.4	72.9	85.0	81.5	83.25	\⌣ all over.	..	N.W.
31	29.201	84.0	87.5	78.0	84.0	71.0	77.5	Clear.	..	N.
	29.261	80.05	81.19	63.84	86.55	68.68	77.61		..	..

JAS. MUIR, *Asst. Secy. to Govt. N. W. P.*

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Notes on the Sources of the Abi Ma, or Amoo or Oxus, extracted from the Journal of Mr. E. GARDINER.—*By* M. P. EDGWORTH, *Esq. C. S.*

It has nineteen principal branches above Oomshurk, which will be enumerated from the S. to E. and so to N. Oomshurk is an independent fort on S. bank of the river, one day W. of Kulef, a fort on N. bank, four days W. of Thermaz, which is four days N. of Balkh, and $1\frac{1}{2}$ S. of some extensive ruins of an old city named Thoor, said to be the largest in Turkistan :—burnt clay idols, walls eighteen yards thick, of polished stones without cement. It is at the S. entrance of a pass in the Thoor hills which run E. to W. or N. W. to S. E. from Shoobrisubz by Mapak mountains and Koh-i-pak, Shamror and Allghoor, the fort of Karbana to Falungir, and through the desert of Woormoor; wind S. to Thalukhar and S. to Khan Durra, and then E. along river Bhoongee to the Esh and Geth districts, where they join the Hindoo Koosh.

1. The Daha kash (or Akroo) rises at Dehan, a small fort at base of Ghoor mountains $1\frac{1}{2}$ day to Nilung; thence N. E. to Khandak, a large but ruinous fort, where it is met by the Zuz, which rises at Shah kool one day W. of Dehan (which is one day from the first fort met on emerging from the Khilzye country, and from the mountain called Shah Shoorwa by Khilzyes and Nak by Therbas, from whose snows the Moorghab or Dorub rises); thence the united streams run N. N. E. to Ghoor—N. E. to fort Janbuk four days, N. E. $2\frac{1}{2}$ days to fort Khasbin, two days N. E. to Soorbhwa; whence it in heavy

floods is able to cross the sand one and half day to Molbergan, where it falls into the Andi Shia.

2. The Andi Shia rises near Aboon and Killabeg, two days W. of Bamian, then runs N. W. to Auk, Pinchoo, Yooknoo to Nasbeen, where it receives a small stream, the Tanab (which rises at Killa-khoor three days W. N. W. of Bamian) ; thence N. W. to Thahsult, where it receives a small stream from S. W. called Awa ; thence Peelkoo, Bulk and Bala, where it winds to N. and runs between the Yusuf range and the Thamoo hills; thence to Khroon, Bulkh-al-paieen, Lashar, Charkhund, and Oombsir, a large fort on W. bank one day E. of Ghoorzewan; thence by Dehkael, Boieen-i-kur, Oodook, where it receives a stream rising at Nasheb in the Thaa mountains ; thence N. to Hood and Derra Guz by Killa Shah, Mollbryan *(vide infrà)* to Pookool, where it begins to be exhausted in irrigation round Balkh, but in floods it passes N. N. W. of Balkh by desert of Now-shahak by Bahool, Fahish to Oomshurk.

3. The Khooloom or Korth has two branches, the most westerly rises at Naishuk, a fort two stages W. of Khara Khooth pass between Kabul and Khooloon; the other rises at Jabun two days E. of the pass; they unite at Meeran and run N. to Fazaamth; thence to Shuhk and Rooee, by Tahal, Koor Koorum, by Vaij and Saharbag, Shehmet, Siri Koond, Dara-i-pirdar to Heibuk, where it is much used for irrigation, and meet the Naizaab, which rises near Maham in the Foorkoo mountains two days from the shrine of *Nab*. From Heibuk the Khooloom runs N. W. to Kheloodurr, by Khoom the ruins of an ancient place ; thence to Pechoo, where it receives the Mahud, which rises near a shrine—Mahood ; thence by Zart, Ghuzni guk, Syed Shah Balumby pass and a fort of Neekkoor and Koolon river to which it is joined by the Noonooal, a small stream from the S. E. rising from Zeib one and a half day S. of Aubdauk. From Khooloom it runs N. to Zooloom, Shah Killa, Ghaur Hásh, where it falls into the Amoo four or five days N. E. of Balkh.

4. The Soorkhab has seven sources.

1. The most westerly of these is the Kai-i-Kahi, rising near the salt springs of Thook in the Foobut district, one day N. N. E. of the Doondaur Shikum Pass. Thence it runs N. E. to Kool, by Kai Murd, E. to Ushon Shah and Dooshauk, Kool Ali Baush Koonth, where it meets the Akáb, which has two branches. 2. The Theh

rising near Dhoonko of Doordam peak, passing Zaimoo and Chaukbik where it meets the easterly branch which rises near Shinwur, and passes Noor, Syghan and Oozanub. 3. From Chákbik the Akthel runs to Bash Kosmust, where the united stream runs E. to Koor Dul, Kazi Pir, where it meets the main branch of the Soorkhab, which rises by various torrents of the Koh-i-Babo. 4. About the Hajíguk pass, the main branch rises near the caves of Ookurbut two days W. of Bamian; thence E. by Kafirghar and Bushbuk Koh; thence N. to Mishuk, where it is called the Noosh; thence to E. of Akroo hills by Huzrut Shah Ali; meets the Duraz from S. E. to Kazipeer, whence it is called Soorkhab. Thence N. N. E. to Kafir Maz and Kaha Baz and Byrah, where it meets the Hoor, which rises among the snowy peaks of Kafir Loo; thence it runs E. one day, then turning N. W. to Poosh, W. to Kroon, where are hot springs; thence to Gee, where it meets another stream from S.; thence W. to Bysah, where it meets the Surkhab. From Bysah the Soorkhab runs N. to Isope, where it meets the Dako (which rises two or three days S. E. of Kunghan); thence N. or N. E. to Reeuk, where it receives the Taha, which rises from the Thadur pass two and a half days S. W. of Thool. These three streams are frozen during five months of the year.

5. From Neeak N. or N. E. to Nawar and Dhorrhee, where it meets the Oondoo or Inderab. This rises at the warm springs of Kooth two days E. of Thool, thence to ---- Geth, where a great part is lost in a subterraneous abyss; thence to Kishnaz, where it receives a small stream rising west of Thool,—to Noorial and Dooshee. Thence the Soorkhab runs N. E. to Shah Nanoo, a great shrine, with salt and bitter springs; thence to Oosl, Ghorighar; thence N. to Kith, it meets the Hooz (rising at a place called Ishoon); thence by the fort and through the pass of Bush to fort Khan Mirza by Kaum, Kimish; N. to Shah Beg and Koondooz just below which it runs into the Zoouk or Aksunn.

6. The Esh, Doolgeth, Oorgeth or Abigeth river rises a day's march S. of the Kafir city and caves of Esh and, collecting the waters from the adjoining Geths, runs N. W. to Shoone; thence to Ashur where it is joined by the torrent of Naoo (part of which is first lost in the Naoogeth); thence to Khoorrum where it is joined by the Bhohog.

7. The river called Bhoongee rises at Ooslot, a Maur fort N. of the great range and five days W. of Chitool; thence W. through the Maur country to Nouvahi Kaffir, where are three gigantic idols in caves, one said to be twenty-one times the size of nature. Thence by Dur or Durra Ooth, where there is a remarkable vortex and subsidence in the river Ooth; what is not swallowed up, joins the Bhohog; thence to Ooslut by the Usbec fort of Kran; thence Khoonroom, *(vide suprà)* having received the Esh N. W. to Ispo through mountains and uninhabited tracts to the pass of Durra Ishol N. W. to the brine-springs of Zee, N. to Durdan, Shah Donoz, where it falls into the Zohak, one day W. of Washi and Thaligam.

8. The Shahageth or Thal rises towards S. E. in the peaks of Maur-i-Moo; its two branches issue from the Durra Toork and Durra Faharang, and unite at Thang-i-Krai, near which are said to be lead and iron mines; these are now neglected and are four days W. of Boodookshun. Thence it runs N. W. to Shahgeth, a famous shrine of Kahika; N. W. to Zun-i-buk and Poorth Kra, where the Zain joins from S., rising also W. of Mahar-i-Moo; thence W. by fort of Tak to Hoon and Thalee Khan, and meets the Bhohog at Shah Oomoz, which is a short day N. E. of the shrine of Joh, formerly a Kaffir place of worship; thence N. W. to Wahi and Khanabad where the river is generally called Zohak; thence to Pithoor and Koondooz, where it receives the Khooloom (v. s.), whence it takes the name of Ak or Akserai; N. W. to Goomsur and Akserai; N. W. to Pathoor, Thaloom and Peer Shah Haj where it meets the Amoo.

9. The Guldarsh or Goolsind runs in the Pâk mountains one day S. E. of Thrain-koh and Moongam; thence N. W. to Kas Abi, Roobnea (four stages from Budukhshan) to Koouk, Koh-e-thog N. W. to Goolsin; thence to Zurbab, where it falls into the Zoon. This river is famous for the rubies found in its bed and neighbourhood.

10. The Zoon rises at Taioork, a place famous for jewels, one day N. of Moongham in the Pâk mountain, three days S. of Boodookhshan; N. W. to Nomah or No, the ruins of an ancient massive building one hundred yards square, and one hundred high, the first twenty yards built up with well polished blocks of stone, about two yards square. It is not quite square, the North side having an angle in it ⋀ so—the circumference is four hundred and twenty yards, and

it is half a mile from the river on S. bank, and three stages S. of Boodookhshan; numerous clay idols are found in the ruins around. Thence the river runs to Wambik where it meets the Tha; thence N. W. to Peeri Moor, a famous old shrine now in ruins; thence to Futhook, where it receives another stream from the S. called *Be ab.* Thence N. W. to Zur or Zurbab, where it meets the Goolsind (v. s.); thence N. to fort of Zoon, where the river is called Aizoon; runs through hilly barren tract to Boloo, an old fort with extensive ruins on the top of a high hill—there are large springs and a place of pilgrimage there; thence N. W. to Weisoon, where it falls into the Boodookshan or Aiksah river.

11. The Aiksah or Kauksahee rises near Thool, a hill fort three days N. of Dharaheem, whence it runs S. to Komu, winds W. to Naum (where there are coal-beds and iron), thence to Erg and Koanch, where it meets the Gaihi (which rises one and a half days to the N. in three small lakes called Ghâl, surrounded by the Kash hills). Thence the stream receives the name Khah, and runs S. and S. W. to the pass of Dur Bohoom, where it meets the Nu-e-choor (which rises in the E. at Ghâz in the Dharabim mountains two stages W. of Dharahun, and thence runs by the caves of Aurooch, near which are good lead-mines,) thence by Peus fort to Dur Bohoom; thence E. to Yoath where it is joined by the Yontee (rising in the mountains of Kalkroosh, passing Maha ruins one and a half stage W. of the Ghal lakes). A few miles lower at Shei, it spreads into two lakes called Ehesh, on the N. bank of which is the hill in which are the caves of Esh. Thence the Khae runs N. W. to Háthus, where it is joined by the Hem, (which rises in the mountains N. of Chitral at Oogurk); thence N. W. to Yahab, to the lake of Noosh where it turns E., and through the Shoolee mountains and pass of Dâd, to Muz where it meets the Mooz (rising in Kalproost mountains and has a S. W. course through the Shooli range). Thence N. W. to Ooshuk where it is called Aiksah,—to Boodookshan, where it is first called Khaksah; two miles N. W. of the city, it is joined by the Shohi which rises N. E. in the Shoolee mountains. Thence it runs past the ruins of Eshka Kall where it receives the Shood, which runs in N. E. at Shush in the Shoolee mountains, three days N. E.

The Shood from Sheesh runs along the Shooli range to Pauk

where it is joined by the Ghanooz (rising in N. W. out of lake Ghanooz) ; thence S. to Maieel to Fort of Ushk or Eshk (v. s.) ; thence N. W. to Shauluk, three days through barren regions to Fort Oorg, to Goorp where it is joined by the Goorp from N. W., rising in Mahash mountains at Savrek, three or four days W. of Bolor (the Mahash is a northern continuation of the Shoolee mountains) ; from Goorp the Khauksah runs N. W. to Oomar, where it is joined by the Bhahath, which rises E. at Thei-i-Bolor and runs W. through the Mahash and Shoolee mountains through the Malk pass, through the barren Shoolee district to Geheez, and thence to Oomir, (v. s.) Thence the Khaksah runs through a hilly country to the fort of Kan-ook, where it is joined by the Kauksoo which rises near the ancient city of Shoh which is about four days N. N. W. from Bolor and two days W. N. W. from Ghâr-look ; thence the stream runs to Areekuk or W. base of Shoolee mountains S. W. to Peor, where it receives a small stream from E. ; thence S. W. to Kaul where it receives another stream (which rises near Nokoo and runs due west through the pass and by the fort of Akm, and so W. to the Kauksoo, which runs on through an almost uninhabited tract to Khaksah, (v. s.); from Kanook the Khasal now called the Boodookshan continues N. W. to Abba Nooz,—to Weizoon where it meets the Goolsend or Aizoon ; thence W. N. W. to Warhook ; W. to Khoja-haur where it meets the Loorkhalas, and runs N. W. to Boolgwa and Yayaan-ossa where the Shamoo or Bolor joins it.

12. The Shamoon or Bolor rises at Ooknumu on the north side of the Kalkroosh mountains, and about two days' march S. from Bolor ; thence N. by Bolor and through its valley to the pass of Durraroz, on which are the old and large ruins of city and fort of Roz ; thence to Boorglass, another ruined city and fort ; thence N. to Shoshun where it is joined from E. by the Shun stream, rising at Pebhaik three days E. of Bolor, and running thence by Dazee to Shosun. (v. s.) Thence the Shaumoon proceeds to Barad, where it meets a stream so called, rising two and a half stages E. at Prahoo ; thence N. W. to Gauzool and Ghaurlook where it is joined from the S. by the Koho rising three days march S., at mineral springs near Kohoo a day S. of Khazur ; N. to Talan an Akâ fort one and a half day east of Shoh. This fort is considered impregnable, being situated

on the tops of inaccessible peaks ; it is as old as Shoh ;—N. to Cheoor about ten miles N. E. of Shoh where it receives the Shoh ; N. W. to Oolook, through the Durra Drewas pass, and N. W. to Aleek where it meets a stream which runs along the pass from Thooroo at its eastern extremity ; thence to Boorth, a Musalmán shrine, below which it receives the Khokhoom, rising E. N. E. in Kok, a fort in Bolor mountains N. to Nath, where it spreads into a lake called Boom Kull by Akaas, and Disrik Kull by Mahomedans. The river here forms three channels—the most northerly pass Boom Baimeer, winding round to W. to Esurk, receives a small stream of that name from N. rising at Nashh, and receiving after heavy rains the overflow of the Kara Kul lake, and running through the pass of Roouk to Esurk ; thence W. and S. W. by Zath and Khybut where it receives the Zath from N., rising in the Akaa range two stages from the lake Riaz Kul. Thence the Bolor runs S. or S. S. W. clearing the great range at fort Shameek, and thence S. W. to Wackund, a large Usbec fort on W. bank ; thence to Peeraz, where it is joined by the Roon from the E. rising at Hazur in Shoolee range two days' march E. of Walfo ; thence S. W. two stages to Akanoon, where it is joined by the Thooz, which rises a stage west of the Ghar lake at a marsh called Seosoo ; thence it runs N. W. through the great Shoolee range S. W. of Shoh W. to Preakgau, to Kheal or Keelâk, W. by Irsh to Akanoon where it meets the Bolor : thence the Bolor runs S. W. to Asoo, Yarga Oop, where it meets the Soorkhab, and thence they flow together to S. W. by Chuktee and Khoojawur, where they fall into the Ab-i-Ma or rather being there joined by the Boodookshan take the name of Abi Ma or Amoo.

13, 14. The Soorkhab has two main branches rising N. E. of the Nonaut Kau peak ; runs thence by Malpoort, where it meets the Abkoor from lake Khiangkul ; thence S. and W. to Shinwar, where it meets the Oosh from E. from lake Kara Kul ; thence S. by Khara Tagoon, S. W. to Auspek, where it meets the Numa rising at Taux to N. W. ; thence S. by Nahamoot, Boolgwan, Yarghan and Ooppa, where it meets the Bolor river.

15, 16, 17. The Kaffir Noshan runs a day's journey to the S. of the pass of Dostara under the peak of Nonaut Kaw. The Hoon

rises at Zeenoo, runs thence to Taux where it is joined by the Molpooth rising in mountains of the same name, passing Shoon and Kaffirnoshan; thence S. to Shiroog where it is joined by the Zerâb or golden river, which rises also to the N. E. in the Malpooth mountains. From Sheroog to Hazar and Shadman, and running thence, I met the Amoo at Tahoo Thun.

18. The Dawoo or Thoupalak rises at Raos about two stages W. of fort Oostam; thence runs through the Karatagh mountains by Kibbot, whence it turns S. through the pass of Rubuko by fort Ko, Kurm, Oora Dehi Noo, S. to Pelank through the pass of Dur Abdoola in the Thu range to Af, where it meets the Amoo.

19. The Zorab or Kootsind rises in the Komjuk mountains one and a half stage S. of Moabooll; thence runs S. to Soorda, about five miles E. of Bayesoom, S. to Killa Yoosuf, by Zauroock, and Sydabad, S. to Peer Koh by Ziarut Shah and Thekâ, Islamook, where it winds W. and S. W. through the Thoo range to Thoor where it decreases in the sand and feebly reaches Nohak. In times of flood its waters thence run S. W. to Choorkaba on the Amoo three days W. of Thermaz.

Notes on the Yarkund and Oxus.

The branches of the Yarkund commencing from the most easterly are—

1. The Kroo, rising at Pomboone in the Yagni Dhawam range, joins the main river at Yark fifteen miles south of Yarkund.

2. The main branch or Yarkund rises at Khai-i-tang in the Kara Khoom mountains, one day S. of Seraigooth, thence N. to Seraigooth, thence N. W. to Palkoom, and meets the Sahoon at Khakaloon.

3. The Sahoon rises at a place of the same name, two days W. of Seraighot, joins the river at Khakaloon. Thence N. W. to Shoonwak-Humlang, where it receives the Khoolkhan.

4. The Khoolkhan rises at Koolkhan in Karakhorum mountains, runs through the Asmoh and Kirghiz, and reaches the river at Humlung one and a half day above Yarkund, N. W. to Khoolan thence W. N. W. through the Asmoh and Kirgiz low forests to Assa, where it is joined by the Anashoog, which rises in the Peeloo

mountains one day S. of fort of Anushoog, and runs N. by Peeloo fort through the Ashahoon pass, and the districts of Mángáun, to Asa. The united river, now runs N. W. through the Ame district along S. of Yagni Dhawan range to Yagne, where it meets the Dowlutsooeh river, which itself has four branches.

1. The most easterly of these is the Ashoohun, which rises West of the Ashoohun pass; thence through Dowlutsooeh; meets the (2) Hautehkoot, which rises mainly from Lake Toong, a day's march N. W. of Hautehkoot S. W. to Tamor; then turns E. and S. E. to Manlook, then to N. and N. E. to Yahoog, where it meets the Ashoohun, two and half days, N. E. of Hautehkoot; thence N. and N. E. by Polum two days N. N. E. of Yagne, where they meet the Selekute.

3. Selekute rises at Jam one day N. of Poosht-e-Kaus, thence by Selekute, and thence E. to Lake Zál, where the Dhan meets it from the S. also, rising one day N. of Pooshtukar. From Lake Zal E. S. E. to Polum, it meets the Dowlutam, which thence continues E. one and a half day to Maloo, where it meets the (4) Aushak, which rises W. of Kashauk at base of Yagni Dhawan, thence through great barren plains to Malor. Thence the Dowlutsud runs E. through the Mangan range, and joins Yarkund at Yagni.

The Yarkund thence runs N. W. three days to Aneuchan where it receives the Chimb, which rises one and a half days more W. thence. Then the river forms an angle and runs N. E. by Ashelook to Yarkund.

Note on the Ranges and rivers N. W. of Indus and Gilgit.

The 1st or most northerly is the valley of Pinghit or Ustikhan or Zairauneh, where the E. branch of the Kanka rises.

2. The Spung valley, an easterly continuation of the last; in it is the Spung lake and source of Ankahoo.

3. The large Peeloo valley.

4. The Ashnoog, S. E., and divided from the East by the Anaushoog mountains.

To the south of these valleys lies the Peeloo range, whose name however varies in different parts of its length. Most north-westerly it is called Pingut, then Spung or Makoo, then Peeloo, and the easterly portion Meúl Ho or Anaushoog S. E. of that Hunzye, and further on Khangram or Bulti, sinking away into the Oskardo hills.

To the north, these valleys are bounded by the Tso-hung-lung or Kara Korum mountains, which goes by various names likewise. At its west end, where it joins the Bolor mountains, it is called Kânchgir. East of that Poosht-i-Khaur E. S. E., thence Appro (in which there is a large fort). To E. thence, the Great Spung. Thence eastward Ashahoon or Ashur ; thence eastward, Thalshool or Krana. Krana itself is a beautiful peak, remarkable for striped ribbon jasper, olivine and chrysopras pebbles found in the beds of its streams. From Krana a considerable range runs down to Bullisthan called Kai-e-Kah. Here are beds of coal near the ruins of an ancient city called Shah Taslif, or anciently Liháf or Leefoo.

The Kai-e-leh is mostly slaty formation. In it are marble quarries, and alum and salt are extracted from some places in small quantities at the eastern base, and large quantities of borax : Leefoo is four or five days due north of Iskárdo.

From Krana eastward the range is called Kara Kurum to the source of the Chorere river, whence it takes the name of Thosung-lung.

The Bolor mountain rises almost N. and S., commencing in the north of Zálnoohee in the Joolkal district, which is four or five days south of Balook Bara, a great lake ; thence south by the fort and district of Zoonáu, which lies to the N. E. of the Pingut range, treading N. W. or S. E. two marches and 8-9 Long. at its south, it is called Poosthekán. To the north it is bounded by the Yoog Uhoog mountains, which commences at Pashee two days N. of Julmookhee and seventeen S. of Balook Bhara ; it tends S. E. and joins the Kara Koorum near Hatch Kooth. N. and E. of Uhoog is the valley of Poosh bounded to N. by a spur of the Yagnee Dhawan mountains, whose westerly extremity commences at a day's march or a little south of Ausgess ; thence it runs S. and S. E. to Othe, thence to Koum and Kharakool, then turning more easterly runs to the S. of Ooshkumnak and Doonshoo ; (mostly uninhabited save by a few wandering Akaas) : thence it runs E. S. E. to Anewchán Asa Mahazâr, thence most southerly to Wahon, Munaham and Khamkoom, when it dies away on the plain of Vacha Thung.

5. The fifth valley is Naw Aloon or Ooloor, due south of Pingut, and divided from it by the Zinpanooch range. It belongs to

Muhammedan chiefs, but is mostly inhabited by Bolorees and wandering Shoolees.

6. The Darahm valley due S. of Lat, and separated by the Dormah range, it is one of the best cultivated of these valleys, and belongs to independent Muhammedan chiefs.

7. Rewanshoor valley, small, to E. and S. E. of the last, on north bank of the Gilgit; it is, though small, well cultivated, and gives good produce, especially wine and fruit.

8. Booloo or Boolooper, a narrow slip, about two days' journey in length, from the Gilgit river to N. E.

9. Gilgit Proper lies on both sides of the Gilgit river from Booloopor to Ooster and thence along N. bank to Shooghoor on the Indus.

10. The Tangoot valley, considered a dependency of Gilgit, is divided from the Bulooper by the little Gilgit range.

11. The Hunzaye may be considered as an eastern continuation of the last, from which it is divided by a small bare rocky range called Hai cha. It runs east and adjoins the Bulte Province, whence it is separated by the Hunzaye part of the Peeloo range.

12. Mâr drâl Choo or Drale to N. and N. E. of Hunzaye, whence divided by the Peeloo. It is a dependency of Baltistan, and bounded on N. by the Karakoon, and E. by Kai ekah mountains, and ends in Iskárdoo proper. The southern portion is most bare, producing nothing but borax. The Koobeloo district commonly called Lubra or Nubra or Nobra, may be considered as a large valley bounded by the Kara Khoorum mountains on N. or W. by Kai-e-Kah, S. by Indus and Kai-e-Kah, E. by the Nubra range; two northerly branches of the Indus run through this. The most westerly is the Koobeloo, which rises by two small branches in the Kara Koorum mountains. The most westerly of these is from a lake called Kaufeloo. The other is from large springs two days' stages from the lake, after these two branches run south to Nishtung where they meet, and the river thence passes the fort of Fo, thence turning W. for three days breaks through the Kai-e-Kah and joins the Indus at Khanthool about one and half day E. of Ooskardo.

The other river—the Cheoera rises in the Kara Khoorum at some large spring one day east of those which are the E. sources of

Koobeloo. Thence it runs S. along the base of Loobra mountain S. W. through Loobra plains and meets the Indus at Budgnak about twelve miles below the fort of Hemap.*

Early Hindústány Poetry.—*By* A. Sprenger, *M. D. Secretary Asiatic Society.*

In a former number of this Journal Vol. 21, p. 513, the Rékhtah verses of Amyr Khosraw have been adverted to. I have since met with an important passage in the Tadzkirah of Mohammad 'awfy, for which he collected materials in A. H. 600. He says in speaking of Sa'd aldawlah Mas'úd:

اگرچه مولد او همدان بود اما چون همه داني كار اورا در بلاد مشرق طراوت داد و ذكراو از فضلاء اين عهد بر آمد و در كتب تواريخ اورا از جملهٔ شعراى اين بلاد داشته اند بدان سبب ذكراو دراين باب آورده شد ونيز حق او آن بود كه اورا در زمرهٔ صدور آورده شدى فاما چون اشعار او از جمله شعرا زيادت است واورا سه ديوان است يكى بتازي ويكى بپارسي ويكى بهندوي بدان سبب اورا در سلك شعرا منخط گردانيده اند

"I have mentioned this poet in this place (i. e. among the poets of Ghaznah) though he was a native of Hamadán, because providence has so willed it, that he should distinguish himself in the eastern countries, and his life is connected with that of the learned men of that age, and because in historical works he is considered a poet of Ghaznah. He had a claim to be classed among the nobles who have written poetry, but he has written more poetry than most professional poets, having left three Dywans, one in Arabic, one in Persian, and one in Hindúy, and for this reason I mention him among the poets."

Khoshgú, Vol. I. No. 34, confirms this statement:

امير خسرو دهلوى در ديباچه غرة الكمال اورا بسيار ستوده و گفته كه درسه زبان عربي فارسي و هندي ديوانهاى ضخيم دارد

"Amyr Khosraw of Dilly (died in A. H. 725) praises him very highly in the preface to one of his works, and says that he has written three thick Dywáns, one in Arabic, one in Persian, and one in Hindy."

* The orthography of the MSS. as far as it could be made out has been carefully preserved. Eds.

The terms Hindúy and Hindy in these two passages mean the language in use among the Musalmáns of India. I need hardly say that the terms Zubáne Urdú, court language and Shi're Rékhtah are very modern. The former of these terms is but very rarely used by natives of India and the latter is already obsolete, the usual term even now applied to the language and poetry which we call Hindustány is Hindy, and always has been "Hindy." The very name of "Dywán" which is given to Mas'úd's collection of Hindustány poetry is a guarantee, that it did not consist of Slokas, Kabits, and Dóhrás, but of Mathnawies, Qaçydahs and Ghazals written in the Persian character.

As to Mas'úd himself. His name is Abú-lfakhr Mas'úd, a son of Sa'd and a grandson of Salmán and his titles were Sa'd aldawlah and 'amyde ajall. By the latter of these titles, he is named in a poem which Sanáy has written in his praise:

ای عمیدی که باز غزنین را صورت و سیرتت گلشن کرد

The statement of Mo*h*ammad 'awfy that Mas'úd was born in Hamadán is supported by the author of the Haft Iqlym, and he says himself that his origin اصل was of Hamadán. But it seems that he means merely that his family was of Hamadán, and that the above two authors have been misled by this statement. Dawlat-sháh believes that he was of Jorján, but Taqyy Káshy shows that he was born at Ghaznah and, surrounded by Hindú slave women as the Mo*h*ammadan nobles of Indian courts always were, it is not unlikely that the language of India was his mother-tongue.

His father Khwájah Sa'd was a noble at the court of Qábús of Dylam, the son of Washamgyr. He left Jorján and went to Ghaznah for reasons which are not recorded. Mas'úd was born towards the end of the reign of the successor of Ma*h*múd and grew up at the court of the Ghaznawides, and being a great financier he attained to the highest distinctions and was made Mostawfy and Munshiy of the kingdom. But he had his downfall, and he had the misfortune to be imprisoned in the fortress of Náy نای for twenty-two years. The cause of his imprisonment is variously stated. Some say that he was arrested by order of an Amyr (military leader) of the name of Qomáj, when on a deputation to Systán and Zábulistán, because the mind of the King was poisoned against

him, owing to some suspicion against his fidelity in the discharge of his duties. But Nitzámy 'arúdhy states in his work which has the title of چهار مقاله *apud Taqyy Káshy* that Sayf aldawlah Mahmúd a son of Sultán Ibráhym was accused of having formed a plan of joining the court of Malikshán, and that he was (in A. H. 472) cast into prison on this account, and put to death in it. His friends, the most intimate among whom was Mas'úd, shared his misfortunes. Mas'úd however regained his liberty after twelve years, but subsequently he had to endure eight years more of incarceration owing to the roguery of Abú Naçr. When he regained the second time his liberty, he withdrew from the world and devoted himself to the service of God. He died in 525. He was acquainted with many of the earliest Persian poets, most of whom sung his praise; among them are Abú-l-Faraj Rúny, who was his teacher, Mokhtáry of Ghaznah and Mo'izzy. Unfortunately none of his Hindústany compositions have been preserved, though it is very probable that they were still extant when Amyr Khosraw wrote. Taqyy Káshy has seen his Persian Dywán which contained about six thousand verses, and he has embodied no less than 4,650 of them into his Tadzkirah.

Report on the Geological Structure and Mineral Wealth of the Salt Range in the Punjaub; with Maps, Sections, &c.—by Andrew Fleming, *M. D. Edin., F. R. S. E., Assistant Surgeon, 4th Regt. Punjaub Cavalry. In charge of the Geological Survey of the Salt Range in the Punjaub. Season* 1851-52.

(Communicated by the Govt. of India.)

(Concluded from Page 368.)

On the Korana Hills.

From the central district of the Salt Range and apparently running parallel to it, an isolated barren range of hills called Korana is seen rising out of the plain of the Jetch Doab or district between the rivers Jhelum and Chenab.

The highest point of this range is about forty-six miles S. S. W. of Pind Dadun Khan, and about twenty-four miles south-east of the civil station of Shahpoor.

When in the Salt Range near the latter place, in the month of January, I took the opportunity of paying a flying visit to Korana,

which, from the abrupt way in which at a distance it appears to rise out of the level alluvial plain, I supposed might turn out to be of volcanic origin, and might assist us in arriving at a conclusion as to the agency by which the strata of the Salt Range were elevated into their present position.

From the Jhelum to Korana is one uninterrupted alluvial plain called the "Bar," about six hundred feet above the level of the sea, thickly covered with a jungle of caper, pelu and mud, through which, from Shahpoor, a four hours' ride brings one to the foot of the hills. In this district there are but few villages, and the scanty population consists chiefly of thieving Beloochees, who, with their flocks of camels, bullocks and buffaloes, wander about the Bar, remaining in any one place only as long as food and water are procurable. For the latter, they are chiefly dependant on rain which is collected in holes or tanks dug out of the alluvial soil.

Two wells have been dug in the interior of the Bar on account of the great depth at which water is reached and its generally saline character.

The aspect of a range of hills which Korana from a distance presents, gradually disappears as we approach it, and we were not a little surprised to find that it consisted of a succession of isolated ridges of stratified rocks of various sizes, running parallel to each other and rising abruptly out of the plain, studding this over a space of some six or eight miles, and extending towards the Chenab in the neighbourhood of Chineout.

As we could only devote one day to the examination of these most singular rocks, our attention was devoted entirely to a portion of the principal ridge to which all the other smaller ones are apparently similar.

The Korana hill, on the summit of which is the residence of a highly venerated Fakir, consists of a ridge of rock stretching from north-east to south-west, and about two miles in length. By the Thermometer, its height is estimated at nine hundred and fifty-seven feet above the plain at its base. It presents a steep slope to the north-west on which a few stunted Phoolahee bushes have taken root, and an escarpment to the south-east. It has a peculiarly black volcanic appearance.

The ridge is entirely formed of a coarse brown ferruginous quartzose sandstone alternating with beds of a greenish quartzite, which in many places passes into a siliceous clay slate. These beds are all distinctly stratified and dip to the north-west at an angle of from 40° to 45°.

The sandstone is traversed by numerous veins of white quartz containing masses of rich hæmatite iron ore, which do not seem to have attracted at all the attention of the natives as a source of iron, although it can be obtained in considerable quantity, and ought to yield from seventy to eighty per cent. of metal.

Filling small cracks in the sandstone some small specimens of pyrolusite or peroxide of manganese were obtained. This, when powdered and treated with hydrochloric acid, gave out chlorine in abundance, and when fused with borax in the oxidating flame of the blow-pipe gave an amethyst-coloured glass. It occurs in thin detritic laminæ of a steel-grey colour with a strong metallic lustre, and which exhibit a black streak. This valuable mineral was not detected in any of the quartz veins; but as it very generally occurs associated with hæmatite, it is not improbable that it may be found. It is nowhere an abundant mineral, and as it is in great demand for the manufacture of glass and for bleaching purposes, and fetches a high price in the market, it would be of great importance were a workable lode of it discovered.

No fossils could be detected in any of the strata which, from their mineral character, we are disposed to reckon as lower Silurian or Cambrian, the lowest of all fossiliferous rocks and subordinate to the salt formation of the Salt Range.

From the general parallelism of the Korana ridges to the Salt Range we think it most probable that at one period, the latter had extended in breadth across the plain of the Punjab, from which, by disturbing agencies and extensive denudation, the softer strata have been removed, leaving only the harder and quartzose sandstones of Korana as monuments of its former extent.

From Korana eastward to the foot of the Himálayas at Roopur we are not aware that a single rock occurs; nay, we believe that a traveller might search in vain even for a pebble in the sun-baked alluvial plain of the Punjab Doab.

As far as we have observed no out-bursts of plutonic or volcanic rocks occur in connection with the Korana strata, but the injection into, what probably were, rents in the sandstone, of pure quartz veins containing metallic ores, indicates their having probably been subjected to igneous agency. The limited time we had to spare did not permit of a more extended and careful examination of so interesting a formation, barren and uninviting though it appears to the eye of any one but a Geologist.

In conclusion we may remark that quartz vein penetrating slaty strata similar to those of Korana, have, in almost every part of the world, been found to be the principal source of the richest metallic ores. Gold ore is almost always found in quartz veins penetrating the most ancient fossiliferous and metamorphic strata, but as that metal is invariably found near the surface of its vein-stone, mining gold has never turned out so profitable a speculation, as washing its "dust" from the debris of its vein-stones in the alluvial deposits at the foot of auriferous ranges. We never have heard that gold was ever seen in the alluvium at the foot of the Korana hills, but the locality is one where we should expect to find it.

The metamorphic strata of the western Himálayas towards Cashmere, where they are so extensively invaded by igneous rocks, are certain to be found, when duly examined, to yield rich metallic ores. The difficulties attending investigations of the kind in such elevated localities are, however, very great. Hitherto the field may be considered as untrodden.

Approximate heights above the sea level of localities in or near the Salt Ranges referred to in the accompanying report, calculated from the boiling point of water.

Locality.	Approximate height in feet.	Remarks.
Mount Tillah,.....	3,277	Pucca Tank on Summit.
Gurjok Hill above Jelalpore,.....	1,882	
Plain at Jelalpoor, ...	619	A little W. of village.
Plain at Jutana, ...	619	
Pind Dadun Khan,.....	608	Plain near Fort.
Top of Koossuck Fort, ...	2,547	At the Musjeed.
Tober Musjeed, ...	2,141	

Keurah Deputy Collector's House,	1,183	Built on Salt Marl.
Chooa Leydun Shah,	1,871	Fakir's Bagh.
Kuringuli Mount,	3,234	
Kutass,	2,155	Field W. of village.
Dhur Range,	3,130	High Point, 2 miles W. of Dehriala.
Noorpoor,	2,288	Beside village.
Mount Sikesur,	4,990	Old Temple on Summit.
Oochalee in Souc Valley.	2,404	A little above Salt Lake.
Kutha Moosoul,	627	
Nullee,	683	A little below village.
Kheree Hill above Nullee,	3,090	
Chideroo,	660	Below village.
Zamanee Hill above ditto,	2,602	
Mooza Khail,	777	Plain between Town and Salt Range.
Maree on the Indus,	633	
Maree 2nd Observation,	636	
Top of Maree Salt Hill,	1,196	An Old Temple.
Summit of Dinghote,	2,746	
Bahadur Dok village,	4,493	Right bank of Indus above Kaffir Kote.
Kaffir Kote Range,	1,602	High Point N. of Old Fort.
Mount Drengun,	3,710	Trigl. Survey Station.
Besharut village,	2,884	Below Tank.
Mount Diljubba,	2,872	Trigl. Survey Station.
Jhelum Station,	671	
Summit of Korana,	1,565	Near Monastery.

The thermometers used in obtaining the above results are made by Newman, and furnished from the magazine of Fort William.

It is to be regretted that they were dispatched without their zero error being accurately ascertained, by comparison with an authentic standard thermometer or barometer. They are divided into $\frac{1}{2}^{\circ}$ divisions, which can be read off to $\frac{1}{4}^{\circ}$ with tolerable accuracy.

Having fixed the height of Pind Dadun Khan as six hundred and eight feet by the barometer, we were enabled thus approximatively to determine the amount of error in the thermometers, and to apply it to correct our results.

In this way they come wonderfully near to the heights obtained by barometric observations.

The small liability to accidents and the portable character of the mountain thermometer as well as the ease with which, in almost every situation, an observation can be taken, render it a most invaluable instrument to an Indian traveller.

The tables we have used are, we believe, those of Prinsep as given in Colonel Jackson's useful book entitled "What to Observe."

Approximate Heights above the Sea Level of Localities in or near the Salt Range, referred to in the Accompanying Report calculated from Barometric Observations.

Date.	Locality.	Hour of Observation.	Barometer unreduced, corrected for capacity and capillary action.	Attached thermometer.	Detached thermometer.	Approximate Height in feet.	Remarks.
Dec. 25th, 1850.	Summit of Mount Tillah, ...	1 P. M.	26.806	57	54	3,270.88	The Barometric observations from which these results were calculated, were made by Mr. Purdon 1st Asstt. previous to my joining the survey.
Jan. 9th, 1851.	Dundhote, ...	1 P. M.	27.701	60	58	2,351.12	
,, 27th, ,,	Old Temple summit of Mount Sikesur, ...	2 P. M.	25.080	62	60	5,128.9	
Feb. 20th, ,,	Kalibag below the Town, ...	2 P. M.	29.380	70	68	641.8	
,, 24th, ,,	Summit of Kalibag Hill, ...	Noon.	27.809	81	74	2,356.68	
,, 28th, ,,	Kothee entrance to Chichalee Pass, ...	8 A. M.	28.755	64	64	1,147.59	These results are probably too high, as the Barometric column was unnaturally depressed before a gale.
,,	Highest point of Chichalee Range N. E. of Kothee, ...	1 P. M.	26.50	75	72	3,628.80	
March 3rd, ,,	Maree on the Indus, ...	7 A. M.	29.383	56	56	609.3	
,,	Temple, summit of Maree Salt Hill,.....	8 A. M.	28.841	68	66	1,221.1	
,, 8th, ,,	Nummul N. side of Salt Range,	9 A. M.	28.900	72	74	1,173.75	
,, 9th, ,,	Dok N. W. flank of Mount Sikesur, ...	11 A. M.	28.179	74	74	1,950.63	When these observations were made, weather was unsettled and cloudy.
,, 10th, ,,	Old Temple (Lingasun) Mount Sikesur, ...	Noon.	25.104	69	68	5,221.00	
,, 15th, ,,	Moosakhail Plain N. E. of Town,	9 A. M.	29.233	63	63	706.22	
,, 21st, ,,	Arub Village, ...	7 A. M.	27.532	60	61	2,233.	
,, 21st, ,,	Old Temple summit of Mount Sikesur, ...	Noon.	24.939	62	60	5,136.9	

Table of Approximate Heights calculated from Barometric Observations—Continued.

Date.	Locality.	Hour of Observation.	Barometer unreduced corrected for capacity and capillary action.	Attached thermometer.	Detached thermometer.	Approximate Height in feet.	Remarks.
Nov. 14th, ,,	Jhelum, Cabin of "Conqueror" Steamer, ...	10 A. M.	29.368	60	60	684.5	For this and the following Barometric observations I am indebted to the kindness of Lt. Grounds of the Indian Navy, who was engaged last cold season in a survey of the River Jhelum. His Barometer was a perfectly new Newman's Patent Mountain Barometer in excellent order, and was suspended in the Cabin of the "Conqueror" River Steamer, about 6 feet above the level of the water in the Jhelum.
,, 7th to 16th, ,,	Ditto ditto (mean of 10 observations), ...	10 A. M.	29.370	63	63	671.2	
Dec. 25th, ,,	Pind Dadun Khan "Conqueror" Steamer, ...	10 A. M	29.519	60	60	616.11	
,,19th to 25th, ,,	Ditto ditto (mean of 12 observations,)	10 A. M.	29.514	59	59	607.9	
,,27th to 31st, ,,							
Jan 21st, 1852.	Shahpoor "Conqueror" Steamer (mean of 4 observations,) ..	7 A. M. to 2 P.M.	29.576	55	54	514.02	
,, ,,	Shahpoor, ditto ditto, ...	9 30 A.M.	29.576	50	50	Height of Korana above the river Jhelum at Shahpoor.	This observation on Korana was taken from an Aneroid, which had been previously compared with Lt. Grounds' Newman's Barometer.
,, ,,	Summit of Korana Hill, ...	9 30 A.M	28.620	54	54	911.15	
,, ,,	Ditto ditto ditto, ...	9 30 A.M.	28.620	54	54	1,469.4	
,, ,,	Plain at Base of Korana (mean of 2 observations), ...	7 A. M. 11 30 AM.	29.370	52	52	Height of Korana above plain at its base.	This observation was made on Aneroid, and was subsequently corrected to Barometer.
,, ,,	Summit of Korana, ...	9 30 A.M.	28.530	54	54	803 94	These observations were made on Lt. Grounds' Aneroid.

In calculating the heights I have used for sea-level observations those recorded in the Surveyor General's Office, Calcutta, as published in the Journal of the Asiatic Society. Provided with one instrument, this was the only course I could adopt. Galbraith's Barometric Tables, which are considered to be very accurate, were employed, and their extreme simplicity is a strong recommendation in their favour.

The instrument employed was a Newman's mountain barometer of the latest and most approved construction, furnished from the Arsenal of Fort William. It was safely conveyed from Calcutta to Lahore, in November 1850, attached to a Palki, and from thence was brought on to Maree on the Indus by Mr. Purdon, from whom I received it in the middle of February 1851. There was then but little leakage, and its indications seemed accurate until towards the end of March, when it commenced to leak very much and became quite untrustworthy. On examining into the source of the leakage I found it proceeded partly from a crack which had formed in the upper wooden part of the cistern, and partly from the side of the tube where it passed into the cistern; several plans were tried without avail to stop the leakage, and at last the mercury escaped to such an extent, as to admit of air passing into the tube.

By the contact of the escaped mercury with the solder which connected the vernier to the arm of the rack which moves it up and down the scale, the vernier became detached, an accident which never could happen if the arm of the rock and vernier were made out of one piece of metal. It is somewhat strange that an instrument-maker of Mr. Newman's celebrity, should not have guarded against the possibility of an accident, such as I have recorded.

In manufacturing mountain barometers for use in the very dry climate of the north-west provinces of India, it would be highly desirable that the wooden part of the cistern of Newman's barometers should be either entirely dispensed with, or be constructed of some thoroughly baked dry and tough wood. I very much doubt, however, if any wood will stand without cracking, the influence of the sun and hot dry winds of the Punjab in March, April, and May.

Another barometer of an old pattern without even a rack adjustment of the vernier, and set in a round mahogany case, which was

received in December 1851, on being taken out of its packing case appeared in good order. After standing in its leather-case for a day in my tent, its mahogany case warped so much as to bend forward the scale (metal) and impede the movement of the vernier. The first day I had occasion to take this instrument out, though carried with the greatest possible care, it leaked so much as to render the results obtained (in the absence of any instrument for comparison) utterly valueless. It is surprising that such an instrument should have been sent all the way from the Arsenal of Fort William to the Punjab for survey purposes.

A little more care in the selection, and speed in the transmission, of instruments required, would save parties engaged in scientific works in the N. W. Provinces from much trouble and disappointment.

List of specimens submitted to Government illustrative of the Geology of the Salt Range, &c. &c.

No.	Name.	Locality.	Remarks.
	Deooman Rocks, &c., ...		
1	Red Gypsum Salt Marl, ...	Pind Dadun Khan.	Contains Carbonate of Mag.
2	Metamorphosed Argillaceous rock with radiating crystals of Tremolite ? in patches on the surface of the Marl, ...	Pind Dadun Khan.	
3	Amygdaloidal variety of No. 2 with Geodes of Talc, appears like a metamorphosed sandstone, ...	Noorpoor.	
4	Variety of ditto ditto,.....	Pind Dadun Khan.	
5	Geodes of Talc in No. 3, ...	Noorpoor.	
6	Flesh-colored crystalline Gypsum.	Kerah Salt Marl.	
7	White Gypsum with Rock crystals, ...	Maree Salt Marl.	
8	Ditto with crystals of Iron Pyrites.	Khond.	
9	Reddish Rock Salt, ...	Pind Dadun Khan.	Most esteemed variety.

List of Specimens, &c., continued.

No.	Name.	Locality.	Remarks.
10	White Rock Salt, ...	Pind Dadun Khan.	
11	Glass Salt, ...	Kalibag.	
12	Old Red Sandstone above salt Marl, ...	Baghanwalla.	Is hygrometric and Magnesian.
13	Variety of ditto ditto, ...	Jubbee.	
14	Grey Argillaceous variety,.....		
15	Greenish Schistose sandstone with carbonaceous markings,.....	Chederoo.	
16	Variety of ditto ditto, ...	Mukraih.	
17	Quartzose grit in No. 15, ...	Chederoo.	
18	Dolomitic Band in No. 15, ...		
19	Dolomitic Calcareous sandstone, (lower beds,)	Mount Tillah.	
20	Variety of ditto, (Upper beds,)..	Mount ditto.	
21	White variety of ditto, ...	Baghanwalla.	
22	Yellow variety of ditto,.....	Chumbul Range.	
23	Upper Red sandstone, ...	Pind Dadun Khan.	Contains Magnesia.
24	Purple shale above 23, ...	Arub.	Contains copper-ore concretions.
25	Quartzose grit with grains of Carb. of copper in beds in purple shales, ...	Mount Sikesur.	
26	Ditto with nodule of copper glame,.....	Dokree,	
27	Copper glame concretions from No. 24, ...	Kuttha.	
28	Ditto ditto ditto ditto, ...	Ditto.	
29	Ditto in siliceous sinter, ...	Koofree.	
30	Concretion of sulphate of barytes in purple shales associated with copper, ...	Kuttha.	
31	Chert from Salt Marl, ...	Dwoda.	
32	Siliceous sinter with Agate, Carboniferous Rocks, &c., ...	Chooah Salt Marl.	
33	Calcareous sandstone, ...	Kaffir kote.	ContainsProductæ,&c.
34	Grey Limestone,.....	Ncorpoor.	Contains Encrinites, Terebratulæ, &c.
35	Black Limestone, ...	Moosahkhail.	Abounds in Orthis, Producti, &c.
36	Flesh-coloured Limestone,.....	Kaffir Kote.	Abounds in Encrinites and Palæozoic fossils.
37	Tubipore Limestone masses in No. 36, ...	Chederoo.	
38	Slaty Limestone, ...	Kaffir kote, &c.	Contain, Orthoceratites, Cratites, Ichthyolites, &c.
39	Grey Schistose sandstone above 38, ...	Moosahkhail.	Is Magnesian, fossils scarce.
40	Dark Argillaceous sandstone, ..	Kaffir Kote.	
41	Yellow Calcareous bed in ditto,..	Ditto ditto.	Contains Encrinites.

List of specimens continued.

No.	Name.	Locality.	Remarks.
42	Rain-drop-marked sandstone above 39,.....	Moosahkhail.	
43	Magnesian sandstone above 42,..	Ditto.	
44	Fine-grained Magnesian sandstone, ...	Ditto.	
45	Upper Magnesian Limestone, ..	Ditto.	
46	Ditto ditto ditto, ...	Chichalee Range.	
47	Yellow lithographic Limestone below No. 44,.....	Moosahkhail.	Contains a few indistinct Icthyolites.
48	Bituminous sandstone above No. 40 resting on decomposing Bituminous shales,.....	Kaffir Kote.	Yields petroleum.
49	Encrinital Limestone, same as 46,	Nullee.	Contains Oothoceratites, Producti, &c.
50	Brecciated productus Limestone, Oolitic Secondary Rocks, ...	Chichalee Range.	Contains Magnesia.
51	Yellow Argillaceous sandstone,..	Moosahkhail.	Contains impressions of ferns, &c.
52	Siliceous Quartzose grit, ...	Chichalee Range.	Contains pieces of carbonized fossil-wood.
53	Shell Limestone,.....	Mulokhail Chichalee Range.	
54	Clay Iron-stone from Shak alternating with beds of 52, ...	Mulokhail.	
55	Brown Calcareous grit; the grits having a metallic lustre, are probably the debris of Hypersthene Rock, ...	Chichalee Pass.	
56	Grey Cherty Limestone, ...	Mulokhail.	
57	Variety of ditto,.....	Chichalee Pass.	
58	Green Belemnite sandstone,....	Kalibag.	
59	Upper Quartzose grit, ...	Mulokhail.	
60	White lower quartzose grit, ...	Chichalee Pass.	Contains bits of carbonized wood converted into coke.
61	Fossil wood converted into Jet (Kalibag coal) from shales alternating with No. 52, ...	Kalibag.	Has been used as a fuel in the Indus Steamer.
62	Cherty Limestone from a mass resting on salt Marl, ...	Ditto.	Contains Magnesia in small quantity.
63	Ferruginous claystone (burnt bituminous shale).....	Moosahkhail.	In beds alternating with Nos. 51 & 52.
	Tertiary Eocene Rocks.		
64	Claystone (burnt shale) forms the base of the formation,....	Intana.	Sometimes highly ferruginous.
65	Quartzose grit in contact with 64, ...	Baghanwalla.	
66	Calcareous sandstone beneath alum shales, ...	Dundhote near Pind Dadun Khan.	Highly fossiliferous between Kuttha and Moosakhail.

List of Specimens continued.

No.	Name.	Locality.	Remarks.
67	Lignite alum shale, ...	Chichalee Pass.	Used in the manufacture of Alum.
68	Yellow Marly Limestone above shales,.....	Baghanwalla.	Contains nummulites, ostreæ, &c.
69	Nummulite Limestone above 68,	North side of Mount Tillah.	
70	Lower Nummulite Limestone, ..	Bukh Ravine Moosahkhail.	Fœtid when bruised.
71	Chalky lower N. Limestone,....	Kuttha.	
72	Lower Numl. Limestone with Fasciolites.....	Koofree.	
73	Argillaceous Numl. Limestone,..	Mulokhail.	Fœtid when bruised, contains black flints.
74	Upper Nummulite Limestone, ..	Tober above Pind Dadun Khan.	Full of flints.
75	N. Limestone with nummulites,	Kalibag Hill.	
76	Black Flint from 73 and 74,....	Bukkh Ravine, Moosahkhail.	
77	Lignite (coal,)	Baghanwalla.	
78	Lignite (coal) from same seam about a mile distant from locality of 77, ...	Ditto.	Contains 1.840 Ash per cent.
79	Lignite, ...	N. side of Mount Drengun.	Much weathered, very brittle.
80	Ditto, ...	Pid near Pind Dadun Khan.	Ditto ditto ditto.
81	Ditto, ...	Dundhote 2 miles W. of last locality.	Ditto ditto ditto.
82	Ditto, ...	Nilawan ravine below Noorpoor.	Ditto ditto ditto.
83	Ditto (coal,)	Kurumee ravine near Kuttha.	
84	Ditto ditto,.....	Chichalee Pass.	Contains 30 per cent. of Ash.
85	Porous Gypsum associated with sulphur, ...	Jabba 10 miles E. of Kalibag.	Produced by the decomposition of Limestone.
86	Native sulphur in Limestone, passing into Gypsum, ...	Jabba ditto ditto.	
86a	Sulphur prepared by sublimation from Tertiary Miocene Rocks,	Ditto.	
87	Petroleum, ...	Ditto.	Floats on the surface of water.
88	Grey Calcareous sandstone, ...	Kullur Kuhar.	Yields gold dust, contains fossil bones, &c.
89	Grey hard Calcareous sandstone in beds alternating with No. 88, ...	Dhar Range near Dehrialah.	
90	Argillaceous Grit, ...	Ditto.	Used as a millstone, contains fossil bones, &c.

List of Specimens continued.

No.	Name.	Locality.	Remarks.
91	Jet (fossil wood) in masses in No. 88, ...	Nurwa near Kullur Kuhar.	
92	Black washed Iron sand with gold dust: the Debris of No. 88, ..	Bed of Boonah Nullah.	Ready for amalgamation process.
93	Red indurated clay alternating with 88, 89 and 90, ... Alluvial Rocks.	Kullur Kuhar.	
94	Calcareous Tufa, ...	Mount Diljubba.	Extensively burnt for lime.
95	Kunkur, ...	Jhelum.	Used extensively as a road metal.
	Lower Silurian or Cambrian Rocks,	Korana Hills Jetch Doab.	
96	Ferruginous quartzose sandstone,	Korana.	
97	Quartzite in beds in ditto,.....	Ditto.	
98	Siliceous clay slate in beds alternating with 96 and 97, ...	Ditto.	
99	Hæmatite in Quartz veins in No. 96, ...	Ditto.	Is a rich ore of Iron.
100	Peroxide of Manganese filling fissures in No. 96,.....	Ditto.	

Description of Sections.

TABLE No. I.

Index to Table of Colours and Markings used in Section of Salt Range.

O. Alluvium.

1. Tertiary Miocene Rocks.
   - *a.* Greenish sandstones, argillaceous grits, conglomerates and red and green clays.

2. Tertiary Eocene Rocks.
   - *b.* Nummulite limestone.
   - *c.* Brown calcareous sandstone.
   - *d.* Alum Shales with Lignite.

3. Secondary Oolitic Rocks.
   - *e.* Cherty thin-bedded limestones with shales.
   - *é.* Yellow, iron-stained quartzose sandstones, grits and bituminous shales.
   - *è.* Green belemnite sandstone and shales.

4. Primary Carboniferous Rocks.

Nº 1. TABLE OF COLOURS & MARKINGS USED ON SECTIONS OF SALT RANGE.

0 Alluvial

1 Tertiary Miocene

a

2 Tertiary Eocene

b

c

d

3 Secondary Oolitic

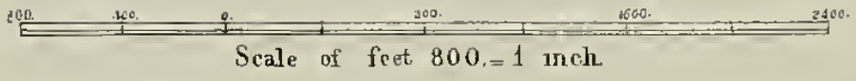
e^1 e e^2

4 Primary Carboniferous

f

g

h



Scale of feet 800. = 1 inch.

5 Primary Devonian

i

J J^1

k

6 Devonian Salt Marl

l

7

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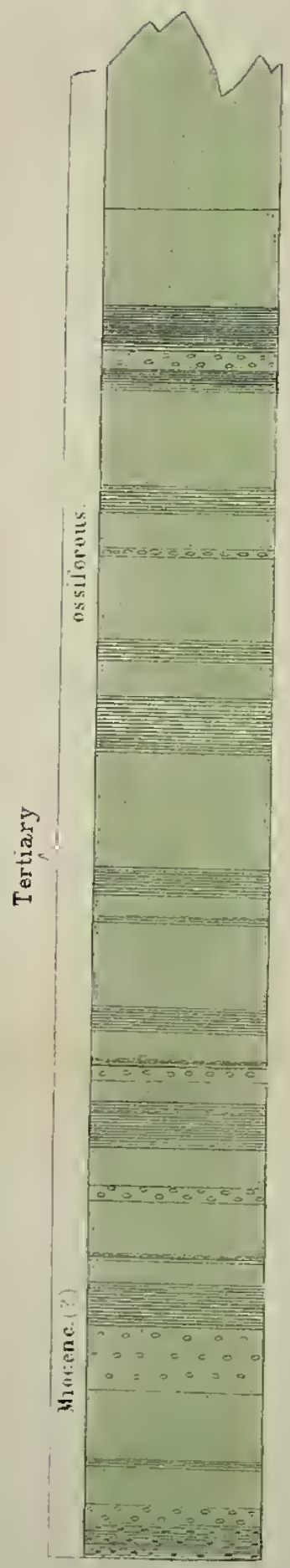
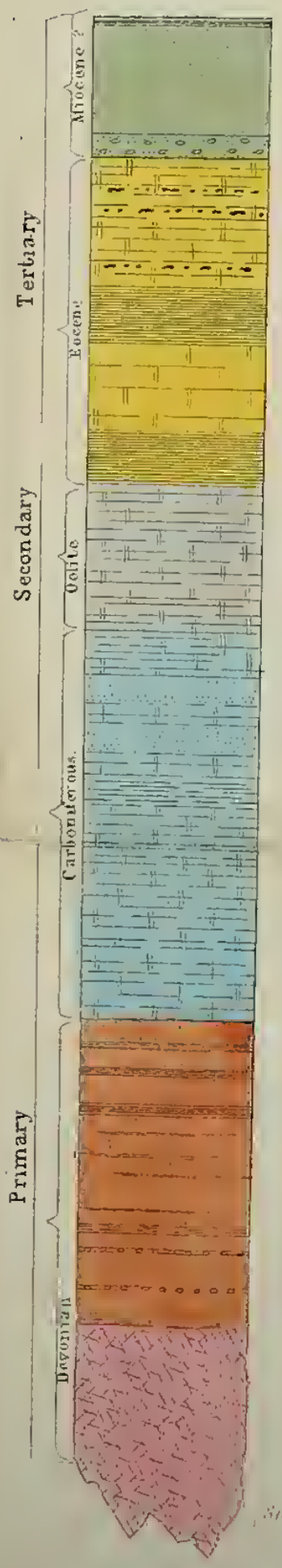
Nº 2 SECTION SHEWING THE ESTIMATED VERTICAL THICKNESS OF SALT RANGE STRATA





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Signed J. Fleming M.D.
Superintendent of the Geological Survey
of Salt Range in the
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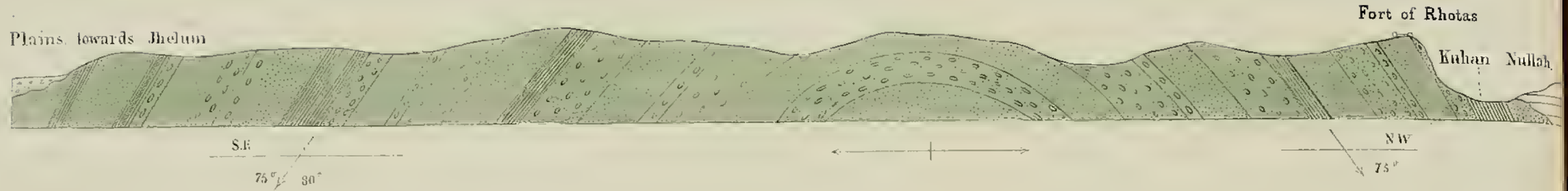
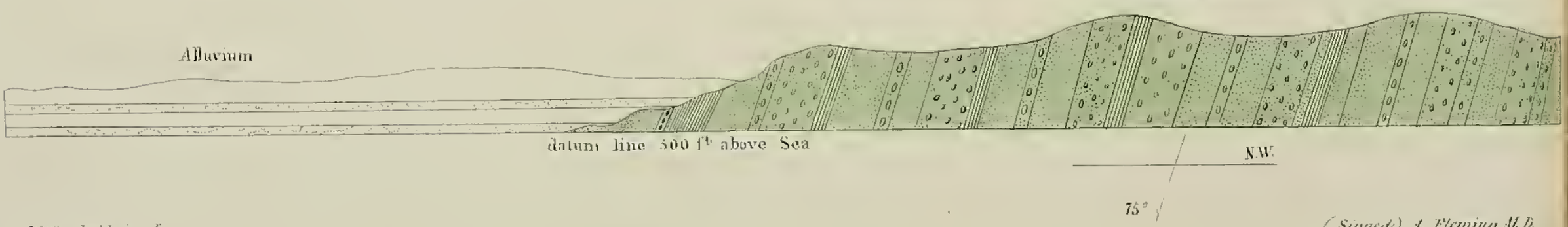
N° 3 SECTION FROM MOUTH OF RHOTAS GORGE TOWARDS BUKRALA.



towards Bukrala.



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f. Upper limestone, sometimes Magnesian.
g. Grey sandstone and shales.
h. Lower limestone, calcareous sandstones and shales.

5. Primary Devonian Rocks.
   i. Upper red variegated sandstones, grits, conglomerates and clays.
   j. Grey Dolomitic (Magnesian) sandstone.
   j'. Greenish micaceous sandstones and shales.
   k. Lower red sandstone and grit with conglomerates.
6. Devonian salt marl.
   l. Red marl with gypsum and rock salt.
7. Lower Silurian or Cambrian Rocks.

In the Geological Maps, Nos. 5 and 6 have been represented by one colour.

N. B. Same scale has been used for heights and distances.

TABLE No. II.

Section showing the supposed vertical thickness of the various formations seen in the Salt Range, estimated at points where they attain a mean development.

TABLE No. III.

This Section represents the Tertiary Miocene formation as seen in the Rhotas gorge, between the plain near Jhelum and the village of Rhotas, and to the N. of this, towards Bukrala on the line of the Peshawur road.

On entering the gorge, through which the Kuhar stream flows towards the Jhelum, beds of soft grey sandstone, red clays and conglomerates are seen dipping under the plain in a S. E. direction, at an angle of from 75° to 80°. A succession of these beds follow, the angle of their dip gradually diminishing, until about a mile from the entrance of the gorge, where they present a beautiful anticlinal curve. Beyond this, their dip again increases, and at Rhotas is 75° to the N. W.

Crossing the bed of the Kuhar Nullah and proceeding along the Peshawur road, beds of alluvium are seen for about a mile. Beyond this, the sandstone strata again appear, dipping at an angle of 75° to the S. E., and may be traced almost uninterruptedly at Rawul Pindee,

presenting a succession of anticlinal and synclinal axes stretching from N. E. to S. W.

TABLE No. IV.

Section across the Rhotas range at Mount Tillah between the villages of Hoona and Bhet at right angles to the strike of the strata.

On ascending the hill from Hoon we have—

1. A succession of Tertiary miocene strata containing numerous mammalian bones, Saurian teeth, &c. Near Hoon they dip to the S. S. E. at an angle of 70°, but on ascending the hill, they present an anticlinal axis beyond which they dip to the N. N. W., as if under the escarpment of Tillah, an appearance which is evidently produced by a fault.

2. Salt Marl with Gypsum. This is very indistinctly seen at the base of the escarpment.

3. Red Sandstone with bands of Conglomerate.

4. Grey Dolomitic (Magnesian) Sandstone brecciated in some places.

5. Greenish micaceous Sandstones and Shales from the decomposition of pyrites, apparently in some of the beds of shale; they have been converted into a red claystone.

6. Red Clays and Schistose micaceous sandstones.

7. Marly yellow nummulite limestone with Ostreæ; in some places is a mass of these shells.

8. Tertiary miocene strata similar to No. 1.

TABLE No. V.

Section across the Salt Range near Baghanwallah.

In an ascending order we have—

1. An extensive alluvial deposit of boulders of gravel, sand and clay.

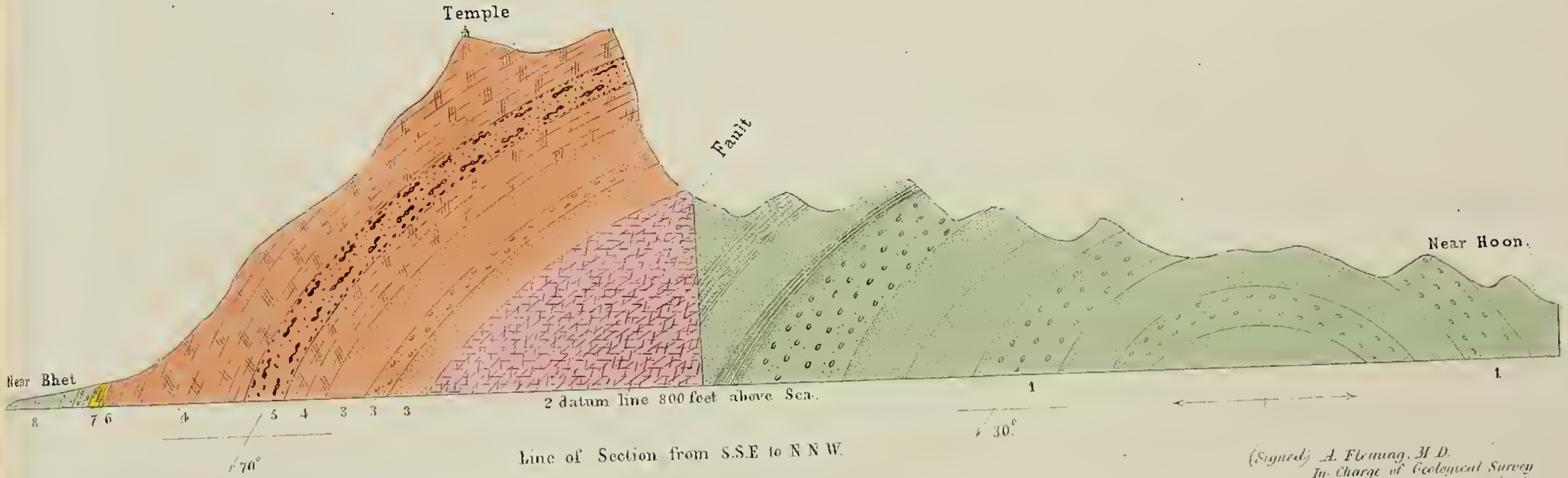
2. Salt marl. This does not appear on the surface, but from the abundance of saline efflorescence, evidently occurs beneath.

3. Red sandstone with bands of conglomerate; its lower beds are schistose and argillaceous, contain laminæ of gypsum, and are encrusted with a saline efflorescence.

4. Greenish micaceous Sandstones and Shales.

5. Grey Dolomitic (Magnesian) Sandstone.

No 4. SECTION ACROSS Mt TILLAH FROM HOON TO BHET.



Line of Section from S.S.E to N.N.W.

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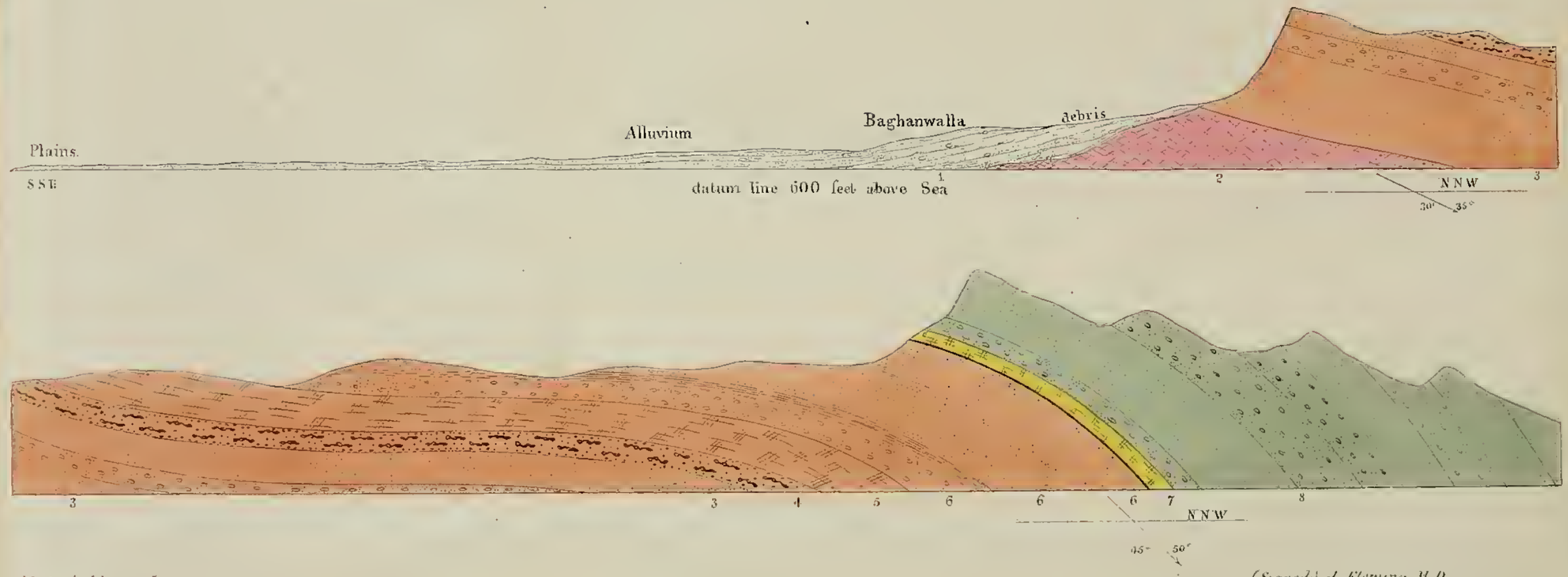
Nº 5 SECTION ACROSS THE SALT RANGE NEAR BAGHANWALLA.



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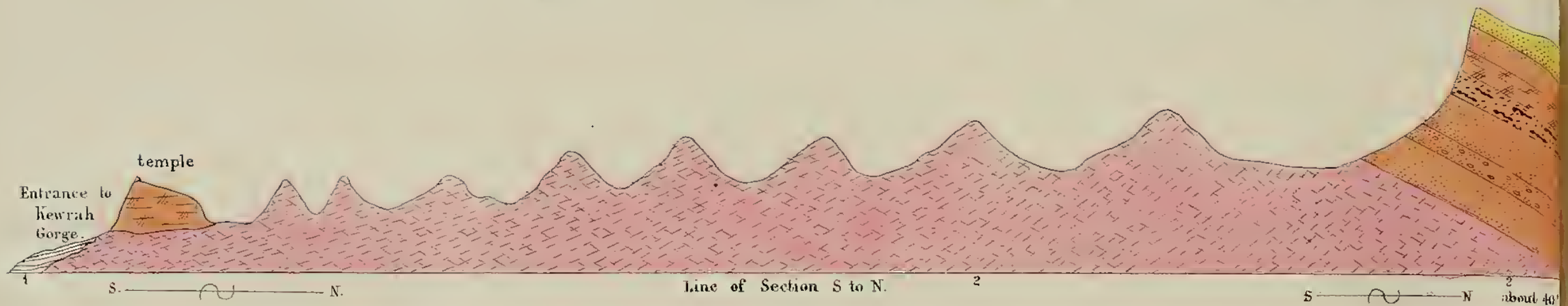
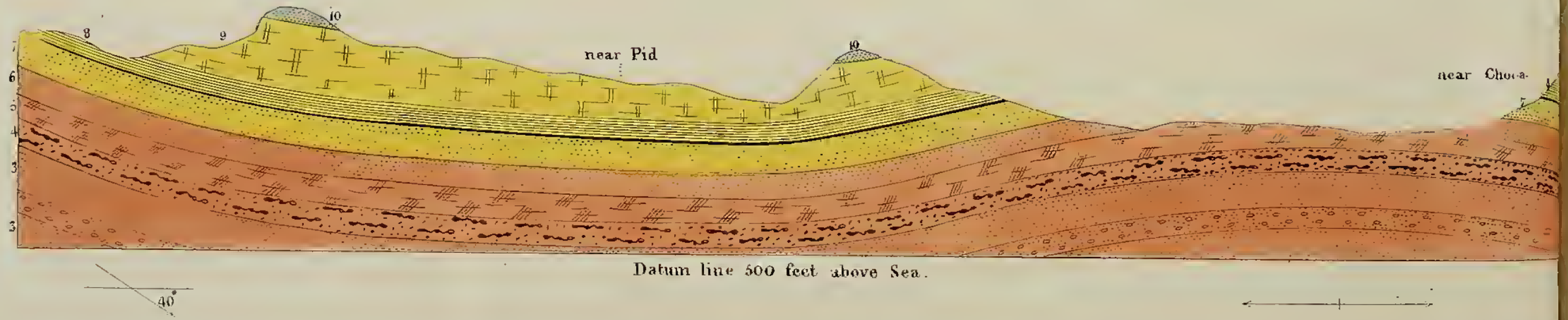
No 6. SECTION ACROSS SALT RANGE FROM KEWRAH TO CHOOA SEYDWN SHAH





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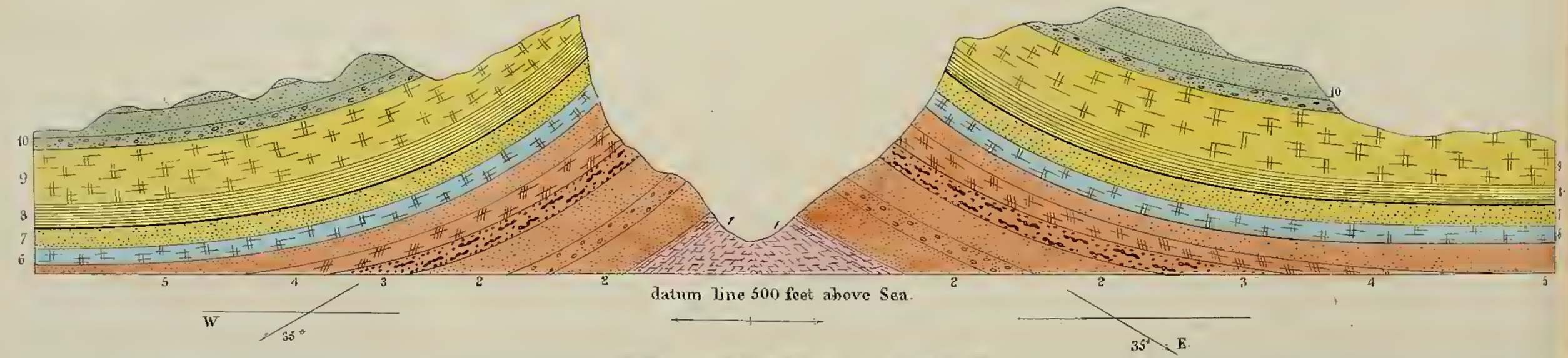
Nº7. SECTION ACROSS NILAWAN RAVINE

IN SALT RANGE NEAR NOORPOOR.



datum line 500 feet above Sea.

Line of Section from W. to E. dip 35°

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6. Upper red variegated Sandstones, grits, conglomerates and red shales.

7. Yellow, marly nummulite Limestone, reposing on bituminous shales, indicated by the dark line in which a bed of lignite, from 3 to 5 feet thick, occurs.

8. Miocene tertiary Sandstones, argillaceous Grits, Conglomerates and red indurated Clays containing mammalian bones and teeth and lumps of brown silicified wood.

The above strata all dip to the N. N. W. at an angle of from 45° to 50°.

TABLE No. VI.

Section across the Salt Range from Kewrah towards Chooa Seydun Shah.

1. Alluvium.

2. Red marl with beds and masses of gypsum and salt, the strata of the former being often bent, and contorted in a most remarkable manner. The marl has been much disturbed, and presents few or no indications of its being a stratified deposit, except towards its upper surface, where it dips under the superior rocks.

3. Lower red sandstone with grit and conglomerates.

4. Greenish micaceous sandstones and shales.

5. Grey Dolomitic (Magnesian) Sandstone, weathering of a fawn colour.

6. Upper red variegated Sandstones, Grits, Conglomerates and clays.

7. Brown calcareous Sandstone (Eocene).

8. Eocene bituminous Alum Shales in which is a bed of inferior lignite.

9. Nummulite Limestone with irregular-shaped masses of grey flint.

10. Patches of miocene tertiary Sandstones, rapidly disintegrating; contain mammalian bones, &c.

TABLE No. VII.

Section across the Nilawan Ravine in the Salt Range below Noorpoor as seen about three miles from the plains.

1. Red Marl, presenting in its upper part thin alternating beds of red and purple clay, impure rock salt and gypsum; below it ex-

hibits the usual disturbed appearance, and contains large masses of salt and gypsum.

2. Lower red Sandstone, Grits and conglomerate bands.

3. Greenish micaceous Sandstones and Shales, with indistinct carbonaceous markings.

4. Grey Dolomitic (Magnesian) Sandstone, weathering of a dark brown colour.

5. Upper red Sandstone, Grits, purple and red Shales and Clays.

6. Primary carboniferous limestone, containing Encrinites, Producti, Spiriferæ and Teribratulæ.

7. Eocene brown calcareous Sandstone resting on a thin bed of ferruginous claystone.

8. Alum Shales with lignite seam, much decomposed in its outcrop.

9. Nummulite Limestone with Flint.

10. Tertiary miocene Sandstones, Grits, Conglomerates, &c. containing fossil bones and masses of silicified wood.

The above strata dip from either side of an anticlinal axis at an angle of 35°.

Table No. VIII.

Section across the Salt Range from the Zamanee Wan Ravine E. of Chederu to the neighbourhood of Dok. The distance is almost 7 miles and the general dip of the strata is to the N. E. at an angle varying from 45° to 55°.

In this Section the heights and distances are considerably falsified.

1. Salt Marl with Gypsum.

2. Lower red Sandstone, Grits and Conglomerates.

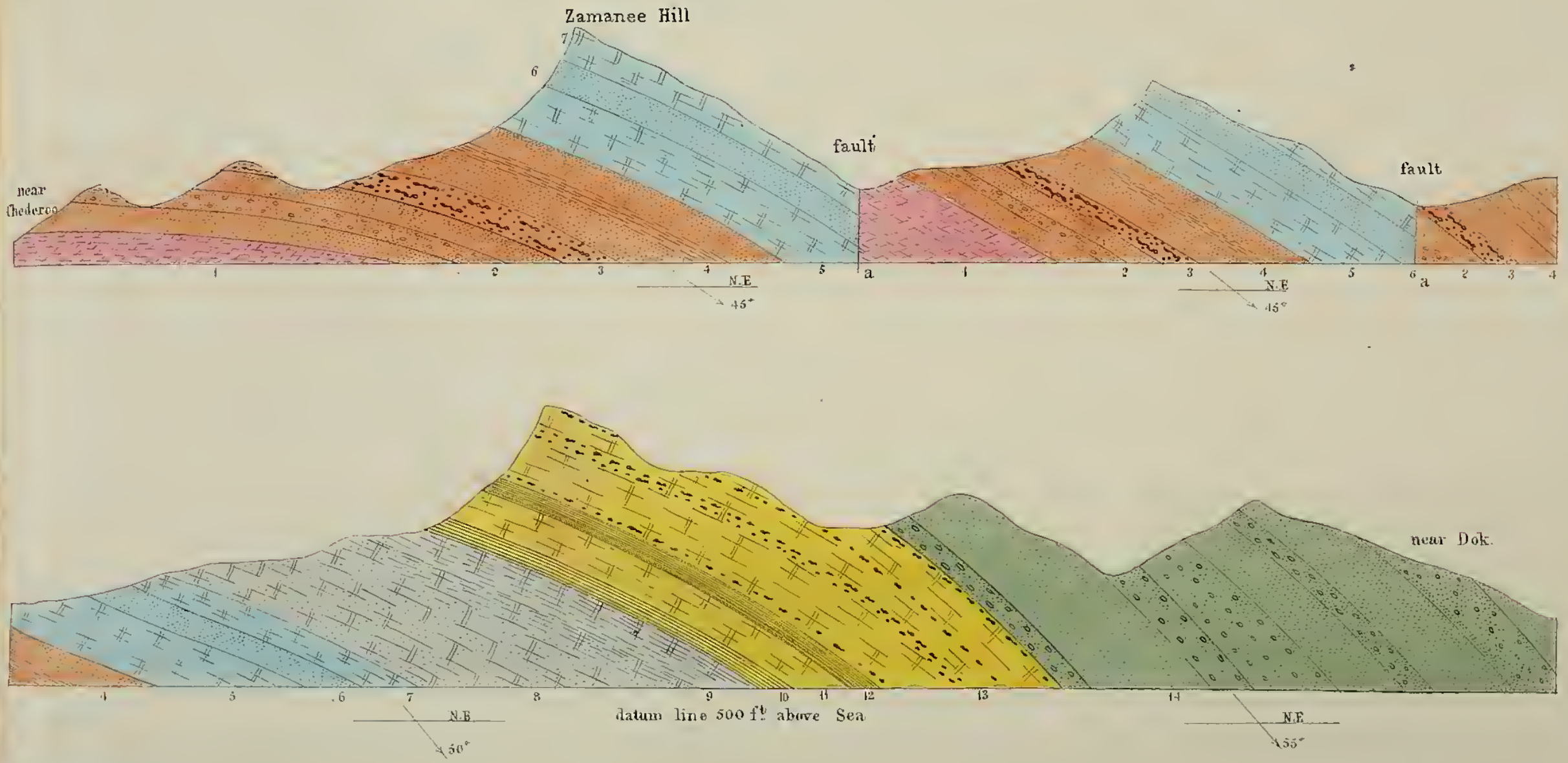
3. Greenish micaceous Sandstones and Shales with thin bands of hard Dolomitic Sandstone of a steel grey colour.

4. Dark red variegated schistose Sandstone, Grits and beds of Conglomerate, succeeded by Shales of a chocolate and purple colour, containing copper ore nodules.

5. Lower primary carboniferous Limestone and calcareous Sandstone, abounding in Encrinites, Producti, Spiriferæ, Orthoceratites, and Ceratites, &c.

6. Middle grey Sandstones and Shales.

Nº 8. SECTION ACROSS THE SALT RANGE BETWEEN CHEDEROO AND DOK.



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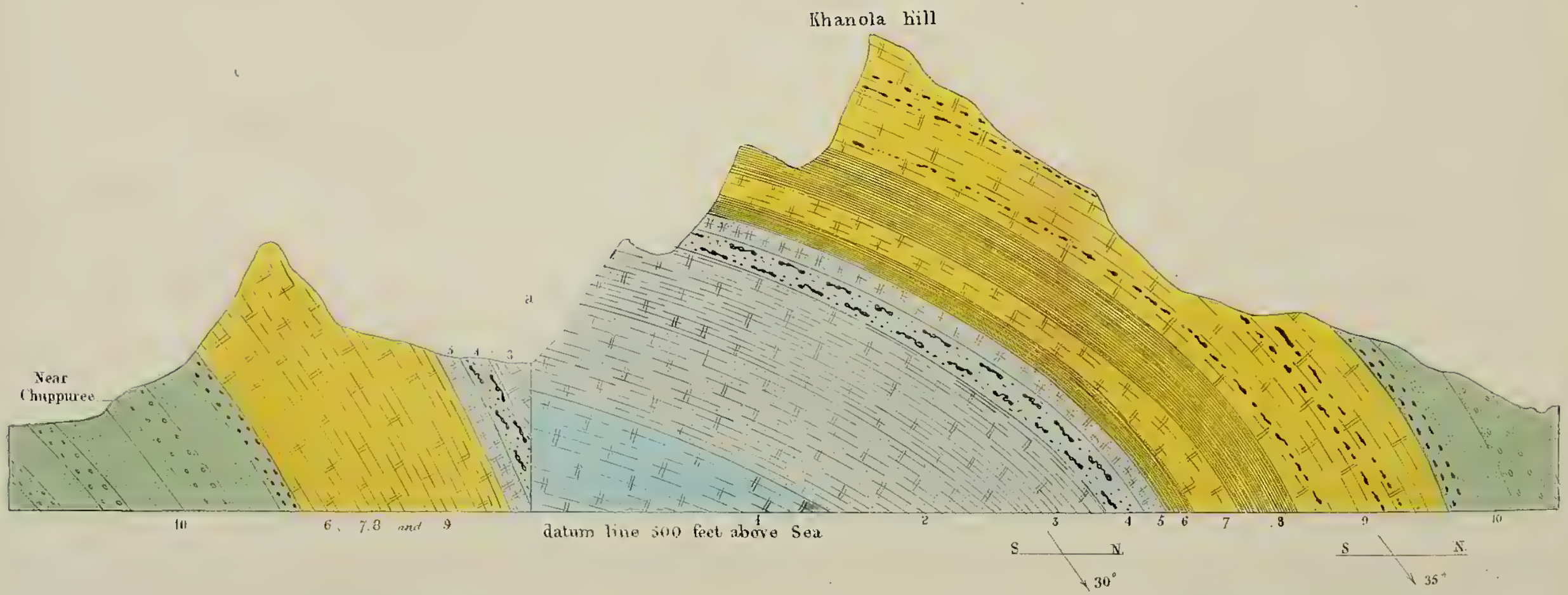
Nº 9. SECTION OF CHICHALEE HILLS W. BANK OF INDUS.
AS SEEN ON W. SIDE OF CHICHALEE PASS.



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2nd Asst del.t

(Signed) *A Fleming M D.*
In Charge of Geological Survey
of Salt Range in the Punjaub

Bullcram Nath & S M Azeem Scr.

Lith. Surv. Gen.l's Office, Calcutta, May 1853.

7. Upper primary carboniferous Limestone, full of Encrinites, Producti, &c.

N. B. In the Bukhh Ravine, 8 miles W. of line of section, this limestone is magnesian, and appears to contain no fossils.

8. Secondary, oolitic, yellow, iron-stained quartzose Sandstones, Grits and bituminous Shales, containing masses of carbonized wood.

9. Oolitic, cherty thin-bedded Limestones with a few shales.

10. Lower tertiary eocene Alum Shales resting on a coarse and highly fossiliferous limestone, containing Nummulites and large gasteropodous molluscœ.

11. Lower nummulite Limestone; its lower beds an imperfect conglomerate.

12. Upper Alum Shales and blue Marl.

13. Upper nummulite Limestone; lower beds argillaceous, upper compact nodules, and irregular-shaped masses of black flint abundant.

14. Tertiary Miocene Sandstones, Grits, Conglomerates and red Clays, containing mammalian bones, &c.

a. a. Are faults.

Table No. IX.

Section across the Chichalee Range on the W. bank of the Indus as seen on the W. side of the Chichalee Pass.

1. Primary carboniferous strata. These do not appear on the surface along the line of section, but occur in the position represented in ravines, both E. and W. of the Pass.

2. Oolitic, yellow, iron-stained quartzose Sandstones, Grits and bituminous Shales.

3. Oolitic cherty and shell limestones alternating with bituminous shales. The upper limestone beds contain Terebratulæ, Belemnites, fragments of Echinidæ, &c.

4. Black Shales passing into a green ferruginous sandstone. These beds contain Belemnites, Ammonites, Gryphеæ and Saurian teeth, bones, &c., associated with fragments of carbonized wood.

5. Iron-stained quartzose Sandstone, with fragments of jet.

6. Lower Eocene Alum Shales, containing irregular beds or nests of lignite.

7. Lower Nummulite Limestone, its lower beds are imperfect Conglomerates.

8. Upper Alum Shales.
9. Upper Nummulite Limestone with flints.
10. Tertiary Miocene strata with the usual fossils.

A. A. *(a.)* a fault occurs to the South, of which at the entrance of the Pass the beds, 3, 4, 5, 6, 7, 8, 9 and 10, are seen in reversed order. The nummulite limestone and oolitic strata are much shattered and compressed, the strata of the former being often remarkably contorted.

TABLE No. X.

Sketch of a slab of carboniferous limestone from Musahkhail in the Salt Range, containing Orthoceratites and Ceratites.

Catalogue of Reptiles inhabiting the Peninsula of India.—By T. C. JERDON, *Esq. Madras Medical Service.*

CHELONIA.

Fam. TESTUDINIDÆ—or Land Tortoises.

Gen. TESTUDO.

Fore feet with 5 fingers, hind do. with 4 nails—Carapax of one piece—Sternum fixed in front.

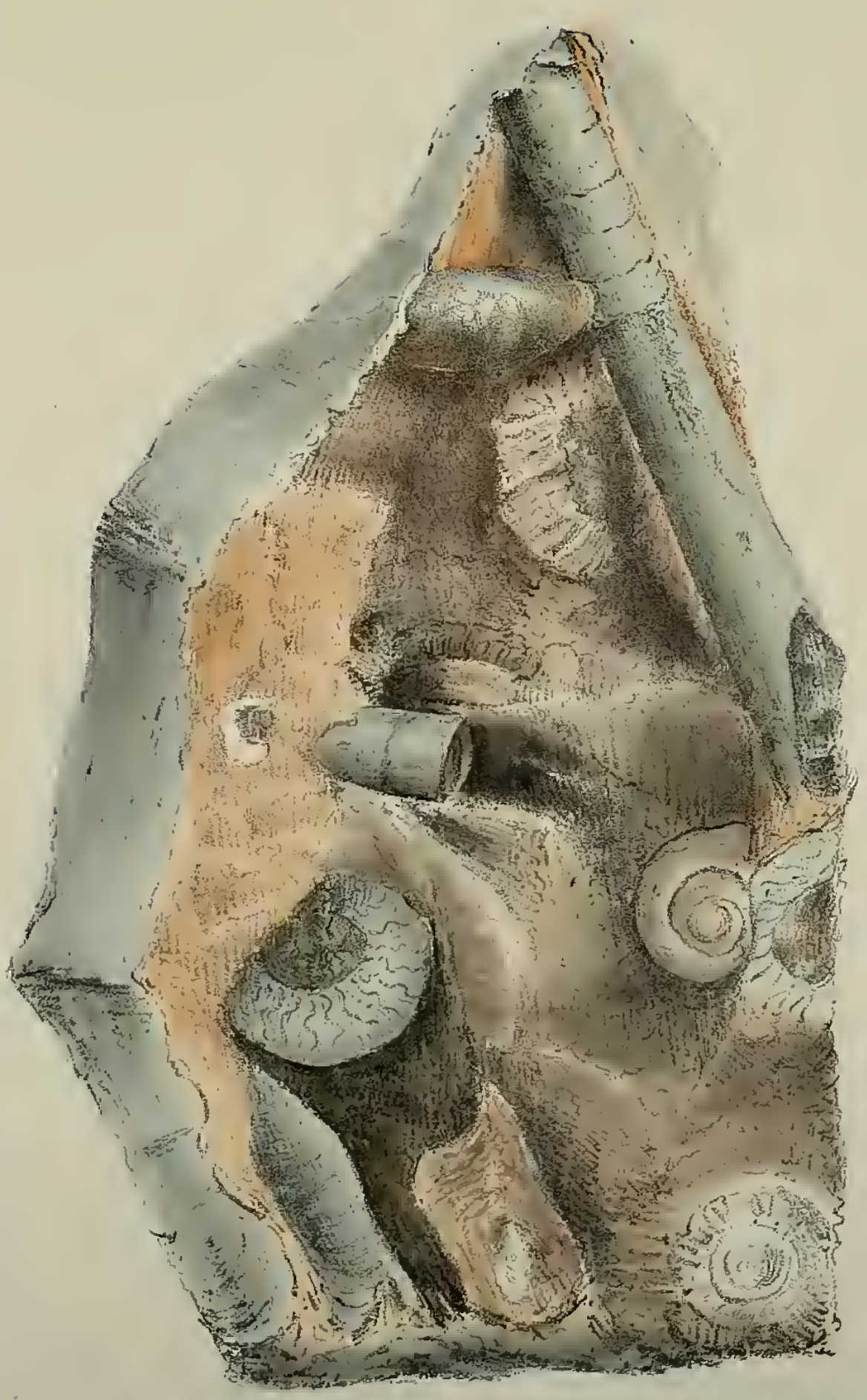
TESTUDO ACTINODES, Bell.

Syn. *T. stellata*, Schw. and Gray—*T. geometrica*, Daud. and Shaw—*T. elegans*, Schœpf. and Shaw—*T. geometrica* apud Hutton, *J. A. S.* VI. 689, and plate XXXVIII.—*Kaynchwa*, H.—*Dasari*, Tambel, Teloog; vulgo *Adavi Moonigadoo*, or Jungle deaf-fellow—Indian Land Tortoise.

This Tortoise is tolerably common in the low jungles of the Carnatic, and I believe throughout the whole of the Peninsula. Length of the shell of one about 6 inches.*

* Capt. Thos. Hutton gives much larger dimensions *loc. cit. supra;* and we have a specimen which I picked up dead in a street of Calcutta, the length of carapax of which (in a straight line) exceeds 12 inches. Three living specimens which I received from Vizagapatam 5 or 6 years ago, certainly did not grow much in the interim, and the carapax of one of these recently dead, and added to the Society's museum, measures 8½ in. It also inhabits Ceylon; but not Lower Bengal.—E. B.

TABLE N°X.



ORTHOCERATITE WITH CERATITES

IN A SLAB OF CARBONIFEROUS LIMESTONE

FROM MOOSAKHAIL IN THE SALT RANGE.

PUNJAUB.

March ... 1852.

C. de A. Fleming.

Fam. ELODIDÆ—or Marsh Tortoises.

Gen. EMYS.*

EMYS TRIJUGA, Schw.

Syn. *E. Belangeri*, Lesson—*Goonta*, Tambel, Tel.

Carapax olive or brown, three-keeled, edges smooth.

By no means common in the south of India, and chiefly to be found in deep tanks and large wells.†

Length of shell of one 8 inches.

[Col. Sykes procured another EMYS in the Bombay Dukhun, E. TENTORIA, Gray, *P. Z. S.* 1834, p. 54, and the supposed adult E. TECTUM of Hardwicke's 'Illustrations.' The Society's museum contains an adult procured by Sir A. Burnes in Sindh, and we have also a young specimen from the river Hughly. The species is most nearly affined to E. TECTUM, Bell, and has the same peculiar form of the fifth vertebral plate; but the fourth is quadrilateral and elongate, the third has a broad transverse posterior margin, the keels of the vertebral plates (especially that of the fourth, so developed in E. TECTUM,) are much less prominent at all ages, the entire carapax is broader and flatter, and the abdominal plates are brown-black with pale margins, and occasionally one or two pale central spots,—instead of whitish, with two or three strongly contrasting blackish marks on each, as in E. TECTUM. Carapax of adult 7 in. long; that of adult E. TECTUM $6\frac{1}{4}$ in.

I am nearly certain that the small specimen is from the vicinity of Calcutta, and that I kept it alive for some time, but did not then distinguish it from E. TECTUM. Three species of restricted EMYS are extremely common in the neighbourhood of Calcutta, viz. E. TECTUM, E. HAMILTONII, Gray, (of which the carapax of our largest specimen measures $5\frac{1}{2}$ in. in a straight line,) and E. THURGII,

* For generic characters, vide Journ. As. Soc. 1847, p. 608. I think it superfluous to repeat in this Journal the characters so lately laid down in Dr. Cantor's most admirable Catalogue.

† Hab. also Central India (vicinity of Chaibasa); but in Ceylon it appears to be replaced by E. SEBÆ, Gray. According to M. M. Dumeril and Bibron, M. Dussumier procured a young individual in a lake near Calcutta (doubtless the salt-water lake); but we have never heard of another instance, although we have seen multitudes of *Emydes* from the salt-water lake and its vicinity.—*Cur. As. Soc.*

Gray, which attains to a much larger size than the others, though adults are not often obtained. Carapax of adult from 20 to 22 in., in a straight line. *Cur. As. Soc.*]

Fam. POTAMIDÆ—or River Tortoises.

Gen. CRYPTOPUS—Dum. and Bibr.

Carapax with a narrow cartilaginous border—sternum wide, flexible in front and behind, and able completely to conceal the extremities.

Cryptopus granosus—Dum. and Bibr.

Syn. *T. granosa* Shœpf.—*T. granulata*, Daud. and Sh.—*Trionyx coromandelicus*, Mesc., Geoff., Less.—*Emyda punctata*, Bell and Gray. —*Tambel* and *Goorada gadoo*, Tel. Shagreen fresh-water Tortoise.

This is an extremely common species in the south of India, and is found in tanks, rivers, wells, and pools of water, burying itself in the mud with great celerity. It is frequently brought to the Madras market and is eaten by many of the people there.

Length of shell of one, 8½ inches—but it becomes much larger.*

Gen. GYMNOPUS—Vide Cantor, l. c. p. 614.

Gymnopus cartilagineus—Vide Cantor, l. c. p. 615.

I have observed this species in the Godavery, the Beena and other rivers of the north west of the peninsula, but have no specimen at present.

Gymnopus indicus, (Gray), Vide Cant. l. c. p. 616.

I have very lately procured a specimen of this large river Tortoise taken in a net at Mahé on the Malabar Coast, where, however, it is considered rare.

Length of carapax 30 inches.†

Fam. THALASSIDÆ—or Sea Turtles.

Gen. CHELONIA—Vide Cantor, l. c. p. 617.

Chelonia virgata—V. Cant. l. c.

I have procured this Turtle on the East Coast of India.‡

Chelonia maculosa—Cuvier.

* Extremely common in Lower Bengal, and here also much eaten by certain classes, as indeed are all other *Testudinata*. It likewise inhabits Ceylon.—*Cur. As. Soc.*

† We have succeeded in obtaining only one small specimen of this in the vicinity of Calcutta.—*Cur. As. Soc.*

‡ Very numerous on parts of the E. coast of the Bay of Bengal.—*Cur. As. Soc.*

Vertebral plates larger than broad, marked with yellow in an olive-brown ground.

This Turtle is occasionally caught by the fishermen both on the East and West Coasts of India.

Chelonia olivacea, Eschscholtz—Cant. l. c. p. 619.

Very common in the Bay of Bengal, where I have seen many captured by ship lascars swimming out during a calm. Length of carapax average about 2 feet.*

Chelonia imbricata (L.) V. Cantor, l. c. p. 619.

I have quite recently procured this Turtle at Tellicherry on the Malabar Coast.†

CROCODILIDÆ,—Bon.

Gen. Crocodilus—V. Cant. l. c. p. 621.

Crocodilus palustris, Lesson—V. Cant. l. c. p. 621.

This Crocodile, pronounced by some erpetologists only a variety of the Crocodile of the Nile, and so considered by Cantor, is very common in all the rivers and back-waters of Malabar and the West of India, very rarely seen out at sea. I have not seen it from the East Coast. It does not attain the dimensions of the next species, and is considered very harmless by the natives.

Crocodilus porosus—Schn. Cantor, l. c. p. 622.

This, the larger and fiercer of our two Crocodiles, is found in various localities both on the East and West coasts, and is the species so abundant in the fort ditch at Vellore. It is of very rapid growth. An egg brought from Vellore to Walter Elliot, Esq., was hatched in the Government house compound, and in eight years had increased to the length of 8 or 9 feet, becoming so powerful as to destroy a full grown buck Antelope which had come to drink water at the tank where it usually resorted to.

I may mention, here, that both of these species of Crocodile are almost universally called Alligators by the English in India; erroneously so, of course, as no Alligators have as yet been found in the old world.

* Abundant at the mouth of the Hughly.—*Cur. As. Soc.*

† In the Society's museum is a small specimen, procured in one of the Sunderbund rivers.—*Cur. As. Soc.*

Fam. CHAMÆLEONIDÆ.

Gen. CHAMÆLEO, Laurenti.

Feet thin with 5 fingers joined to the nails into two lobes, one of two, the other of three fingers. Skin granular. Eyes large, covered by the scales of the eyelid except one small round aperture. No visible tympanum.

CHAMÆLEO ZEYLONICUS—Laur.

Dorsal crest short; abdominal crest with the spines long and somewhat distant. Colour green.

Syn. *C. vulgaris*, var. B, Dum. and Bibr.—*C. zebra*, Bory de St. Vinc.—*C. calcaratus*, Merr.

I have no hesitation in considering this Chameleon distinct from the African one, as well on account of the slight but permanent structural distinctions (the abdominal ridge being in the African one composed of very short and closely set spines), as the difference of locality, and the great difference in the change of colour of the two. In our Indian one, the only change produced is from one shade of green to another. In a state of quiescence, it is usually very pale green, sometimes dark blackish green; but when excited it is mottled or *zebra'ed* very prettily with dark transverse blotches on a pale ground. I never saw any pure yellow, or red in any state.* It is found in all the wooded districts of India. It is used in medicine by some of the native doctors, and many generally be procured in the Madras market.

Length of one 10 inches, of which the tail is more than half.

CHAMÆLEO PUMILUS—Latreille.

Head tuberculated; dorsal crest continued over the tail. Some large circular scales mingled with the small and unequal granulose ones.

I possess a specimen of this small Chameleon in spirit, which was said to have been taken near Coonoor on the Nilgherries.

Length $5\frac{1}{2}$ inches, of which the tail is nearly 2.

Fam. GECKONIDÆ,—Bonaparte.

Gen. HEMIDACTYLUS, Cuvier, Cantor, l. c. p. 628.

HEMIDACTYLUS TRIEDRUS—Daud.

* A very fine one which we long kept, assumed a tolerably pure yellow ground-tint occasionally, with black markings.—*Cur. As. Soc.*

Many large triedral tubercles mixed with the other scales—tail somewhat rounded—several large transverse brown bands marked with large white triedral scales—7 or 8 femoral pores in each thigh in the males.

Syn. *Deowur bullee*, Tel., of the Yanadees.

This very handsomely marked Gecko is rarely found in houses, being chiefly met with in jungly places, on rocks and trees, in all parts of the country, but is nowhere common.

Length of one 7 inches, of which the tail is about half.

HEMIDACTYLUS SUBTRIEDRUS—n. sp.?

H. TRIEDRUS—var.?

Sookha bullee of the Yanadees.

Differs from TRIEDRUS in somewhat shorter head, in the scales of the throat and muzzle being smaller in its shorter head; fewer dark bars on the back and fewer of the white tubercles; and in the triedral scales generally being smaller. It is equal in size to TRIEDRUS, and the number of femoral pores is the same. Colours much as in TRIEDRUS but paler.

Length of one $6\frac{1}{2}$ in. of which the tail is more than half.

The Yanadees, a peculiar jungle race in the Nellore district, who have a considerable knowledge of reptiles, pronounced this to be a distinct species from the last, and gave it a peculiar name, or I should have put it down as a casual variety of TRIEDRUS without closer inspection. It is found chiefly in rocks, seldom entering houses. It forms a link between TRIEDRUS and MACULATUS.

HEMIDACTYLUS MACULATUS—Dum. and Bibr.*

Brown or olive-green with dark marks; back furnished with numerous subtriedral tubercles. This is the most common species of Gecko in the South of India, but never attains here the dimensions stated by Dumeril and Bibron. It is very subject to variation both in the ground-tint and the dark markings, which it appears to have the power of deepening or reducing. Length of an average specimen $4\frac{1}{2}$ inches, of which the tail is $2\frac{4}{10}$ths.

HEMIDACTYLUS PUNCTATUS—n. sp.

Back with some larger conical scales, and sub-caudal scutæ very large; scales of abdomen dotted, brown above; limbs and tail reddish

* Qu. H. FRÆNATUS, D. and B.? *Cur. As. Soc.*

with dark bands: a pale yellow streak from muzzle to tail bordered beneath by a dark line; another dark line from nostrils to behind the eye—beneath yellowish white—some of the sub-caudal scutæ orange.

Length $3\frac{2}{8}$ inches, of which the tail is $1\frac{1}{2}$.

I procured a single specimen of this small Gecko lately, in a house at Tellicherry. At first glance, I took it for *maculatus*. It appears very similar to *H. frenatus*, but I can find no pores, and the thumb appears as well developed as in *maculatus*.

HEMIDACTYLUS LESCHENAULTII—Dum. and Bibr.

Small tubercles scattered sparingly among the very small scales of the back, 13 femoral pores in each thigh. Adult pale grey above; young with dark markings and tail annulated black and white.

Length of one nearly 6 inches, of which the tail is $2\frac{8}{10}$ths.

This species of Gecko is very common throughout the South of India in houses. I have not observed the mode of coloration described by Dumeril and Bibron.

[Gen. HOMONOTA,—Gray.

H. FASCIATA, nobis. Body covered above with large, imbricated, keeled and pointed scales, below with much smaller hexagonal scales ranged in oblique series: the throat and limbs studded with minute hexagonal scales, larger on the thighs; and the head uniformly covered with hexagonal plates, smaller than the scales of the back. A range of simple labial plates above and below, the rostral larger, bordered on the lower jaw with a series of small oval plates, and these with a second series of smaller oval plates. Tail wanting in the specimen. The pupils appear to be round. Colour plumbeous-brown, with 7 or 8 irregular broad whitish cross-bands, formed each of three or more contiguous spots. An omega-like mark on the forehead. Length of head and body $1\frac{1}{2}$ in., of head $\frac{3}{8}$ in., This specimen was sent many years ago to the Society's museum by Mr. Jerdon. *Cur. As. Soc.*]

Genus GYMNODACTYLUS—Wiegman—Vide Cantor, l. c. p. 631.

GYMNODACTYLUS INDICUS,—(Gray).

Scales of body and tail small, equal; those beneath the tail larger.

Syn. *Goniodactylus indicus*, Gray.

This species, lately* described from specimens sent home by myself, is found on the Nilgherries, concealing itself under stones in the day time. I have procured it on the top of Dodabetta, the highest mountain of the group, and have also found it in Coorg. Its colours when fresh are a mottled brown, or greenish-brown, with a row of orange-yellowish spots along the back edged darker, and a line of similarly coloured spots on each side; lips also of the same tint, and the lower portion of the tail.

Length of one $2\frac{4}{10}$ inches, of which the tail is $1\frac{2}{10}$th.

GYMNODACTYLUS MALABARICUS—n. sp.

Scales of the back uniform, small, granulose, a few at the root of the tail between the two hind legs smaller, those in the tail above larger, imbricated; a few small spines at the root of the tail: dark brown above, marbled with black spots and a white spot on the nape.

Length of one $2\frac{4}{10}$ inches, of which the tail is about half.

I have only very recently procured this small Gecko from the forest of Malabar, where it frequents large trees and rocks. It is generally to be found on those large trees, whose base is protected by buttresses, in the inequalities of which it finds a secure retreat, and occasionally it hides itself under a cleft in the bark. The dark markings on its back are edged lighter, and it is of a bluish white colour beneath. It is of a more slender habit than the preceding species.

GYMNODACTYLUS LITTORALIS—n. sp.

Very slender form, scales of back small, equal; those on the muzzle larger; beneath the tail a series of large six-sided scales. Colour pale brown, with a series of paler marks along the back and tail, a black spot on the nape, the chin and throat pale yellow.

Length $2\frac{3}{10}$ inches, of which the tail 1 $\frac{2}{10}$th.

I procured a single specimen of this well marked species of Gecko in a ware-house on the Sea Coast in Malabar, and have not yet been fortunate enough to find another.

GYMNODACTYLUS MYSORIENSIS—n. s.

Scales of the back uniform, granulose, with 2 or 3 rows of spines on each side, and on the tail; tail beneath with a triple series of large unguiform scutæ.

* Ann. and Mag. of Nat. Hist., Dec. 1846, p. 429.

Head and back covered with small granulose scales, and two or three distant rows of spines on each side and extending along the tail; chin and throat covered with small hexagonal scales, gradually changing to rounded imbricated scales which cover the abdomen; scales of tail imbricate, with 3 rows of larger nail-shaped scutæ beneath; scales of the basal joints of the fingers and toes, enlarged, nail-shaped.

Body above greyish-brown, with a light stripe down the centre of the back, and a series of dark brown marks on the head, back and sides; legs and feet banded; beneath bluish-white; chin, throat, and anterior portion of palpebræ bright yellow.

Length of one $2\frac{1}{2}$ inches, of which the tail is $1\frac{1}{4}$.

I have quite recently found this small and very distinctly characterized species of Gecko at Bangalore, frequenting rocks and also entering out-houses. The young has the tail flesh-coloured: 2 femoral pores on one side and 3 on the other.

Fam. IGUANIDÆ.

Gen. CALOTES, Cuv. Vide Cant. l. c. p. 636.

CALOTES VERSICOLOR, (Daud.)

Two spines on each side of the nape. No fold on the neck.—Tail conical. Scales large, keeled.

Syn. *Agama Tiedmanni*, Kuhl.—*A. vulturosa*, Harl.

This is the most common and extensively distributed lizard in the country, being found everywhere in gardens, avenues and jungles. Though not a Chameleon in structure, it is yet one in habit, and much more so than our Chameleon. Its usual tints are a pale drab or fawn colour, but this it changes to bright red, to black and to a mixture of yellow red and black. This change is sometimes confined to the head, at other times diffused over the whole body and tail. A common state to see it in, is seated on a hedge or bush with the tail and limbs black, head and neck yellow picked out with red, and the rest of the body red. I am inclined to think that this display of colours is merely seasonal. It only occurs in the males, the females being uniformly and plainly coloured. The young has a pale band on each side of the body from the eye to the tail, and a series of dark bands on the back. Mr. Blyth mentions, in a notice of this lizard in the Journ. As. Soc. for 1842, p. 870, that its usual colour

is * * * * . This is somewhat remarkable and I should doubt if it was the same species. Are the changes mentioned here observed in Calcutta ?*

This and the other species of Calotes are essentially tree lizards, seeking their prey often on the ground, but always retreating up trees when in danger.

Length of one specimen 18 inches, of which the tail is 12.

Calotes nemoricola, nov. spec.

One detached spine in front of 2 or 3 small ones on each side of the nape. A fold of skin on the shoulder, scales of the sides very large, not keeled, those of the abdomen much smaller, keeled. Dorsal crest extending only about one-third along the back; colour green.

I only procured one specimen of this lizard near the foot of the Coonoor ghât of the Nilgherries. Compared with *versicolor*, the large smooth scales are the most prominent feature of distinction. The scales at the base of the tail above are of rather large size, keeled and pointed. The tympanum is large: where the dorsal crest terminates, the scales of the ridge are pointed.

Length of my specimen 18 inches, of which the tail is 8.

Calotes rouxi—Dum. and Bibr.

An oblique fold in front of each shoulder. Scales of the sides small, nearly as large as those of the abdomen. Base of the tail above furnished with much larger scales, somewhat angular. Colour pale brown with darker bands.

I have lately procured from the forests of Malabar a species of lizard, which appears to correspond with the description of *C. Rouxi* from the Burmese country. I found it more abundant than elsewhere in a small wooded island known as Pigeon I., about 20 miles

* I never saw any yellow in a Bengal specimen; and some which Dr. Kelaart sent me alive from Ceylon were perfectly identical with the Bengal reptile. It is chiefly during the months of May and June that the species here displays its fine colours; which generally are—head and neck, and more or less of the fore-part of the body, bright red; rest of body and limbs dark greenish-brown; and a great black patch on the shoulder. The female is smaller, and deposits her 8 to 16 eggs very commonly in a flower-pot, burrowing 4 or 5 in. into the hard dry soil, and finally covering them up most carefully, so that no appearance remains of the ground having been disturbed. The young appear in about 8 or 9 weeks. I have seen a two-thirds grown lizard of this species carry off and partly swallow a Scolopendra nearly of its own length.—*Cur. As. Soc.*

S. S. W. from Honore. The usual change of colour consists in the head and nape becoming brick red, and the rest of the body blackish.

Length of one 11 inches, of which the tail is $7\frac{3}{4}$.*

CALOTES VIRIDIS, Gray.

Nape with 2 isolated spines above the ears; a high crest on nape and shoulders diminishing along the back and lost on the root of the tail, scales large above, smaller beneath, those at base of the tail largest. I always considered that the very pretty green lizard which I had procured from Travancore and the southernmost portion of Malabar agreed tolerably exactly with the description of *C. ophiomachus*, but Mr. Gray has described it as new by the name of *viridis*.†

The colour is a bluish-green with 4 or 5 transverse stripes of reddish white, and some of the scales of the throat are edged with orange.

Length of one $16\frac{1}{2}$ inches, of which the tail is nearly 13.

CALOTES OPHIOMACHUS.

A small crest of long spines on each side of the nape. Dorsal crest extending to the root of the tail, which is long, conical, and very thin towards the end. Green; with transverse bands.

Mr. W. Elliot possesses a rough drawing and brief description of a green lizard, distinct from any of those previously described, which I believe to be identical with the *C. ophiomachus* of authors. He procured the specimen in Dharwar. Its dimensions were as follow:

Length 14 inches, of which the tail is 10.

The drawing represents the colours to be pale green with dark transverse bands, interrupted by a pale longitudinal line from ear to tail.

Gen. SALEA, Gray.

Differs from *Calotes* in the series of scales pointing directly back-

* This coloration is altogether dissimilar from that described of my supposed C. ROUXI from Newera Elia, vide *J. A. S.* XXI, 354.—*Cur. As. Soc.*

† Ann. Mag. Nat. Hist. XVIII, page 429. [There appears to be some confusion here. The present species we consider to be, decidedly, C. OPHIOMACHUS, as figured by Daudin; and its range extends to Ceylon and to the Nicobar islands. The C. VIRIDIS, Gray, was long ago presented by Mr. Jerdon to the Society, and it does not correspond with Mr. Jerdon's present descriptions, either of this or of the next species; yet his figure sent of the supposed OPHIOMACHUS would seem to represent C. VIRIDIS.—*Cur. As. Soc.*]

wards, or running in longitudinal lines; not as in *Calotes*, where the points are directed upwards, nor as in *Bronchocela*, where they are directed downwards.

SALEA JERDONI, Gray.

Nuchal and dorsal crest formed of elongated compressed scales; tail with a keeled crest.

This pretty lizard, described by Mr. Gray from specimens sent home by me, is only found in the Nilgherries where it frequents bushes, hedges and gardens. Its colour is a bright grass-green marbled with brown, some red marks on the head and nape, and a few white scales on the sides. It does not appear to possess the faculty of changing its colours.

Length of one $9\frac{1}{2}$ inches, of which the tail is $6\frac{1}{2}$.*

Gen. SITANA, Cuv.

Four toes on the hind-feet, no dorsal crest, a large dewlap in the males.

SITANA PONTICERIANA, Cuv.

Fawn-coloured, with rhomboidal dark spots on the back, and a pale longitudinal streak from ear to tail. Male, in breeding season, with a large tricoloured dewlap.

This common ground lizard is distributed over all India, I believe, but is rare in the wooded districts, frequenting the open country, fields and low copses: on the approach of danger, it runs with great rapidity, tail erect, and conceals itself in any crack in the ground or hole, or under a stone or bush. Notwithstanding its activity, it is the common prey of harriers, buzzards, hawks and eagles. I have not seen the beautiful dewlap (blue black and red) developed in the south of India, nearly to the extent that appears to take place in the north, and there it attains a greater size. The colours

* Hab. also Ceylon (Newera Elia), whence a specimen was presented by Dr. Kelaart to the Society's Museum, since purloined together with a SALEA from the Nicobars. Another, from Mirzapore (?), presented by the late Major Wroughton, may be described as.

S. GULARIS, nobis. Length $16\frac{1}{2}$ in., of which the tail measures $11\frac{3}{4}$ in. Structure typical. Hind-limb reaching to the articulation of the lower jaw. Series of 14 lengthened spines from occiput to behind the shoulders, increasing in length to the 7th and 8th, and then successively diminishing. Gular fanon, or dewlap, well developed. Two inconspicuous ridges of slightly lengthened spines above the tympanum.—*Cur. As. Soc.*

of the dewlap are only exhibited during the pairing season, and it then becomes larger than previously. At this time, too, some blue marks are observable on the nape and back, that on the nape indeed forming a kind of crest more conspicuous now, the colours in general too are deepened, and the quadrangular marks on the back and barring of the limbs very distinct. The name *Sitana*, said by Cuvier to be the name by which it is known at Pondicherry, is a Latin termination of the word *Shaitan* or Devil, a name sometimes applied to it by the Musulmans of S. India.

Length of one $6\frac{3}{4}$ in., of which the tail is $4\frac{5}{8}$ in.

Gen. DRACO, *Linné*—Vide Cant. l. c. p.

Draco dussumierii—Dum. and Bibr.

Anterior and posterior angles of each orbit edged by a small pointed horn; grey, wings marked black and red.

This very beautiful little lizard is only found in the forests of the West Coast, or rather in the neighbourhood of the forests, for it frequents cocoa-nut and betel-nut plantations in their vicinity chiefly, not living, it is alleged, in the woods themselves, nor in the gardens at any distance from the forest. It is tolerably common in all Malabar, Cochin and Travancore, but not known farther North than Malabar, being either unknown or very rare in Canara.

The colour of the body is a delicate grey with some darker markings, which the animal occasionally renders very distinct, at other times obscures entirely. It sometimes also changes its whole hue to a dark blackish grey. The ground colour of the wings is red marbled with black and edged with yellow. The small dewlap is pale yellow marbled with green at the base. This I may remark is never extended forwards to the extent usually seen in stuffed specimens, being merely brought forward now and then to the edge of the chin, and in a flat state not distended with air. The two lateral appendages of the head, also, are merely slightly raised now and then, and never distended in the manner seen in dried specimens.

Gen. AGAMA—Daudin.

Head short, triangular; nostrils near the muzzle: 2—5 incisive teeth in upper jaw; a longitudinal fold beneath the throat and another across the neck. Tail compressed, conic. Anal pores.

AGAMA DORSALIS—Gray.

Nostrils small, somewhat tubular; occipital plate very small, simple; a small group of spines behind the ear, which is large. Dorsal crest almost wanting; scales above small, equal, keeled, those beneath smooth.

This large rock lizard is only partially distributed in Southern India, and is only found at some elevation above the sea. It is most abundant in Mysore, and especially so in the neighbourhood of Bangalore, where it may be seen on every bare rock about. It is also not uncommon on the edges of the Nilgherries up to the height of nearly 6000 feet. Its normal colour and that of the female at all times is a dusky grey with dark markings. The male can assume a very bright livery, viz. fine vermilion red above, with a streak through the eyes; under surface, limbs and tail black: occasionally the red is exchanged for yellow. It frequents bare rocks only, and retreats into holes and clefts on the approach of danger.

Length of a fine male 16 inches, of which the tail is $10\frac{1}{2}$.*

Fam. VARANIDÆ.

Gen. VARANUS—Vide Cantor l. c. p. 633.

VARANUS DRACÆNA—L. (*Query Linné?*)

Tupin. bengalensis, Daud.—*V. guttatus*, Merr.—*V. argus*, Merr. —*Tup. cepedianus*, Daud. and Kuhl.—*V. punctatus*, Merr. and Less. —*Mon. gemmatus*, Guer. Ic. R. A.—*V. Bibroni*, Blyth, *J. A. S.* 1842, p. 869.

Nostril situate exactly between the eye and muzzle. Tail compressed with a strongly dentated ridge.

This species of Monitor appears generally spread throughout the whole of India. It is chiefly nocturnal in its habits and frequents jungly places. It is by no means confined to the neighbourhood of water, though perhaps it prefers such a locality. It defends itself most vigorously by striking with its tail. It can climb well both trees and walls, and it is popularly believed, that thieves make use of it to effect an entrance into a building or over a wall by allowing the guana to get hold by its fore-claws of the window sill or wall and pulling themselves up by it. It is eaten by the natives, who

* The Society possesses a specimen from Pind Dadun Khan, presented by W. Theobald, Esq., Junr.—*Cur. As. Soc.*

consider it highly nourishing and aphrodisiac, and many Europeans use it for soup, imagining it allied to the West Indian Guana. It can always be procured in the Madras market.

Length of one 44 inches, of which the tail is 25.*

Fam. LACERTIDÆ.

Gen. CALOSAURA—Dum. and Bibr.

Maxillary teeth simple and tricuspid. Nostril placed on the *canthus rostralis*. A small fold of skin in front of the shoulder; abdominal scutæ quadrilateral, smooth, placed in longitudinal bands; 5 fingers and 5 toes; tail square at the root, round for the rest of its extent.

Calosaura Leschenaultii—Dum. and Bibr.

Dorsal scales rhomboidal, keeled; six rows of longitudinal scales on the abdomen.

Reddish brown above, pale yellow beneath, sides dark brown with 2 pale yellow bands, tail red.

Length of one $5\frac{2}{10}$th in. of which the tail is $3\frac{1}{2}$.

This pretty little ground lizard is somewhat locally distributed. I have seen it in the Salem and Coimbátoor districts only, especially near the banks of the Cavery. It frequents bushy ground, hedges of Euphorbia and clumps of Cactus, under which it rapidly takes shelter, as also among rocks.†

Gen. ACANTHODACTYLUS—Fitz.

One naso-rostral plate, ventral lamellæ quadrilateral, smooth. Fingers and toes compressed, toothed.

Acanthodactylus nilgherrensis—n. s.

Anterior edge of ear toothed scaly, collar transverse, scales of back somewhat larger behind than in front, an occipital plate.

This lizard, apparently belonging to a genus new to India, was

* The largest specimen in the Society's museum measures 52 in.; and our largest of *Hydrosaurus salvator*, (Laur.), 78 in., or exactly the same as that of *H. giganteus*, Gray, in the British Museum. *Empagusia flavescens*, Gray, our third common Monitor of Lower Bengal, we have not known to exceed 3 ft. in length. The Society has lately received a large specimen of *Hydrosaurus salvator* from Ceylon; and *Empagusia flavescens* likewise inhabits the Indus territories. —*Cur. As. Soc.*

† The Society's Museum contains examples of what we take to be this species from Pind Dadun Khan, in the Punjab Salt Range; and formerly possessed the same from Afghanistan.—*Cur. As. Soc.*

obtained by W. Elliot, Esq. on the Nilgherries near Coonoor. I have not myself been fortunate enough to observe it, and know nothing of its haunts. Its colours in spirit are of a pale pearl grey with a row of black spots on its back, another row on its sides somewhat larger and white, edged black.

Length of one $5\frac{1}{2}$ inches, of which the tail is 3.*

Fam. SCINCIDÆ.

Gen. MOCOA—Gray.

Mocoa bilineata—Gray, Ann. Nat. Hist., Dec. 1846, p. 430.

Fronti-parietal plates two, separate; ears round, moderate, with two very indistinct minute scales in front; the drum sunken; scales 6 or 8 rowed, thin, smooth; above shining olive, whitish beneath, a dark broad line on each side from nostril to end of tail; two narrow dark lines on back from neck to end of tail. In the young and half grown animal, the tail is of a beautiful smalt or violet colour.

Length of one $5\frac{1}{2}$ inches, of which the tail is $3\frac{1}{2}$.†

I have only found this Scink under stones on the summit of the Nilgherries. It appears very similar to *Lygosoma Dussumerii of* Dumeril and Bibron.

Gen. RIOPA—Gray.

Riopa albopunctata—Gray, l. c.

Pale olive brown above, yellowish white beneath, sides of neck and body, purplish black, dotted with white. Length of one 4 inches, of which the tail is not quite 2.

This certainly looks very like the *Tiliqua pulchra* figured in Gray and Hardwicke's Illust. of Indian Zoology. I have found it in the Nellore district, where it is rare.‡

Riopa punctata (L.)—Gray.

Length of one 9 inches, of which the tail is $4\frac{3}{4}$.

I have found this lizard both on the Eastern and Western Coasts of India under stones, or in the ground.

* A specimen with tail imperfect was long ago presented by Mr. Jerdon to the Society's museum.—*Cur. As. Soc.*

† Remarkable for its *Riopa*-like proportions, and great length of tail; also for having four large acutely triangular præ-anal scales, with the points converging posteriorly.—*Cur. As. Soc.*

‡ The Society has lately received it from Mergui.—*Cur. As. Soc.*

Riopa Hardwickii—Gray.

Very similar to the last, but with a longer and more pointed muzzle, and brighter colours, the stripes on the back being generally more distinct, and the tail, in the young, bright vermilion red. I have only found it in the Carnatic, where it is not very rare.

Length of one 9 inches, of which the tail is 5. It is found concealed in dark places, under logs of wood, stones, &c.*

Gen. TILIQUA.

Tiliqua rufescens—Merr.

T. carinata, Gray—*Euprepes Sebæ*—D. and B.

This is the most common Scink in the country, being universally dispersed throughout India, hiding itself under leaves, rubbish, stones, in dark rooms, &c. It runs with some rapidity, and is very active. Those I have seen in the Carnatic have the two yellow bands on the sides well developed, and appear to belong to the varieties A. and B. of Dumeril and Bibron, whilst on the Malabar Coast the variety D. and E. only is to be seen.†

Length of one 9 inches, of which the tail is $5\frac{1}{4}$.

Tiliqua trivittata—Gray.

Gray and Hardwicke's Ill. Ind. Zool.

Very similar to the last, but with the head shorter and more triangular, scales of the back broader, and three stripes along the back.

Length of one 8 inches, of which the tail is $4\frac{3}{4}$.

Mr. Gray, in his description of the *Euprepes trilineata*, mentions that his *T. trivittata* is yet unknown in Europe. I possess two specimens, which correspond exactly with the figure in Hardwicke's 'Illustrations.' I procured my specimens at Jalnat, where it is the common species.

Tiliqua rubriventris—Gray.

Gray and Hardw. Ill. Ind. Zool.

Olive brown above, beneath yellowish, usually red on the throat only, at times the whole abdomen red, sides white-spotted on a dark

* Hab. also Ceylon.—*Cur. As. Soc.*

† Those of Bengal are constantly banded, so far as we have seen; and the sanguine red colour of the lower band seems to denote the breeding season. In a very large specimen taken lately in my own garden (length 12 in., of which the tail measures $7\frac{1}{2}$ in.), the bands are nearly obsolete.—*Cur. As. Soc.*

gronnd, row of black spots on centre of back, and some other smaller ones on each side: three keeled scales.

Length of one $6\frac{3}{4}$ inches, of which the tail is $3\frac{6}{10}$ths.

This pretty Scink is tolerably common in wooded places, lurking about chiefly among fallen leaves. It is more abundant on the West Coast than in the Carnatic. The red colour of the abdomen is, I think, seasonal, and confined to the males. Mr. Gray mentions that, before my specimens were sent home, it was only known by the figure in Hardwicke.*

Gen. EUPREPES.

EUPREPES TRILINEATA—Gray, l. c.

Ears with two elongated scales in front, scales five-keeled, above pale yellow brown, beneath yellowish white, 3 white stripes edged with black on anterior half of the back, legs reddish.

Length of one $7\frac{2}{10}$ inches, of which the tail is nearly 4.

This well marked species is locally distributed. I have found it only in sandy ground, near the sea in the Carnatic, concealing itself in holes and fissures, and under shrubs.

I procured, on one occasion, a specimen of a small Scink in the forests of Malabar, which appeared distinct from any of the previous ones. It was uniform dark above and whitish beneath, body compressed, and scales two-keeled. Unfortunately, however, it was destroyed before I made a full description of it. I may here mention that *Goniodactylus indicus*, *Calotes viridis*, *Salea Jerdoni*, *Mocoa bilineata*, *Riopa albopunctata*, and *Euprepes trilineata*, were described by Mr. Gray from specimens sent home by me to the British Museum.

* The Society has a small specimen from Asám which may be T. MULTICARINATA, (Kuhl?), apud Gray. Scales distinctly seven-keeled. Colour greyish olive-green above, with dark spots on the hinder part of the body and base of tail. Lateral band, commencing from the ears, dark olive, with three narrow whitish stripes along the basal half of the tail, which are broken into spots on the sides of the body. Terminal half of tail whitish. Below also white, with obscure dark striæ.

Note on the Discharge of Water, by the Irrawaddy.—*By* J. McCLELLAND, *Esq. F. L. S., Commissioner of Forests, Rangoon.*

At the request of Capt. Phayre, Commissioner of Pegu, aided by Lieut. Nicholson of the 4th Seiks and the boats of the Hon'ble Company's Steam Frigate Sesostris, I took the soundings and velocity of the current, at different points, across the bed of the Irrawaddy at Prome, on the 14th and 25th of April last, with a view of ascertaining the quantity of water discharged by the river into the sea.

From a river-guage kept on board the Sesostris anchored opposite the wharf at Prome, (extracts of which are annexed,) it appears that there was a fall of about twenty feet from October 1852, when the place was taken, to February.

How much the river had fallen prior to October when the guage was first noted, is uncertain, as also the daily ratio of the fall during the subsequent months of November, December and January, the entries in the Sesostris's log-book having at first been irregularly made.

The river, however, continued to fall until the 23rd of February; on the 26th and the three subsequent days, a rise, in all of eleven inches, took place.

This partial rise of eleven inches in February, was followed by a fall of fourteen inches in March, with a slight rise of $\frac{3}{4}$ of an inch on the 24th, and again of two inches on the 29th of March.

From this date until the 7th of April, the river again fell about an inch daily, when it rose again five feet seven inches from the 8th to the 13th of April.

These changes in the river appeared to take place without reference to the changes of the weather, or even of the season in Burmah. On the contrary, the rains or S. W. monsoon, may be said to have set in at Prome on the 16th of May, when some inches of rain fell, and probably still earlier in the Arrakan and Moneepore mountains, from which direction the Irrawaddy receives a considerable tributary, yet the river continued still to fall, so that on the 5th of June, it stood one foot lower than it stood on the 14th of April.

About the beginning of April or end of March, 1837, the late Mr. Griffith observed that at Mogoung, one hundred and eighty miles above Ava, the Irrawaddy presents the same large undivided body of water as in the lower parts of Burmah, and, as an instance of its great magnitude, he says that it is not affected in size or appearance by the addition it then receives of the Mogoung river, the last large tributary worthy of the name, which the Irrawaddy receives.

These circumstances together with the quantity of water discharged by the Irrawaddy into the sea, certainly claim for it a first place amongst the great rivers of the east, hardly second to the Ganges itself.

While thus struck with the size of the Irrawaddy, we are forcibly reminded of its being, I believe, the only one of our great rivers, whose source is still a matter of speculation.

Making all allowance for the extravagance of Burmese Historians, there is enough in the authenticated history of the country, to show that great armies have passed and re-passed to, and from, China. Besides which, the Chinese character of the boats and houses of Burmah, together with some of the ceremonies of the people, suggest a more immediate and direct intercourse with China on the part of the Burmese, than any other nation on the western side of the Himalaya. So much so, that I have often heard it surmised by our officers at Prome, as one way of accounting for the resemblances, that the Irrawaddy probably flows from China, not that it was supposed to be navigable to that extent, but that its valleys may afford comparatively easy passes between the two countries.

Klaproth considered the Irrawaddy to be a continuation of the *Tsan peu* or great river of Thibet, an opinion with which Mr. Griffith coincided. Colonel Wilcox, however, an excellent authority, considered the Tsan peu to be the continuation of the Burrampootur, and Captain Pemberton, I believe was of the same opinion, and accordingly made the Irrawaddy terminate in the Borkhumtee country, three hundred and sixty miles above Ava, although there can hardly be a doubt that it must necessarily have a more extended course, more especially as it has been traced two hundred miles

above Ava, without observing any perceptible difference or diminution of size.

Under these circumstances, discoveries of much interest may be expected to result from an investigation of the source of the Irrawaddy.

It is true that a part of the Chinese province of Yunnan approaches to within four days journey of Mogoung, and presents an extended boundary along the north-eastern frontier of Burmah sufficient to account for the direct intercourse that appears to be carried on between the two nations. But Yunnan itself seems to be here a mountain province, with perhaps but little communication with the rest of the Empire.

If on the other hand, the Irrawaddy be found, as is not unlikely, to be the continuation of one or other of the two great rivers laid down on Pemberton's Map as coming from the north of Thibet, some great gate or pass may be found across the chain by means of which an easy communication is formed with the central provinces of China.

The mean depth of the river on the 25th of April was ascertained to be 12.70833.

The mean speed of current was found to be $1\frac{21}{22}$ of a mile or 3440 yards per hour.

The mean speed multiplied by 0.8 will give the average speed of the whole volume. The direct breadth of the River opposite the Commissariat Ghaut, taken by means of the Theodolite, was found to be 1210 yards.

Average speed in feet.	Mean depth.	Breadth in feet.
8256	× 12.70833 ×	3630 =

380,859,500.1024 cubic feet discharged per hour.

$\frac{380,859,500.1024}{60.}$ = 6,347,658.33504 cubic feet discharged per minute.

$\frac{6347658.33504.}{60.}$ = 105794.305584 cubic feet discharged per second.

There are 6.2321 gallons in a cubic foot.

Rise and Fall of the Irrawaddy at Prome between the 20th of February and 30th of March, 1853.

Date.	Rise.		Fall.		Remarks.
Feb. 20th,	..	..	1	Inch.	
21st,	0	0	0	0	
22nd,	..	..	1	Inch.	
23rd,	..	..	1	Inch.	
24th,	0	0	0	0	
25th,	..	..	1	Inch.	
26th,	4	Inches.	..	..	
27th,	2	Inches.	..	..	
28th,	3	Inches.	..	..	
March 1st,	2	Inches.	..	..	
2nd,	..	..	1	Inch.	
3rd,	..	..	1	Inch.	
4th,	..	..	1	Inch.	
5th,	..	..	1	Inch.	
6th,	..	..	1	Inch.	
7th,	0	0	0	0	
8th,	..	..	3	Inches.	
9th,	0	0	0	0	
10th,	0	0	0	0	
11th,	0	0	0	0	
12th,	0	0	0	0	
13th,	..	..	1	Inch.	
14th,	..	..	1	Inch.	
15th,	..	..	1	Inch.	
16th,	0	0	0	0	
17th,	..	..	1	Inch.	
18th,	..	..	$\frac{3}{4}$	Inch.	
19th,	..	..	1	Inch.	
20th,	..	..	$\frac{1}{4}$	Inch.	
21st,	..	..	$\frac{1}{4}$	Inch.	
22nd,	..	..	$\frac{1}{2}$	Inch.	
23rd,	..	..	$\frac{1}{4}$	Inch.	
24th,	$\frac{3}{4}$	Inch.	..	..	
25th,	..	..	$\frac{3}{4}$	Inch.	
26th,	0	0	0	0	
27th,	0	0	0	0	
28th,	0	0	0	0	
29th,	2	Inches.	..	..	
30th,	..	..	1	Inch.	
31st,	..	..	..	..	

Rise and Fall of the Irrawaddy at Prome between the 8th and 24th of April, 1853.

Date.	Rise.	Fall.	Remarks.
April 8th,	1½ Inches.	.. ..	
9th,	2½ do.	.. ..	
10th,	22 do.	.. ..	
11th,	27 do.	.. ..	
12th,	13½ do.	.. ..	
13th,	1 do.	.. ..	
14th,	.. ..	4 Inches.	
15th,	.. ..	8 do.	
16th,	.. ..	4 do.	
18th,	.. ..	11 do.	
20th,	.. ..	10 do.	
21st,	.. ..	3 do.	
22nd,	.. ..	5 do.	
23rd,	.. ..	2 do.	
24th,	.. ..	2½ do,	

No. 964.

Memorandum on the prospect of remuneration in working the Iron Mines of the Raneegunge district. By Major W. E. Baker, *Consulting Engineer to the Govt. of India, with a Report on the same subject by Professor Oldham, Geol. Surveyor.—Communicated by the Govt. of Bengal.*

The prospect of profit in working these mines, has been fully and ably discussed by Professor Oldham in his report, dated 18th May, 1852, pp. 9 to 20, and though I cannot say that his arguments have on all points commanded my conviction, I believe that on the whole they are sound; at all events I have not the familiar knowledge of details, which would enable me to combat them, or would justify my dissent from his general conclusion, p. 18.

" That under existing conditions the manufacture of Iron, on any efficient scale, and on the European system, cannot be undertaken in this district with a certain prospect of such a return, as would justify the great outlay required."

But Mr. Oldham remarks in the paragraph succeeding that which I have quoted, that the then " existing conditions" may alter, and, in fact, they have already altered to such an extent, as materially to affect the argument.

One of the most important calculations on which Mr. Oldham's conclusions rest, is that of the relative cost in England and India, of the raw materials required for the manufacture of a ton of pig Iron—showing a difference in favour of India, of 11*s.* which he does not consider to afford a sufficient margin to cover the increased cost of machinery required for the subsequent processes—or the risks so forcibly and truly enumerated in the 13th page.

About half of the estimated cost in India is that of limestone, which is set down at 8*s.* 6*d.* a ton in Calcutta, and 27*s.* a ton at Raneegunge—but the mineral branch of the Railway is now approaching completion, and though stopped for the present at the Collieries, would doubtless be extended to the site of any large Iron works that might be established—this would convey limestone from Calcutta at about 7*s.* 6*d.* a ton, making an aggregate cost of 16*s.* instead of 27*s.*, and exactly doubling the difference of cost in favour of India.

But a circumstance which will still further affect the comparison, and which will throw additional weight into the scale of the Indian manufacture, is the great rise which has lately occurred in the price of Iron at home, and of freight of all kinds from England to this country. How far the continuance of these prices may be depended upon, it is impossible to say—but it should be recollected that Mr. Oldham's comparison was made during a period of great depression of the Iron trade, when prices were lower than, I believe, they had ever been before, or were likely to be, or at all events to continue, again.

On these considerations, I would hope that the prospect of turning to useful account, the mineral riches of this locality, are not now so discouraging as they appeared to Professor Oldham, but I would recommend those, who may contemplate embarking their capital in such a speculation, to commence on a small scale, by the establishment of one or two blast furnaces for the manufacture of cast Iron (for which there is a considerable local demand), and to await public opinion on its quality, before incurring the additional expense of puddling furnaces, rolling mills, &c.

In connexion with this subject, I may mention that the chairs supplied for the East India Railway by the Porto Novo Iron Com-

pany of Madras—have been much objected to, by the Engineers, as being brittle, and somewhat irregular in shape. I would not say that these faults (if not exaggerated) are irremediable—or that they would necessarily be found in the Raneegunge manufacture—but they serve to illustrate the truth that something besides the raw material is requisite to the production of a marketable article—and perhaps also, we may further deduce from these circumstances, that Iron of local manufacture will have to encounter a certain amount of prejudice on the part of English Engineers and Platelayers.

G. A. C. Plowden, Esq., *Offg. Secy. to the Govt. of India.*

(Sd.) W. E. Baker, *Major,*
Consulting Engineer to the Govt. of India.
20*th June*, 1853.

(True Copy)
(Sd.) G. Couper, *Offg. Under-Secy. to the Govt. of India.*

No. 189.

From the Superintendent of the Geological Survey,
To W. Gordon Young, *Esq., Under-Secy. to Govt. of Bengal.*
Dated August 10*th*, 1853.

Sir,—I have the honor to acknowledge the receipt of your letter No. 513, dated July 19th, 1853, enclosing copy of a memorandum by the consulting Engineer to the Government of India in the Railway Department, on the prospects of remuneration in working the Iron mines of the Raneegunge district, and requesting that I will report my opinion on the subject, under the present altered aspect of the case.

Major Baker has very justly stated that a great change in the conditions under which the manufacture of Iron in that district could be undertaken, will be effected by the completion of the intended Railroad to Raneegunge; and by the consequent economy of transit for such materials, as are required in that manufacture, but which, not occurring in the vicinity, must be procured from a distance. And while admitting the justice of the conclusion at which I had arrived from an investigation of the whole matter in 1852, he yet considers that the alteration in the conditions then existing, will be of sufficient amount materially to affect the argument.

The principal, and indeed the only change in these conditions of any importance, to which Major Baker refers, is the greatly diminished cost of limestone, the price of which would be reduced from 27*s.* per ton, (at which I estimated it,) to about 16*s.* per ton. Of course the sum estimated by Major Baker, as the cost of carriage per Railway is liable to such alteration, as experience in the cost of working the line may introduce, but taking this estimated cost as correct, we would have a saving in the cost of limestone of from 10*s.* to 11*s.* per ton. But this does not, as Major Baker says, "exactly double the difference of cost of the raw materials in favour of India," as the difference originally estimated by me, of 11*s.* per ton, was *per ton of pig Iron*, and not per ton of limestone. Taking then the cost of limestone at 17*s.* instead of 27*s.* per ton, we would have the entire cost of the raw materials required for the production of one ton of pig Iron as follows.

	s.	*d.*
Coal, ...	7	$2\frac{1}{2}$
Ore,.....	14	$4\frac{3}{4}$
Limestone, ...	12	9
	34	$4\frac{1}{4}$

As compared with 52*s.* $10\frac{1}{2}$*d.* in Great Britain or a saving in prime cost of 18*s.* $6\frac{1}{4}$*d.* per ton.

I should state here, that subsequently to the publication of my former report, I was informed by more persons than one, that I had therein estimated the cost of raising the Iron stone at too low a price, and that in reality the expenses attending it, would be more nearly 6*s.* per ton, than 4*s.* My own enquiries did not lead me to think so, but I should not wish to place my casual examinations in comparison with the long acquired experience of those resident in the neighbourhood, and who could not have any very obvious interest in misrepresenting the facts, as the establishment of Iron works would evidently benefit the district. But if these statements be admitted as true, and the estimate given above be modified accordingly, the cost of the raw materials for one ton of pig Iron would be

	s.	*d.*
Coal, ...	7	$2\frac{1}{2}$
Ore,.....	21	$7\frac{1}{2}$
Limestone, ...	12	9
	41	$6\frac{1}{2}$

This as compared with the cost in Great Britain, (52*s.* $10\frac{1}{2}$*d.*) will leave the difference in favour of India, very nearly the same as originally estimated, viz. 11*s.* notwithstanding the difference in cost of the limestone.

As I have stated above, my own enquiries certainly did not lead me to think that the cost of raising the ore, would be more than 4*s.* per ton. But on a reference to my report, it will be seen that I fully anticipated and referred to the difficulties which would attend on the extraction of it, and stated that I had been fully satisfied that Mr. Williams had previously under-estimated its cost. It is possible, I did so also, judging from the amount of work which would readily be done by an English miner. But I do not think the cost (even allowing for all these difficulties, and for the want of training in the hands employed) could be so great, as it has been stated. If the cost be therefore estimated at the mean of the two statements, or at 5*s.* per ton. we have the cost of raw materials still showing a balance in favour of India of 14*s.* 11*d.* or 15*s.* per ton.

Now I have, in my former report, estimated that the difference in the cost of the raw materials of 11*s.* per ton of pig Iron would not more than counterbalance the great additional charges and risks, necessarily attendant on such undertakings in this country. Beyond this, there will remain therefore a clear saving, under the altered conditions of the case, of from 4*s.* to 7*s.* for each ton of pig Iron.

Major Baker also states, as additional reasons for supposing that the manufacture of Iron could probably be carried on with profit now, that since my report was written the price of Iron has greatly advanced, and also the charge for freight.

With reference to the former fact, that the price of Iron has advanced, it must be borne in mind that the calculations in my report were founded on the cost of the raw materials without any reference whatever to the cost of the manufactured article. And I may state,

that I purposely avoided any allusion to the then cost of Iron, as I was fully aware, that at the time alluded to, Iron was being sold at the smallest possible profit, and in many cases *at an actual loss.*

With regard to the question of *freight*, I have no means of ascertaining the probability of a continuance or non-continuance of the present high rates, though I am disposed to think, that these rates are *exceptional*, caused by the sudden diversion from the ordinary channels of trade, of a very large amount of shipping, in consequence of the rapid and immense extension of intercourse with the gold-producing countries. I have no means here, of ascertaining by a reference to commercial reports, what the average charge for freight has been, during the last twenty years, but I am inclined to think that the tendency has been to a regular decrease, and not to an increase, and to suppose that the present is only a temporary derangement in the scale of charges, arising from the temporary causes, which are even already passing away. On this, however, I cannot pretend to offer an opinion, and of course, any increase in the freightage charges will be so much in favour of the Indian manufacture.

If therefore, my former conclusions were just (and I was glad to find that Major Baker fully confirmed the general correctness of the argument) I am still of opinion that the only really well founded advantage in favour of the manufacture in India, will be the saving in the original cost of the materials and that this saving will be from 4*s.* to 7*s.* per ton of pig Iron manufactured; this saving being over and above the amount sufficient to counterbalance all additional risks in this country. And *I think that this ought to be sufficient to induce the investment of capital in such undertakings.*

Major Baker has suggested that any persons engaging in such manufacture, should at first confine their attention to the production of cast Iron only, in the justice of which advice I fully concur. Indeed, such *must* be the necessary consequence of any attempt to work these ores, on an efficient scale. I do not, however, see that there is any sufficient demand for cast Iron, to justify the commencement of such heavy works as would be required *with a view to the production of cast Iron only.* Major Baker states that there is "a considerable local demand for cast Iron." A reference to the tables

of imports however, shews that during the year 1851, only 510 tons of pig-iron were imported. Now a single blast-furnace of small size would produce about 45 tons per week, or considerably more than 2000 tons per annum, that is more than four times the amount at present required to supply the market. And such blast-furnaces to be worked economically, must be worked nearly continuously.

With such a demand, therefore, (and I am not aware of any supply of cast Iron other than that imported) or even supposing this demand to be doubled, I cannot see that any one would be justified in undertaking such a manufacture on the British system, with a view to the supply of cast Iron only :* I would put out of the question the consideration of other systems, as being inapplicable to the peculiar kind and quality of ores found in the district referred to.

Major Baker in his memorandum refers to the objections urged against some of the chairs supplied by the Porto Novo Madras Iron Company. I have myself seen castings turned out from that Company's works, which on any English Railroad, would have been not only objected to, but at once rejected without the slightest hesitation. But I am satisfied that these defects arose as much from a want of sufficient care in moulding, and from the use, probably, of inferior sand, as from the quality of the metal; and that they are quite capable of being remedied. I stated in my former report (page 15) that the character of the iron produced in this country should, like every new article of commerce, be established before it would be purchased with confidence, and there can be no doubt, it would have to contend against the *thoroughly well grounded prestigè* in favour of English work, but this difficulty would rapidly vanish, provided the articles supplied, were equally good in quality and finish.

In connexion with this subject, I cannot avoid again taking the

* Supposing there were a demand for 1000 tons of pig Iron ; and that as above calculated, the manufacturer in India would have an *additional* profit, beyond the ordinary profits of the trade, of 7*s*. per ton (taking the most favourable estimate) this would only give him £350 per annum ; while the first outlay for machinery, &c. would be at the least £6000 to £7000, thus yielding an additional profit of nearly five per cent. Having no returns of the amount of "castings" imported, I have been obliged to estimate solely from the amonnt of pig Iron imported.

opportunity of respectfully urging on the consideration of the Most Noble the Governor of Bengal the great importance of a careful and systematic analysis of the several Iron ores of the district referred to, and of other parts of India. I have already,* in connexion with coal enquiries, urged the importance of such a series of experimental investigations, and I am satisfied that valuable results would spring from a similar enquiry into the composition, &c. of the various ores of India; of the methods now adopted in their reduction, and of the possible improvement in these. There have been no trustworthy analyses of these ores as yet made, and it is possible that some ingredient may be found in one or other of the many beds, which may either render the ore of that bed comparatively useless, or may materially increase its apparent value. Such a series of analyses systematically conducted by a competent chemist, and in connexion with the actual examination of the mode of occurrence of the several ores in the field, would prove of great value; but could only be undertaken with advantage by some one, who could devote his time zealously, and continuously to the task, so that the result might be strictly comparable.

(Signed) Thomas Oldham,

Darjeeling, August 1st, 1853. *Superintendent of Geological Survey.*

Literary Intelligence.

Extract from a letter of Colonel Rawlinson, C. B. Honorary Member of the Asiatic Society of Bengal, to Dr. A. Sprenger.

Baghdad, April 15th, 1853.

"I have indeed such an enormous mass of materials in hand that a couple of years' leisure, is almost indispensable to put them in order, and carry them through the press. The historical portion consists of an almost continuous series of annals extending from the time of Solomon to the destruction of Nineveh. But besides this, I have the library of the Assyrian kings to classify and publish.

* From Superintendent of Geological Survey, To Under-Secretary Government of Bengal. No. 181, June 27, 1853.

—On the clay tablets, indeed, which we have found at Nineveh, and which are now to be counted by thousands, there are explanatory treatises on almost every subject under the sun, the art of writing, grammars, and dictionaries, notation, weights and measures, divisions of time, chronology, astronomy, geography, history, mythology, geology, botany, &c. In fact we have now at our disposal a perfect cyclopædia of Assyrian science, and shall probably be able to trace all Greek knowledge to this source."

Extract of a Letter from Col. Rawlison to Mr. Grote, dated, *Baghdad, 5th July*, 1853.

"You will have seen probably in the Anniversary Report of the London Society, a brief account of my late proceedings, but I may be able to add a few details of interest that have not yet been published. The comparative modernicity of the Assyrian Empire is now established beyond all cavil. I have obtained almost a complete list of Kings numbering about thirty from the fall of Neneveh, late in the 7th century B. C. to the institution of the Empire in the middle of the 13th century. Previously to that date Assyria was subject to Babylonia, and as materials accumulate, we should be able, I think, to turn up Babylonian history, through the various dynasties noted by Berosus to the real starting point of Western-Asiatic Empire, in the 23rd century before the Christian era. I do not expect to ascend higher than that period, except through ethnic affinities and mythological tradition, sources of evidence which should be used very cautiously, but which, in this case, I can already plainly see will bring the subject into immediate connection with the 10th chapter of Genesis. The labour, however, required to bring out these results is immense. It would take a person at least ten years nearly, to copy all the curious MSS. documents now at our disposal, forming the debris of the Royal Library at Nineveh; and in the mean time wherever we dig, fresh tablets are being brought to light, so that our stores of information are likely to increase indefinitely. With regard to the mechanism of this enquiry, I must also inform you that if you merely looked to my preliminary dissertation in the R. A. S. Journal, you would have a very imperfect idea of the extent or condition of the Alphabet. Later researches have furnished me with above a thousand distinct characters, and

these characters have on an average four or five distinct values, so that the very element of the study presents a really formidable difficulty. I will write to you at greater length, as soon as I have a little more time at my disposal."

Extract from a letter from Sir Henry Elliot to Dr. A. Sprenger, dated Cape Town, June 23rd, 1853.

"I am engaged just now in printing off a few copies of some of the notes and appendices I have been writing, since the beginning of the year. Much is left incomplete, as I have not the means of finishing the notes here, since references are required to works which I have not got. This refers to the Arab period (see Journal As. Soc. Vol. XX. p. 252). The previous printing of the most difficult portion, will save a deal of trouble, when I put the whole work to press."

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL,

FOR JULY, 1853.

The Society met on the 6th instant at the usual hour.

Sir JAMES COLVILE, Kt. President, in the chair—

The minutes of the last month's proceedings were read and confirmed.

The accounts and vouchers for the month of April and May were laid on the table.

The following presentations were announced:

1. From J. A. Cockburn, Esq. Supt. Barrackpore Park. Specimens of a Loris (Nycticebus tardigradus), a Pheasant (Phasianus torquatus), and a Porcupine (Hystrix bengalensis).

2. From the Secretary of the Meteorological Society of Mauritius. Proceedings of the Society for May, 1853.

3. From J. L. Beaufort, Esq. Pubnah. A silver coin of the reign of the Emperor Akbar, dated 999 A. H.

4. From Major Baker, on the part of G. Turnbull, Esq. Chief Engineer of the E. I. Railway. Specimens of fossil bones found in the Ranigunge district.

The following is an extract from Major B.'s letter.

"I beg to forward, for presentation to the Asiatic Society, on the part of G. Turnbull, Esq. Chief Engineer of the E. I. Railway, some fossil remains consisting of a set of tarsal bones, and three fragments of the jaw, of a large ruminant.

"I am informed that these specimens were found in the Ránigunge district, near the confluence of the Damuda and Singharin,

in an excavation made for the purpose of obtaining ballast for the Railway: it will be observed that they are encrusted with limestone (Kankur).

"They were accompanied by several other fossils which I have failed to obtain, but which are said to have been of a similar character to these now presented to the Society. It is probable that they all belonged to one animal."

Mr. W. J. Herschel of the Civil Service, duly proposed and seconded at the last meeting, was balloted for, and elected an ordinary member.

Dr. E. Röer was named for ballot at the next meeting,—proposed by Mr. Grote and seconded by Dr. Sprenger.

The Council submitted a report for the removal of Mr. J. T. Shave's name from the list of members, under Rule 13.

Communications were received—

1. From W. Muir, Esq. Secretary to the Government of the North-Western Provinces, forwarding a Meteorological Register kept at the Government Secretariat Office, Agra, for the month of April.

2. From W. G. Young, Esq. Under-Secretary to the Government of Bengal, enclosing further correspondence regarding the discovery of coal on the bank of the Chawa Nadee.

The report of the Curator of the Museum of Economic Geology, read at the April meeting, referred to this discovery. The correspondence now received gives the result of an examination of the site of the coal by a small party of sappers.

The following extract from the report of the serjeant in charge of the party is not favourable.

"The Sivok Nadee is about four miles long, and takes its rise from between two high hills (names not known) which are, judging from supposition, in height three or four thousand feet, and very steep, extending its course for upwards of two miles between these hills, before it opens out into the *plains*. Ultimately it empties itself into the river "Teesta" two miles further on, the average width being about ninety feet, and it is in that portion of the Nadee between the hills *and not on the plains*, that, amongst the high rocks which overhang each side, the coal exhibits itself in the fissures of

the rocks, in small quantities, which with difficulty we extracted. The thickness of veins visible in the fissures in the rocks, is from a quarter to two inches, that in the cavities we found in lumps, specimens of which I am bringing with me. The whole of the coal to be seen is embedded in a hard sandstone."

3. From Major J. Turton, Prome, offering for the Society's acceptance, specimen of a fossil root of a tree from that district.

The following is an extract from Major T.'s letter:

"It was broken in half whilst being rolled towards the camp and when first moved, a piece eight or ten inches in length, that might be called the tap-root, was broken off and afterwards lost. The root measured about four feet across the longest diameter, and two to two and a half at the shortest. It was found embedded on one of the small hills to north-east of the Pagoda a mile or so distant, and to all appearance was on the position in which it had grown. Only one piece of any size such as would be considered part of the same tree was lying near it."

4. From Dr. J. Fayrer, Rangoon, enclosing Meteorological Registers kept at the Field Hospital, Rangoon, for the months of February, March and April.

5. From C. Gubbins, Esq. Bijnore, noticing the occurrence of a dust-storm at Bijnore on the morning of the 30th May last.

The following is an extract from Mr. Gubbin's letter:

"For the benefit of future meteorologists, I may as well place on record the fact of an *andhi* or dust-storm coming from the north-east, the first time that I remember such an occurrence during nearly twenty-five years' residence in the northern parts of the upper provinces. Its extent appears to have been considerable, including all northern Rohilcund, but I am not aware how far it was felt south of Moradabad, nor whether it entered the Doab.

"The month of May has here been very tolerably mild, but on Sunday the 29th the atmosphere became oppressively warm. The evening and night were extremely close, without the usual freshness towards morning, and as the sun rose (30″) an east wind also got up raising clouds of dust, but hardly sufficient to be called a dust-storm. Throughout the whole day a grove of trees, about a mile off, was never once seen, some other trees within three hundred yards

were dimly perceived as in a cloud, and although there was constant sunshine, it was so reflected and obstructed by the fine dust floating in the atmosphere, that often for an hour together, there was hardly a perceptible shadow cast.

"Towards 6 P. M. the wind, still from the north of east, rapidly increased, and for about quarter of an hour blew as strongly as in an ordinary *andhi* (I have no Anemometer, so cannot be more precise), completely hiding from view an out-building rather above a hundred yards distant. The whole then cleared off, a very few drops of rain fell, and the evening and night were clear and remarkably cool for the season. This was probably due to a heavy fall of rain which, I am informed, took place about the same time among the lower hills."

6. From Captain C. Haughton, enclosing a note on the site of Alexandria ad Caucasum.

The Librarian submitted a list of additions made to the Library during the past month.

Read and confirmed, 3rd August, 1853.

(Signed) J. W. Colvile.

Library.

The following additions have been made to the Library since the last meeting.

Presented.

A Geological Report on the Kymore Mountains, the Ramghur Coal Fields and on the manufacture of Iron. By D. H. Williams, Esq. Calcutta, 1852, 8vo. 2 copies.—By the Government of Bengal.

Journal of the Indian Archipelago for Jan. 1853, 2 copies.—By the same.

A notice of the Origin, Progress and Present Condition of the Academy of Natural Sciences of Philadelphia.—By W. S. W. Ruschunburger, Philadelphia, 1852, 8vo.—By the Academy.

The Benares Magazine, Vol. VIII. p. ii.—By the Editor.

The Calcutta Christian Observer for July, 1853.—By the Editors.

The Oriental Baptist, No. 79.—By the Editor.

The Upadeshak, No. 79.—By the Editor.

The Oriental Christian Spectator for May, 1853.—By the Editor.

The Missionary for July, 1853.—By the Editor.

Bibidhártha Saṅgraha, No. 18.—By the Editor.

The Citizen Newspaper for May and June.—By the Editor.
Purnachandrodaya for June, 1853.—By the Editor.
The Indian Charter, for June.—By the Editor.
Tattwabodhiní Patriká, No. 119.—By the Tattwabodhiní Sabha'.

Exchanged.

The Calcutta Review, No. 38.
Edinburgh Philosophical Journal, No. 108.
The Philosophical Magazine, Nos. 31, 32.

Purchased.

The Annals and Magazines of Natural History, Nos. 64, 65.
Journal des Savants, January to March, 1853.
Comptes Rendus, Nos. 8 @ 13.

for August, 1853.

The Society met on the 3d instant at the usual hour.

Sir James Colvile, Kt. President, in the Chair.

The minutes of the last month's proceedings were read and confirmed.

The accounts and vouchers for the month of June last were laid on the table.

Donations were received—

1. From R. N. C. Hamilton, Esq. Resident at Indore, 2 copies of a Memorandum on the caves of Kulvie in Malwa, by Dr. E. Impey, Presidency Surgeon, Indore.

2. From Captain M. Turnbull. A squirrel from the Straits *(Sciurus hypoleucos*, Horsf.)

3. From H. Stainforth, Esq. C. S. through Captain Thuillier, twelve silver coins dug up from the ruins of Gour.

4. From W. G. Young, Esq. Under-Secretary to the Government of Bengal, a map of the station and suburbs of Jessore for the use of the Museum of Economic Geology.

Dr. E. Röer, duly proposed and seconded at the last meeting, was balloted for, and elected an ordinary member.

The following gentlemen were named for ballot at the next meeting.

Captain J. C. Haughton, 54 N. I.;—proposed by Captain Hannyngton and seconded by Dr. A. Sprenger.

George Plowden, Esq. C. S.;—proposed by J. R. Colvin, Esq. and seconded by Mr. A. Grote.

Lieut. C. H. Dickens, Bengal Artillery;—proposed by Mr. Grote and seconded by the President.

The President in a short speech announced to the meeting the death of Major Kittoe, and then proposed the following resolution which was seconded by Mr. C. Allen and carried unanimously:—

Resolved—that the Society desires to record its regret at the death of Major Kittoe, for many years a valuable member of this Society, and a distinguished labourer in the field of Indian Archæology.

A conversation then took place on the subject of Major Kittoe's papers and drawings, in the course of which Dr. Ballantyne stated that Major K. had left certain facsimiles of inscriptions in the College at Benares. It was consequently resolved that the Secretary should address the Government with a view to measures being taken for the preservation of those or any other documents relating to archæology which may have been left by Major Kittoe in India; and should at the same time state the readiness of the Society to take charge of them, in case the Government should see fit to entrust them to the Society.

Communications were received—

1. From Captain E. Dalton, Debrughur, Assam, enclosing two papers, one, by himself, on Gold Washing in the Jugloo and Seesee rivers, and the other by Major Hannay, on Assam Gold Fields generally.

The first is the substance of an official report communicated by the Bengal Government in May last, and reduced into its present form by Captain D. at the suggestion of the Secretaries. Two drawings, which accompanied the paper, were laid upon the table.

2. From Captain Layard, Berhampur, forwarding copy of a sunud connected with the site of Gour, and promising soon to send a stone from the steps of the Muhammadan Durgah at Ghysabad bearing a Pali (?) inscription.

3. From F. E. Hall, Esq. Benares, transmitting a list of Persian books contained in the Library of his Highness the Rajah of Benares.

4. From Dr. McClelland, enclosing a Memorandum on the discharge of water by the Irrawaddy.

5. From W. G. Young, Esq. Under-Secretary to the Government of Bengal, forwarding a report, by Captain Sherwill, on the geology of Darjeeling, and of the mountains in its neighbourhood.

Captain Thuillier proposed that for the above, as one of a series of very valuable papers, which Captain Sherwill has contributed for the Journal, the best thanks of the meeting be accorded to him.

The President seconded the resolution, which was carried unanimously.

6. From C. Gubbins, Esq. Bijnore, submitting "Notes on the ruins at Mahavalipuram on the Coromandal Coast."

Read and confirmed, 7th Sept., 1853.

(Signed) J. R. Colvin.

Library.

The following books have been added to the Library since the last month.

Presented.

Selections from the Records of the Bengal Government, No. XI. Report on the Political States in the S. W. Frontier Agency, Revenue Administration of Assam, and the Wild Tribes bordering the South Frontier of Chittagong. 2 copies.—By the Government of Bengal.

Annual Report of the Grant Medical College, Bombay, 1852-3.—By J. Murehead, Esq. Principal of the College.

Description of the Caves of Kulvie in Malwa. By E. Impey, Esq. Agra, 1853, 8vo. Pamphlet (2 copies).—By R. N. C. Hamilton, Esq.

The Atmabodha with its Commentary; also the Tattwabodha: being two treatises of Indian Pantheism—Mirzapur, 1852—8vo. Pamphlet.—By the Editor.

Journal Asiatique, No. 2.—By the Asiatic Society of Paris.

The Oriental Christian Spectator for June, 1853.—By the Editor.

The Oriental Baptist, No. 80.—By the Editor.

The Calcutta Christian Spectator, August, 1853.—By the Editor.

The Upadeshaka, No. 80.—By the Editor.

Catalogue of a Collection of Ancient and Modern Italian books comprising several in Greek and Latin, printed in Italy, and offered for sale by C. F. Moloni.—By the Publisher.

Exchanged.

The Athenæum, for April, 1853.

The London, Edinburgh and Dublin Philosophical Magazine for May, 1853.

Purchased.

Journal des Savants, for April, 1853.

Comptes Rendus, Nos. 14 to 18, Vol. 36.

Spiegel's Grammatik des Parsisprache.

Akademische Verlesungen uber Indische Literaturgeschichte. Gehalten von A. Weber.

The Annals and Magazine of Natural History for May.

Bibliotheque des Croisades par M Michaud.

Schönberg's Travels in India, 2 Vols.

Hardy's Eastern Monachism.

Abstract of Meteorological Observations for the month of February, 1853.

Rangoon, 1*st March*, 1853.

No instruments.	Barometer Sunrise.			Thermometer Sunrise.			Barometer 9 A. M.			Thermometer 9 A. M.			Barometer Noon.			Thermometer Noon.			Barometer 3 P. M.			Thermometer 3 P. M.			Barometer Sunset.			Thermometer Sunset.			Barometer 9 P. M.			Thermometer 9 P. M.			Remarks.
	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	
Dry.....				78	59	66.666	81	69	72.616	92	83	87.677	97	87	91.9	No observation.			79	69	75.847															Weather this month, fine; wind variable, occasionally in gusts.
Wet.....				71	57	63	74	63	69.154	80	65	72.765	82	63	73.85	Ditto.			76	62	70.667															No rain.
																												Ditto.								Atmosphere dry.
																																				Mornings foggy at sunrise, but clearing off rapidly.

J. Fayrer, M. D. *Asst. Surgeon,*
Field Hospital, Rangoon.

Date.	Sunrise.					9 A. M.					Noon.				
	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.
	Wet.	Dry.				Wet.	Dry.				Wet.	Dry.			
1	..	..	No Instrument.	N. light.	Clear.	67	71	..	N. W. lt.	Clear.	65	89	..	S. W. fresh.	Cumuli.
2	57	59		Ditto.	Ditto.	63	71	..	Ditto.	Ditto.	65	83.5	..	Ditto.	Ditto.
3	57	60		Ditto.	Ditto.	63	71	..	N. E. do.	Ditto.	65	87	..	Ditto.	Ditto.
4	58	60		Calm.	D. fog.	66	71	..	Ditto.	Ditto.	..	..	..	S. W. light.	Cirri.
5	57	61		Ditto.	Slight fog.	..	..	..	....	....	..	..	..	....	....
6	62	64		Ditto.	Hazy.	69	74	..	N. E. lt.	Clear.	72	85	..	S. W. light.	Cirri.
7	63	65		Ditto.	Thick fog.	..	..	..	Ditto.	Ditto.	69	83	..	....	....
8	63	65		Ditto.	Hazy.	..	..	..	Ditto.	Ditto.	..	..	..	....	....
9	65	67		Ditto.	D. fog.	..	..	..	Ditto.	Ditto.	..	..	..	....	....
10	64	67		Ditto.	Ditto.	..	..	..	Ditto.	Ditto.	..	..	..	....	....
11	67	70		Ditto.	Ditto.	74	76	..	Ditto.	Ditto.	75	88	..	....	Cloudy.
12	..	..		....	Hazy.	..	..	..	Ditto.	Ditto.	..	..	..	....	....
13	..	..		.. .	Ditto.	..	..	..	Ditto.	Ditto.	..	..	..	....	....
14	66	69		Calm.	Cumuli.	68	74	..	Calm.	Ditto.	71	87	..	....	Cirri.
15	64	66		....	Hazy.	..	..	..	Ditto.	Ditto.	71	85	..	....	Ditto.
16	..	..		....	D. fog.	..	..	..	Ditto.	Ditto.	..	..	..	....	....
17	63	64		Calm.	Ditto.	67	69	..	Ditto.	Ditto.	..	..	..	....	....
18	64	65		Ditto.	Ditto.	69	71	..	Ditto.	Ditto.	73	86	..	....	Cumuli.
19	67	68		Ditto.	Ditto.	..	..	..	Ditto.	Ditto.	..	..	..	....	Ditto.
20	68	70		Ditto.	Ditto.	..	..	..	Ditto.	Ditto.	74	90	..	....	Ditto.
21	66	68		Ditto.	Fog.	..	..	..	Ditto.	Ditto.	77	87	..	....	Ditto.
22	68	78		Ditto.	Ditto.	..	..	..	Ditto.	Ditto.	77	88	..	....	Ditto.
23	67	69		Ditto.	Hazy.	72	74	..	Ditto.	Ditto.	75	89	..	....	Ditto.
24	68	69		Ditto.	Ditto.	73	76	..	N. E. lt.	Ditto.	74	91	..	....	Ditto.
25	69	71		Ditto.	Ditto.	74	81	..	Ditto.	Ditto.	77	91	..	....	Ditto.
26	69	73		Ditto.	Ditto.	74	75	..	Ditto.	Ditto.	80	92	..	D. fog.	Ditto.
27	71	72		Ditto.	Thick fog.	..	..	..	Ditto.	Ditto.	77	89	..	....	Cir.-cuml.
28	69	70		Ditto.	Ditto.	..	..	..	....	....	..	..	..	....	....
Total.	1512	1600	..	....	....	899	9444	..	. ..	....	1237	1490.5	..	....	....
Mean.	63	66.666	..	....	....	69.154	72.616	..	....	....	72.765	87.677	..	....	....

Meteorological Remarks for the month of February, 1853—(Continued.)

3 P. M.					Sunset.					9 P. M.					Remarks.
Thermometer		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	
Wet.	Dry.				Wet.	Dry.				Wet.	Dry.				
65	88	..	N. W. fog.	C.-cum.	..	..	..	..	..	..	..	..	N. lt.	Clear.	Fine, clear, cool morning.
..	..	..	Ditto.		..	..	..	..	..	62	69	..	Ditto.	Ditto.	
63	89	..	Ditto.	Cirri.	..	..	..	..	..	62	70	..	Ditto.	Ditto.	
63	89	..	N. lt.	Ditto.	..	..	..	..	..	..	..	..	..	..	Gusts of wind in afternoon.
72	90	..	Ditto.	Ditto.											
73	87	..	Ditto.	Cumuli.	..	..	..	..	..	68	72	..	N. lt.	Clear.	
71	89	..	Ditto.	Ditto.											
74	96	..	Ditto.	Ditto.	..	..	..	..	..	..	..	..	..	..	Whirlwind small, but overcrossing several native houses.
..	..	..	Ditto.	Ditto.											
..	..	..	Ditto.	Ditto.											
76	90	..	Ditto.	Ditto.	..	..	..	..	..	..	77	..	N. lt.		
..	..	..	Ditto.	Ditto.	..	..	..	..	..	69	77	..	Ditto.		
73	90	..	Calm.	Cirri.											
..	..	..	S. E. lt.	Cumuli.											
72	92	..	Ditto.	Ditto.											
71	93	..	S. W. fr.	Ditto.											
..	..	..	Ditto.												
72	93	..	Ditto.	..	..	..	..	..	..	..	..	..	..	Clear.	
81	92	..	Ditto.	..	..	..	..	..	..	75	75	..	Calm.	Ditto.	
80	92	..	Ditto.	..	..	..	..	..	..	74	77	..	Ditto.	Ditto.	
..	..	..	Ditto.												
82	96	..	Ditto.												
76	97	..	S. W. lt.	..	..	..	..	..	..	75	78	..	Calm.	Clear.	
76	96	..	Ditto.	..	..	..	..	..	..	76	78	..	S. E. lt.	Ditto.	
80	93	..	Ditto.	Steady.	..	..	..	..	..	71	78	..	Ditto.	Ditto.	
79	93	..	Strati.	Cumuli.	..	..	..	..	..	71	78	..	Ditto.	Hazy.	
78	93	..	S. E. lt.	Cirri.	..	..	..	..	..	72	79	..	Ditto.	Cirri.	
..	..	..	Ditto.	Ditto.	..	..	..	..	..	73	78	..	Ditto.	Ditto.	
1477	183.8	..	....	..	..	..	..	..	..	848	986				
73 85	91.9	..	....	..	..	..	..	..	..	70.667	75.847				

Abstract of Meteorological Observations for the month of March, 1853.

Rangoon, 1*st April*, 1853.

	Thermometer Sunrise.			Thermometer 9 A. M.			Thermometer Noon.			Thermometer 3 P. M.			Thermometer Sunset.			Thermometer 9 P. M.			Remarks.
	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	
Wet....	75	62	71.175	79	67	75.28	82	74	77.203	84	68	78.59	81	74	78.2	80	64	75.14	Weather, this month fine, but very hot.
Dry....	77	64	72.825	83	74	79.286	96	83	91.23	100	81	94.63	90	81	86.2	84	74	79.23	Occasional fresh breezes with thunder and lightning.
																			Nights cool, and early mornings foggy.
																			Winds variable, shower on the E. 0.15 inch fell.

	Barometer Sunrise.			Barometer 9 A. M.			Barometer Noon.			Barometer 3 P. M.			Barometer Sunset.			Barometer 9 P. M.		
	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.
No instrument.																		

J. Fayrer, M. D. *Asst. Surgeon, Field Hospital, Rangoon.*

Meteorological Observations for the month of March, 1853.

Rangoon, 1st *April*, 1853.

Date.	Sunrise.					9 A. M.					Noon.				
	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.
	Wet.	Dry.				Wet.	Dry.				Wet.	Dry.			
1	..	..	..	....	....	..	..	..	....	....	..	..	..	....	Cumuli.
2	72	73	..	....	Dense fog.	78	81	..	Calm.	Cumuli.	80	91	..	E. light.	Dense fog.
3	74	76	..	c.H.v.close.	....	78	80	..	Ditto.	Ditto.	81	88	..	Calm.	Cirri.
4	..	..	..	Ditto.	Calm.	..	..	..	....	....	72.5	88	..	S. E. light.	Ditto.
5	65	66	..	Ditto.	Hazy & fog.	68	73	..	W. lt.	Cirri.	70	85.5	..	Ditto.	Clear.
6	62	64	..	Calm.	Ditto.	67	76	..	Ditto.	Clear.	72	89	..	N. E. light.	Cumuli.
7	64	67	..	Ditto.	Dense fog.	73	80	..	N. E. lt.	Hazy.	72	88	..	S. E. llght.	Hazy.
8	71	72	..	Ditto.	Ditto.	72	74	..	Ditto.	Fog.	77	90	..	Ditto.	Calm.
9	69	71	..	Ditto.	Hazy.	..	..	..	....	....	91	93	..	Ditto.	C.-Cumuli
10	66	69	..	D. C. v. w.	Hazy, Sult.	..	..	..	....	....	82	93	..	....	Ditto.
11	72	75	..	Cloudy.	Hazy.	77	81.5	..	S. by W. lt.	Clear.	79	93	..	S. E. light.	....
12	76	77	..	Ditto.	Dense fog.	78	87	..	Ditto.	Cumuli.	..	..	..	....	Cumuli.
13	74	75	..	Calm.	Ditto.	..	..	..	....	....	74	91	..	....	Ditto.
14	..	..	..	....	....	..	..	..	....	....	79	93	..	S. E. light.	Ditto.
15	..	..	..	....	....	73	75	..	N. E. lt.	Cloudy.	76	96	..	Ditto.	Ditto.
16	73	74	..	Calm.	Hazy.	..	..	..	....	....	76	91	..	Ditto.	Cirri.
17	..	..	..	....	....	..	..	..	....	....	..	..	..	Ditto.	Cumuli.
18	..	..	..	....	....	75	80	..	....	Cumuli.	81	94	..	Ditto.	Ditto.
19	73	76	..	Calm.	Hazy.	78	82	..	N. E. lt.	Cirri.	82	92	..	....	Ditto.
20	74	76	..	....	Stdy.breeze.	79	83	..	Ditto.	Cumuli.	81	93	..	S. W. fog.	Ditto.
21	75	77	..	Den.clouds	Thunder.	79	81	..	Ditto.	S. Cloudy.	67	90	..	Ditto.	Do. Thun.
22	..	..	..	....	Cumuli.	77	81.5	..	Ditto.	Cirri.	79	90	..	N. W. light.	Cumuli.
23	..	..	..	....	Ditto.	76	82	..	Ditto.	Ditto.	80	93	..	Ditto.	Ditto.
24	..	..	..	....	Ditto.	..	..	..	Ditto.	....	75	95	..	Ditto.	....
25	72	73	..	N. W.	Ditto.	74	78	..	N. W. lt.	Cumuli.	76	88	..	Ditto.	....
26	70	71	..	Calm.	Cum.-str.	73	75	..	Ditto.	Ditto.	76	90.5	..	Ditto.	....
27	73	74	..	....	Dense fog.	78	85	..	Ditto.	Clear.	76	94	..	Ditto.	....
28	74	75	..	....	Cum. Hazy.	74	..	..	....	....	77	95	..	Ditto.	....
29	..	..	..	....	Fog.	74	76	..	N. W. lt.	Cumuli.	72	90	..	Ditto.	Cirri.
30	..	..	..	....	Ditto.	77	81	..	Ditto.	Ditto.	..	..	..	Ditto.	....
31	74 5	75 5	..	Calm.	Ditto.	78	83	..	Ditto.	Ditto.	81	94	..	S. W. fog.	Cumuli.
Total.	1423.5	1456.5	..	....	....	1656	1665	..	..	....	20.45	24.63	..	....	....
Mean.	71.175	72.825	..	....	....	75.28	79.286	..	..	..	77.203	91.23	..	..	..

3 P. M.					Sunset.					9 A. M.					
Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Remarks.
Wet.	Dry.				Wet.	Dry.				Wet.	Dry.				
79	94	..	S. W. fog.	Hazy.											
..	..	..	....	..	..	..	..	....	..	75 5	77.5	..	S. E. lt.	Cirri.	
82	93	..	S. E. F.	Cumuli.	..	..	..	....	..	77	81	..	Calm.	Ditto.	Strong breeze.
68	95	..	Ditto.	Ditto.											
..	..	..	....	..	..	..	..	....	..	64	74	..	S. E. lt.	Cirri.	
75	93	..	....	..	74	86	..	S. E. lt.	C.-Haz.	71	76	..	Ditto.	Cumuli.	
77	94	..	S. E. light.	Hazy.											
80	94	..	Ditto.	Ditto.	79	86	..	S. lt.	Hazy.						
81	95	..	Ditto.	Ditto.											
81	97	..	Ditto.	Clear.	..	..	..	....	..	75	79	..	S. E. lt.	Cumuli.	
..	..	..	Ditto fog.	Ditto.											
81	95.5	..	S. E. fog.	Cumuli.											
81	95.5														
76	93	..	D. steady.	Ditto.	..	..	..	....	..	..	..	..	....	..	Very hot.
..	..	..	Ditto.	..	..	..	..	....	..	..	..	..	....	..	Strong breeze.
..	..	..	Ditto.												
81	97	..	....	..	..	..	..	....	..	77	80	..	S. E. lt.	Cumuli.	Very hot.
82	95	..	Fog.	Ditto.	..	..	..	....	..	..	..	..	....	..	Cool fine nights.
..	..	..	....	..	..	..	..	....	..	80	84	..	S. W. lt.	Cumuli.	Thn. in distance
..	..	..	S. W. lt.	Cloudy.	..	..	..	....	..	80	81	..	S. b. E. lt.	Ditto.	with lightning.
77	78	..	Do. fog.	Rain.	77	81	..	S. E. lt.	Cloudy.	76	78	..	S. W. lt.	Cirri.	Cool.
78	81	..	Do. fog.												
81	92.5	..	Do. fog.												
82	97	..	S. W. fog.	Cumuli.											
75	99	..	S. W. fr.	Ditto.											
75	99	..	S. W. stdy.												
78	98		....	..	81	90	..	S. E. lt.	Cloudy.						
76	99.5	102 (at 4 P.M.)	S. W. lt.	..	80	88	..	Ditto.	Cumuli.	75	81	..	S. E. lt.	Cirri.	
84	99	103 (at 4 P.M.)													
76	100		S. W. fog												
80	97	..	S. W. lt	..	..	..	..	....	..	76	80	..	W. lt.	Clear.	Strong gale.
18.86	22.71	..	....	..	391	431	..	....	..	826.5	871.5				
78.59	94.63	..	....	..	78.2	86.2	..	....	..	75,14	79.23				

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of January, 1853.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Date.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer.			Mean Dry Bulb Thermometer.	Range of the Temperature.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1								
2	*Sunday.*							
3	30.024	30.099	29.965	0.134	69.3	80.4	56.6	23 8
4	30.061	30.134	29.996	0.138	66.8	74.0	58.4	15.6
5	30.112	30.202	30.058	0.144	64.2	73.0	52.8	20.2
6	30.088	30.176	30 023	0.153	63.7	74.0	52.3	21.7
7	30.061	30.142	30.005	0.137	64 9	76.6	52.0	24.6
8	30.031	30.125	29.979	0.146	66.6	78.0	53.2	24.8
9	*Sunday.*							
10	29.995	30.064	29.939	0.125	70.8	81.2	59.8	21.4
11	29.985	30.053	29.935	0.118	69.8	79.6	57.7	21.9
12	30.019	30.084	29.974	0.110	69.5	77.4	60.2	17.2
13	30.060	30.154	29.999	0.155	67.4	75.9	56.6	19.3
14	29.993	30.075	29.942	0.133	65.3	70.4	57.0	13.4
15	30.024	30.095	29.976	0.119	65.0	73.0	55.3	17.7
16	*Sunday.*							
17	30.077	30.143	30.015	0.128	64.0	75.0	50.4	24.6
18	30.113	30.196	30.062	0.134	64.7	73.4	55.6	17 8
19	30.113	30.203	30.043	0.160	62.8	73.1	51.0	22.1
20	30.086	30.180	30.017	0.163	63.5	75.3	50.6	24.7
21	30.031	30 106	29.971	0.135	65.4	74.7	51.3	23.4
22	29.978	30.067	29.931	0.136	66.0	72.8	55.9	16.9
23	*Sunday.*							
24	29 930	29.992	29.864	0.128	66.3	73.0	59.2	13.8
25	30.011	30.097	29.953	0.144	66.6	76 8	55.0	21.8
26	29 996	30 077	29.925	0.152	66.5	77.2	54.0	23.2
27	30.015	30.091	29 964	0.127	64.9	72.0	57.9	14.1
28	30.073	30.146	29.978	0.168	65 9	74.5	57.0	17.5
29	30.119	30.212	30.066	0.146	66.1	75.3	55.5	19.8
30	*Sunday.*							
31	30.016	30.123	29.923	0.200	64.1	74.8	50.7	24.1

Compared by Gopeenath Sen.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of January, 1853—(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								
2	*Sunday.*							
3	63.7	5.6	60.2	9.1	0.527	5.80	2.03	0.741
4	62.3	4.5	59.5	7.3	0.514	5.70	1.56	.785
5	57.9	6.3	53.2	11.0	0.416	4.64	2.05	.694
6	58.0	5.7	53.8	9.9	0.424	4.73	1.86	.718
7	59.3	5.6	55.3	9.6	0.447	4 97	1.88	.726
8	60.8	5.8	56 9	9.7	0.471	5.21	2.00	.723
9	*Sunday.*							
10	65.4	5.4	62.3	8.5	0.565	6.20	2.00	.756
11	65.8	4.0	63.6	6.2	0.589	6.49	1.46	.816
12	65.0	4.5	62.4	7.1	0.566	6.24	1.64	.792
13	62.7	4.7	59.7	7.7	0.518	5.73	1.66	.775
14	61.6	3.7	59.3	6.0	0.510	5.67	1.26	.818
15	58.5	6.5	53.8	11.2	0.424	4.72	2.15	.687
16	*Sunday.*							
17	57.1	6.9	51 7	12.3	0.396	4.41	2.24	.663
18	58.5	6.2	54.0	10.7	0.427	4 75	2.05	.699
19	56.3	6.5	51.1	11.7	0.388	4.32	2 09	.674
20	57.6	5.9	53.2	10.3	0.416	4.65	1.90	.710
21	59.2	6.2	54.8	10.6	0.439	4 87	2.08	.701
22	61.6	4.4	58.8	7.2	0.502	5.57	1.51	.787
23	*Sunday.*							
24	62.7	3.6	60.5	5.8	0.531	5.90	1.25	.825
25	62.1	4 5	59.3	7.3	0.510	5.66	1.55	.785
26	60.7	5.8	56 8	9.7	0.470	5.20	1.99	.723
27	60.0	4.9	56.6	8.3	0 467	5.20	1.65	.759
28	62.5	3.4	60.4	5.5	0.529	5.88	1.18	.833
29	59.9	6.2	55.5	10.6	0.450	4.99	2.11	.703
30	*Sunday.*							
31	58.1	6.0	53 7	10.4	0.423	4.72	1.95	.708

Compared by GOPEENATH SEN.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of January, 1853—*(Continued.)*

Date.	Max. Solar radiation.	Rain.	Prevailing direction of the Wind.	General aspect of the Sky.
	o	Inc.		
1				
2	*Sunday*			
3	..	..	Calm or N.	Cloudless.
4	..	..	S. W. or N. W.	Scattered ∩ i till morn, and nearly cloudless [afterwards.
5	..	..	N.	Cloudless.
6	..	..	Calm or N. W.	Ditto.
7	..	..	Ditto.	Ditto.
8	..	..	Ditto.	Cloudless till morn, scattered _ i during day and cloudless afterwards.
9	*Sunday.*			
10	..	..	Calm or S. E. or S.	Cloudless.
11	92.8	..	Calm or N. or S. W.	Cloudless till morn, scattered _ i during [day and cloudless afterwards.
12	90.3	..	S. or N. W.	Cloudless till morn, scattered _ i or ∩ i or \ i during day, and cloudless afterwards.
13	88.0	..	N. E. or N. W.	Cloudless till 4 A. M. scattered \ i till 6 P. M. and cloudless afterwards.
14	81.0	..	Calm or N. E. or N. W.	Cloudless till 6 A. M., and overcast after- [wards.
15	85.0	..	W. or N. W.	Overcast till 3 A. M. scattered ∩ i and _ i till noon, and cloudless afterwards.
16	*Sunday.*			
17	92.3	..	Calm or N. or N. W.	Cloudless till 5 A. M. scattered \ i or _ i or ~ i till 6 P. M. and overcast afterwards. [less afterwards.
18	84.0	..	N. W. sharp at 3 A.M.	All kinds of clouds till 2 P. M. and cloud-
19	87.0	..	N. W.	Cloudless.
20	91.3	..	Calm or N. W.	Ditto. [afterwards.
21	88.3	..	Ditto.	Cloudless till 4 A. M. scattered or close \ i
22	82.4	..	N. W.	Scattered or close \ i or _ i till 6 P. M. and overcast afterwards.
23	*Sunday.*			
24	89.8	..	N. or N. E.	Thin clouds till 4 A. M. Dense or Light ∩ i till 6 P. M. and cloudless afterwards.
25	92.8	..	S. W. or N. or Calm.	Cloudless till 11 A. M. ∩ i till 5 P. M. cloudless afterwards.
26	93.0	..	N. or W.	Cloudless till 11 A. M. _ i or _ i till 6 P. M. cloudless afterwards.
27	80.4	0.10	N.	_ i till 6 A. M. and overcast afterwards.
28	95.7	..	N. W. or Calm.	Overcast till noon, _ i or _ i till 4 P. M. cloudless afterwards.
29	88.0	..	N. sharp from 11 A.M. till 3 P. M.	Cloudless.
30	*Sunday*			
31	87.3	..	Calm or N. W. or W.	Cloudless.

\ i ..... Cirri.
∩ i ..... Cumuli.
— i ..... Strati.
_ i ..... Cirro-cumuli.
_ i ..... Cirro-strati.
~ i ..... Cumulo-strati.
_ i ..... Nímbí.

JOURNAL

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Account of a visit to the Jugloo and Seesee rivers in Upper Assam, by Capt. E. T. DALTON, *together with a note on the Gold Fields of that Province, by Major* HANNAY.

I received instructions, in November last, to examine and report on the Gold-producing capabilities of an auriferous stream, an affluent of the Booree Dihing, called the Jugloo. This stream takes its rise in the Tipam range of hills in this District (Luckimpore) in about 27° 20′ North Latitude and 95° 30′ East Longitude, flows through an uninhabited tract of high undulating forest-land between the hills and Dihing river, into which the Jugloo discharges itself fourteen miles above Jaipore after a course of about ten miles.

This Jugloo, or the tract through which it flows, was, in olden times from the richness of the metal found there, considered a royal preserve as a gold-field. There is a tradition that in some part of it, gold was found in lumps attached to an edible root accidentally pulled up by a fortunate traveller; but the exact site of this discovery is not now known.

In modern times, it has been quite deserted by the professional gold-washers, because they say that it costs more to propitiate the spirits who guard over the mineral treasures of the stream, than they can afford to pay. Fortunately these spirits are said never to molest Europeans, so without considering the propitiatory offering necessary as a preliminary, I proceeded to the field accompanied by an expert gold-washer who, as a slave in a Singphoo family, had

practised the vocation in the Northern Provinces of Burmah, and a few men with kodals, pick-axes and shovels.

After about an hour's walk from the Dihing up the stream of the Jugloo, when we first came on pebbles, we commenced washing in a rough wooden pan made for the occasion. The very first attempt gave a few minute specks of rather pale gold; we continued washing at intervals as we advanced, and every panful of gravel was found to contain a few of these spangles. At a point which seemed favourable for the purpose, we turned a portion of the stream and made a hole three feet in its bed. The washings from this depth decidedly gave a greater number of spangles and of a richer colour, than those we had obtained from the surface washings. Rising from a part of the stream the section of a hill about fifty feet in height, of coarse reddish sandstone, was left bare and perpendicular by a land slip. This contained a stratum of gravel about fifteen feet *above the highest* water-mark, some of which I caused to be washed, and it too was found to contain gold, indicating that the presence of that metal was not confined to spots acted on by the waters of the Jugloo; sand and gravel taken from occasional water-courses leading to the Jugloo were washed with the same result.

Retracing our steps we proceeded up another branch of the Jugloo, and were joined by a party of gold-washers deputed by me to obtain specimens, who took us to the scene of their operations about half a mile from the junction of the two rivers. They had been working two pans and, to assist the operation, they had constructed two small embankments with bamboos and rubbish which divided the stream into three channels and enabled them to turn all the water into or out of the central channel. Their practice is to collect with small wooden scrapers a heap of gravel at the lower end of their central channel; upon this they cause the stream to play, and with sieves made of bamboo they sift the heap and throw aside the pebbles.

The stream carries off the lighter particles of the sand thus disturbed. Pansful of the residue, which consists entirely of mineral fragments, are then taken up and washed in the usual manner with results far more satisfactory, than when the gravel is washed in the pan without being subjected to this preliminary process.

Proceeding up this stream I found it had in many places cut for itself little ravines showing sections of hills formed of deposits of grey and red coarse sand of sufficient consistency to form upright cliffs, though crumbling when handled, with beds of gravel intervening, which also occur in tolerably consistent masses approaching to a conglomerate; these lay in strata inclined at an angle of forty-five or thereabouts. I obtained washings from them all, and found gold dust in the red sand and gravel strata always, but not always in the blue sand which owed its colour to a mixture of blue clay slate silt.

It follows from the above that gold is not confined to the bed of the stream, it is disseminated throughout the tract through which the stream flows, and the only question is whether it is found in sufficient quantities to render washing for it a profitable speculation.

The mere surface experiments as yet made are not a sufficient test; the deposit should be thoroughly examined to its base before its value can be determined.

Of the comparative richness of the Jugloo tract, so far as it has been examined I can only judge from the quantity of gold dust obtained in my own desultory operations.

I made a rough estimate of the quantity of rubble washed, and on comparing it with the gold obtained, it gave about 18 grains to the ton and about 8 grains as the out-turn of one man's labour for the day.

Subsequently I had an opportunity of more accurately testing the produce of a gold-washer's daily work in a different field.

After I had left the Jugloo, Major Hannay proceeded with the examination of the auriferous deposits in that vicinity and about Jaipore, and, as will be seen from his paper on the subject, has satisfactorily established, that it is of great extent, flanking the whole of the Naga range of hills from the Noa Dihing to the Dhunsiri river. We subsequently proceeded together to examine the gold-producing sands of the Seesee river on the North bank of the Brahmapooter; we took gold-washers with us and found a party of the Seesee ryots at work just under the hill.

Within an easy march of their own villages, they annually find here lucrative occupation for the months of the year when an excursion of the kind is most enjoyable, and when they have most leisure

from their agricultural pursuits to give to it. After "harvest home" in January, they form parties and start with provisions for a week or a fortnight, and in a very short time, if they are fortunate, they may obtain sufficient gold to pay their revenue. They wash in troughs called "doorunis," a process which has been already described in former numbers of the Journal.*

In favourable localities, 20 grains of gold is not an unusual return to one day's labour with a dooruni worked by three men, who between them dig up, remove and wash in a day on an average about one ton of rubble. In the operations conducted in our presence, the yield of one dooruni, which was made over to me, was only 11 grains, from 1 ton, 2 cwt. and 36 lbs. of rubble, but this was pronounced by the gold-washers to be very unfavourable.

The average may be estimated for the Seesee at 15 grains to 1 ton of earth. This in Siberia would not be considered worth working, but to an Assamese, it is very good return for an employment which is not very laborious and is decidedly interesting. To prove this, it is only necessary to observe the excited and gratified looks of the party as they collect round the dooruni at that period of the operation, when the gold is displayed as a bright fringe bordering the upper portion of the fine black sand, to which the operator has reduced the rubble, he has been working in.

The annual yield of the Seesee is said to be about half a seer. Judging in this way, the most valuable rivers are the Subanshiri and Dibong, whose yield annually is from a seer and a half to two seers of pure gold.

The Brahmapooter and Dibong are said to give each from half a seer to three quarters; the numerous smaller rivers in Luckimpore are variously stated at from a quarter to half a seer, the total annual yield of the district being about ten seers. Each river is worked by the gold-washers who live nearest to it. But, few are now employed in the occupation in comparison to the numbers that engaged in it when Assam was under a native government. The whole of the Khéle or tribe of gold-washers were then obliged to follow that profession, as they were under the necessity of paying their contribution towards the expenses of the state in pure gold.

* Vide Journal Vol. VII. p. 621.—Eds.

Notes on the Gold Fields of Assam.—By Major HANNAY.

Although it is well authenticated that the produce of the gold-washings in Assam, particularly Upper Assam, formed a very considerable source of revenue to the Assam Government of former days, no correct data can be obtained so as to give an idea of the exact amount of gold realized yearly:—but, as the Sonwals, or gold-washers, one of the constituted Khéle or sections of the inhabitants (according to occupation) who paid their taxes in gold, form a large portion of the population, we may reckon on its having been something considerable, when in the Northern district of Sudeah alone, including Luckimpore, these Sonwal paiks amounted to 10,000. Allowing, therefore, that every paik, at the lowest rate, supplied 4 annas weight of gold-dust yearly, the total amount would be 40,000 grs. for that district alone, and as the same system of gold-washing obtained in the districts of the South bank of the Brahmapooter, as much more may have been there realized, and it may not be perhaps beyond the mark, to note the yearly produce of gold-washing in Assam, in former times, as amounting to 8, or 10,000£ sterling.

In the short account of Assam given at the end of Vol. III. of Montgomery Martin's "Sketches of Eastern India," in enumerating the rivers on the North bank of the Brahmapooter, the whole of them are said to contain gold in their sands, and the Subanshiri, Dikrung, Boopani, Booragong, and Boargon, rivers of the Luckimpore and Kullungpore districts, are noted each as to the quality and quantity of their gold; but other small rivers in the Luckimpore district—the more prolific sources of the Dihong, the Dibong, or the Brahmapooter—are not alluded to, neither is the Dihing or any one river on the South bank mentioned; which shows, that the information relative to the extent of the Gold fields, was imperfect. Chap. III., however, of the same notice, under head "Commerce of Assam," states, that the Assam Government received into the Royal Treasury 1,500 grs. *weight* of gold yearly, from a gold mine called Pakerguri, situated at the confluence of the Dhunsiri river with the Brahmapooter. The Pakerguri is a small river rising in the Rengma mountains joining the Dhunsiri, a day's journey within its con-

fluence with the Brahmapooter. I cannot vouch for the correctness of the statement given regarding the gold *mine*, but this small river is known in its upper course, to be a prolific gold stream in the present day. It is stated also, that the imports at Goalparah from Bengal in 1808-9 amounting to two and a quarter lacks of rupees, paid in gold from these resources, and in silver. A good deal has been already written on the gold statistics of Assam, as they are known in modern times ; (Vide vol. VII. p. 625) and little more can be said beyond the personal knowledge which has been obtained of the wide extent of the existence of the precious metal ; and that in some of the districts in North East Assam, it is now a profitable source of payment of revenue to the Sonwal ryots ; the Luckimpore and Suddeah districts produced in 1851-52, ten seers of pure gold. The selling rate to the Ryah traders being from 14 to 15 Rs. per tolah of solid gold prepared by melting with quicksilver.

The geological features of Assam are decidedly in favour of its being a Gold field. The valley, like others in Northern Burmah and North West China, abuts upon a portion of Tartary in which, from Longitude 96° Eastward, in a distance of a hundred miles, several large and magnificent rivers, having their sources in Eastern central Tartary, burst through the great Southern mountain barrier, finding their way to the ocean in a direction not far varying from the cardinal points North and South, thus forming valleys and mountain ranges running in the same direction.

Several of these mountain ranges are known to be very rich in minerals, particularly in Northern Laos, and in the range called, by the Chinese, Ootai Shan, or Great Black Mountains, which forms the boundary between China and Burmah, can be enumerated gold, iron and salt in the Northern portion—silver, iron and precious stones in the central, and further on, antimony, iron and tin. This range also evidently passes through the Malayan Peninsula ; and in its most Southern limits, we have again gold and tin. Indeed, as a geographical and statistical fact, it may be safely stated that in this line of mountains, we ought to recognize the true Aurea Chersonesus of the ancients, as well as their Auria Regio and Argentea Regio.

Other tracts in Burmah are also rich in valuable minerals ; its white marble and noble serpentine, are perhaps unequalled. The Ir-

rawaddy itself, in its higher course, abounds in rocks of beautiful workable serpentine of varied colours. There is every appearance of the existence of copper interspersed amongst these rocks: and most of the affluents of the Irrawaddy like the tributary rivers of the Brahmapooter abound in gold: but the most prolific sources of this metal appear to be well to the North, where the mountain torrents have a short and turbulent course to the main river.

In the Hookong valley, the tributaries of the Kyondwen are prolific in gold, and two of the rivers, Kapdhoop and Nam Tibee, are noted for the size of the scales (pepitas), which are described as varying from the size of a pumpkin seed to a four-anna piece, and, from what I have myself seen, I do not doubt it. Most, if not all of this gold goes to China, where it is beaten into gold-leaf and subsequently finds its way to Burmah to be used in the gilding of the Kyoungs (monasteries) and temples.

In Assam, in the lower and central portion of the valley, the rocks visible and in situ, are granite, gneiss, and a coarse sandstone and quartz rock. In the line of the Brahmapooter river these disappear on the North or right bank after leaving the high table-land at Bishnath; on the South bank the Dhunsiri river, which runs but at some distance along the Eastern flank of the Rengma mountains, may be said to be its limit here. The granite rocks which come very close upon the Dhunsiri at the Nambar falls, are succeeded by shell and other limestone of an uniform fawn colour, and in the same vicinity are hot sulphureous springs, and numerous salzes, containing sulphurates of iron and salt. Succeeding the Rengma range also, we have a low hilly and undulating country with deep dells and rice pathars, extending Eastward across the valley to the great Naga range, and throughout this tract, there are extensive hard ferruginous deposits, some of which crop out in the bed of the Dhunsiri. In the banks of that river also, as well as throughout a considerable tract of country to the East, including Basah Doyang, the plastic clay at some depth under the surface contains an oxide of iron in grains, which is extensively smelted for its iron.

The great Naga range in the interior, as far as I have seen it, East of the Dikho, is clay slate, which in some of the hills imbeds nodules of a compact clay iron ore; in other parts also a coarse sand-

stone crops out, as well as a hard heavy homogeneous blue-coloured rock with white quartz veins. Tufaceous limestone has also been discovered both in the clay slate, and in the last named rock. In the steep banks of the rivers of this section of the Naga range, so soon as the clay slate commences, there are numerous brine springs, many of which have been open from time immemorial, and others are being constantly dug out. The shafts are from twelve to thirty feet deep, and always dug in the clay slate, but no workable brine is found, until boulders are reached of the blue-coloured rock above-mentioned, which from its hardness is called by the Nagas, Tan Loung. After leaving the true clay slate there is a tract of hilly ground, composed of small boulders of the foregoing rocks, with ferruginous deposits as hard as the metal itself. To this succeed the deposits of the lower range in which we find coal and carboniferous strata indications, and in all the small streams which pass through their tract gold is found in a rubble consisting of rolled pebbles of rocks, not however visible, granite, mica schist, quartz, jasper and lydian stone, with occasionally pieces of fossil wood. This rubble appears of great extent, and apparently flanks the whole of the Naga range from the Nao Dihing to the Dhunsiri.

In no part of the hill streams passing through the clay slate is a trace of gold to be found.

The black debris, dug from the brine springs, contain however much sulphuret of iron. The salzes also which are numerous towards the plains, throw up mud, sand and gravel, impregnated with sulphuret of iron. The gravel in some of them is consolidated to the consistency of rock, composed of minute particles of jasper, quartz and other igneous rocks: this appears stratified, but to what depth is unknown.

It may be worthy of notice also, that these salzes extend across the Upper Muttuck and shew in their vicinity the same gravel deposits. In the gravel of the Tepuck Jan, an affluent of the Dibroo river, in the North or right bank of that river, traces of gold have been found.

In the North East section of Assam, that is round from the Nao Dihing at the confluence of the Duffa Panee to the Dihong river, little is known of the nature of the rocks in situ, excepting at dis-

tant points. The constant landslips that are occurring, would make it difficult to say whether the masses of rock however large, which have been seen, were really in situ, or may not have been detached from their parent site ages ago. We find also large tracts of table-land lying along the edge of the North East mountains, based principally upon well rounded granite and other primitive rock boulders to which, from the apparent great age of the deposit, a source cannot be assigned. However, the rocks in situ which have been noted by Wilcox, in his journey from the Nao Dihing to Bot Khampti across the Great Duffa range, are conglomerate and coarse sandstone near the Dihing, and gneiss passing into mica slate, sienite and clay slate, on the high ridges. Inland from the Brama Koond in the line of the Brahmapooter and its tributaries in the Mishmee country also, granite, granite gneiss, sienitic granite, sienite, greenstone, serpentine, gneiss passing into mica slate, primitive limestone and hornblend rock;—primitive limestone of a bluish grey and white, seems to be a very common rock. I observed the rocks in the river below, and at the Brama Koond were a stratified heavy schistose rock passing into chlorate slate, and serpentine apparently. Between the Koond and the Degaroo river and its sources, Wilcox marks the rocks as limestone, and the boulders of this, which are annually brought down by the Degaroo, show the existence of this stratum. A dirty white primitive limestone associated with sandstone in large masses, is also visible near the gorge of the Dihong river. Most of the landslips appear to be a quartz or feltzpar rock of a reddish or greenish colour with veins of decomposing feltzpar interspersed, the powder of which from some of the scar appears to be kaolin.

In the beds of the rivers in the tract of country defined, we find the boulders composed of all the rocks before-mentioned, with many varieties, and the addition of trap, porphyry, basalt and white quartz. The last prevails in the bed of the Brahmapooter, the former in the Dihong and Debong. In two of the small tributaries of the Dihong, on the Assam side of the gorge, hard conglomerates and jasper rocks are in situ.

The mountainous region within the points here noted, and which encircle the head of the Assam valley, cannot be considered as a

continuation of the great Himálayah, though their height ranges from 7 to 8,000 feet, and at one point the Duffa Bhoom reaches to 14,500, and the Thigoroe, twenty miles North of the Brahmapooter at Saikwah, 11,000. These mountains are evidently the Udaya, or "mountains of the rising sun" of the Hindus. The true Himálayah appear to end in a direction nearly North of Dibrooghur in Latitude 28.40, or 29 probably—and from the gorge of the Dihong several hill ranges diverge to the S. W. and West: that which bounds the Assam plain is not more than sixteen miles distant from the Brahmapooter. The intervening country is a deposit of no great age, and has no doubt been formed by the Lohita or Dihong, which is known to have run under these hills. The small rivers passing through this tract have their sources a short distance within the hills, and are all auriferous in their pebbly beds. They are the Sillee, Deemo, Dirgemo, Seesee, and Dob. The rock strata of the hills are sedimentary—one, a coarse grit composed of granite debris—another finer and of a bluish colour containing sulphuret of iron—both appear to imbed lignites and fossil wood. The boulders in the rivers, besides those of the grits noticed, are of the older rocks, such as are found in the larger rivers to the East, with the exception of the serpentine. In and about the gorge of the Seesee, it was observed that the sedimentary rock rested on a stratum of rubble of these older rocks cemented together by a ferruginous sand containing gold. This sedimentary rock stratum is of great thickness within the hills, and a similar deposit is to be found along the line of hills further to the West: near the gorge of the Boroli Gunga in the Chardwar district, a tuffaceous limestone is in situ. Salzes also, similar to those on the South side of the valley, are very common, and it is an interesting geological fact, that, as the stratum on the Southern mountains is tilted up at an angle of 45° to the East, the sedimentary rock stratum of these hills is tilted up to the North West and West, and the stratum of the Brahma Koond to the North East.

The granites, primitive limestone and serpentine are highly metalliferous. Black magnetic oxide is to be found in the first and last named rock, and sulphuret of iron in the limestone. In the ore found in some of the serpentines there are traces of copper if not

of silver: and what is called the gold-washer's sand (the Schlich of the Bohemians) contains universally the different oxides of iron and other minerals, with minute crystals of quartz and precious stones.

In regard to the manipulation or washing of the auriferous sands according to the methods in use with different people in the East, after reading the description given in Lecture IV. of the "Lectures on Gold," delivered at the Museum of Practical Geology, it is evident that the principle adopted by gold-washers of all countries in the washing of auriferous rubble, and the object, that of washing out all useless matter, so as to leave nothing but the oxide of iron and its associated gold dust, is the same. The Chinese have a trough with cleets and transverse grooves. The Assamese generally wash in a trough and take the whole stuff in the rough, the finer sand, &c., being washed into the trough through a bamboo grating or sieve placed at the higher end, and although for want of cleets there is some loss, it is wonderful to see with what dexterity the left hand is used to keep the dust at the head of the trough, and to allow of a constant stream of water passing down its slope, thus washing the stuff thoroughly in a very short time and leaving nothing but the very finest of the *Schlich* with its gold dust. This trough might be improved, but as it is light, and one man can work it easily, being supplied with material by a boy, and one man to dig, it answers the purpose—and when gold is plentiful, this is the cheapest method of labour which could be employed in Assam. The oval board in use with the Singphoes appears to me, however, in dexterous hands to be equal to any trough—and provided the stuff could be given to the washer after having been passed through a sieve, I reckon this to be the best and cheapest method of extracting the gold dust—for not only does an expert gold-washer wash clean every particle of oxide and gold contained in a given quantity of rubble, but he will after the day's labour is over, take the Schlich and gold dust on the board, and by a peculiar dexterity of hand with the board and the water, wash away every particle of the former, leaving the latter at the head of the board with little necessity for quicksilver to lick it up, as generally done to prepare it for melting.

Dibrooghur, June, 1853.

Catalogue of Reptiles inhabiting the Peninsula of India.—By T. C. Jerdon, *Esq. Madras Medical Service.*

Continued from p. 479.

The following is merely a brief and imperfect resumé of the serpents and frogs of S. India, drawn up from my drawings, with a few rough notes attached to them; as circumstances have prevented my giving a more full account at this time; but a detailed account will be drawn up, as soon as I have again access to my collection.

OPHIDIA.

VENOMOUS SERPENTS.

Fam. VIPERIDÆ.

Sub-Fam. BUNGARINÆ.

Terrestrial.

Elaps melanurus, (Shaw)—Russell 1, pl. 8.

I never procured but one specimen of this little snake. It was at Jalnah and about 14 inches long. It was red beneath the tail and was very bold. Scutæ 234. Scutellæ 28. 13 rows of scales.*

Elaps malabaricus—n. s.

Head black with transverse bands, body brown above with black markings, bright red beneath. Scutæ 246. Scutellæ 38. 13 rows of scales. Tail exceeds $\frac{1}{10}$th of total length.

I have found this little snake in forest in Malabar, once or twice during the monsoon. The red colour of the abdomen fades in spirits.

Bungarus candidus—L., Russell 1, pl. 1.

B. semi-fasciatus, Schl. 'Yenna vyrien' of the Tamools. Up to 3 feet in length. Is very common all over Southern India, and is said to be fatal. Scutæ 217. Scutellæ 39.

This snake may be distinguished from one or two harmless species that much resemble it in colour, by the sub-caudal scutellæ being in one row, not double.

Bungarus fasciatus—Russell 1, pl. 3.

Golden banded bungarum.

I have only seen specimens of this handsome snake in the Northern Circars at Ganjam, where it is not very common. It is said to be very deadly.

* Common in Burma.—*Cur. As. Soc.*

Sub-Fam. NAJINÆ.—Bon.

HAMADRYAS OPHIOPHAGUS—Cantor?

NAIA VITTATA—Elliot?

I once had a magnificent snake of this genus sent me, which had been killed in forest in the Wyraad. It was 12½ feet long. Scutæ 225. Sub-caudal do. 12. Scutellæ 64.

I am inclined to think that it may be a different species from the Bengal serpent, for it was of an uniform dark olive colour above, without any appearance of bands. The specimen was unfortunately destroyed.*

NAIA LUTESCENS—Russ. 1, pl. 6. Cobra.

NAGA PAMBU, or NELLA PAMBU—Tam. But too common all over India.

Sub-Fam. VIPERINÆ,—Bon.

TRIGONOCEPHALUS NEPA—Laur.

COPHIAS HYPNALE—Morrem.

Scutæ 142. Scutellæ 39. 17 rows of scales. Not uncommon in forests in Malabar. I have not seen it longer than 16 or 17 inches.

TRIGONOCEPHALUS ELLIOTTI—n. s.

Form massive; 23 rows of scales on the body; Scutæ 151, Scutellæ 43. Olive-green above; pearl-white beneath; poison-fangs small; head covered with plates. Up to 2 feet and upwards long.

I have only procured this on the Neelgherries towards the lower portion of the plateau. Dr. Cantor tells me that "the shields of the crown of the head resemble those of Trig. blanchoffi, Schlegel.

TRIGONOCEPHALUS (COPHIAS) VIRIDIS—Merrem. Russ. 1, pl. 9.

21 rows of scales, 154 Scutæ, 60 Scutellæ. Rare, I have only got it from the Eastern Ghats.

TRIGONOCEPHALUS (COPHIAS) MALABARICUS—n. s.?

Very closely allied to T. nigromarginatus. Has 21 rows of smooth scales. Scutæ 145 to 149. Scutellæ 48 to 53. Green above, with brown transverse and zigzag markings. Up to 2 feet long nearly. Not uncommon in all the forests of the West Coast.

* One, 9 ft. long, which I procured about 20 miles S. of Calcutta, and now in the Society's Museum, is banded throughout. *Sankarachúr* and *Shakha-muti*, Beng. *Cur. As. Soc.*

Trigonocephalus (cophias) neelgherriensis—n. s.

Of small size, dark brown with black markings. 23 rows of carinated scales. Scutæ 142. Scutellæ 36. Not uncommon in woods on the Neelgherries.

Trigonocephalus (cophias) wardii—n. s. ?

Has 21 rows of carinated scales. Scutæ 154. Scutellæ 51. Greenish colour, with purplish-brown diamond spots on back and sides; 12 to 14 inches long. The scales of the head resemble those of T. sumatranus, Raffles, according to Cantor *(in literis)*.

Vipera Russellii—Gray. Russell 1, pl. 7.

'Kunnádi vyrien' of Tamools.

This well known and justly dreaded snake grows to a large size. I am strongly inclined to believe that the far-famed *Cobra monil*, or *Cobra manilla* of some, is merely the young of this species. The old orthography is *monil*, which simply means a chain or necklace, and whoever looks at the markings of this snake, especially of the young one, must be struck with the resemblance thereof to a necklace. I need hardly remind the reader that both *Cobra capella* and *Cobra monil* are Portuguese names, and I have little doubt, that the latter name was given to our present species by the Portuguese. It has however been forgotten as applied to this viper, and may now be considered a fable; for every one you meet is able, on his own showing, to point you out the *real Cobra monil* as quite distinct, and what is more remarkable, no two observers describe it alike, they only agree in its being a very small and a very deadly snake. I may here add that the *carpet snake*, another household word in the Madras army, appears to me to be equally fabulous, as I have not been able to identify it among the venomous snakes, several prettily marked innocent species having been, at different times pointed out to me as the carpet snake.*

Vipera echis—Schlegel. V. noratta—Shaw. Russell 1, pl. 2.

Kutta vyrien of the Tamools.

This little snake is very common in the Carnatic. I do not think its bite would prove fatal to man. I have known a dog bitten by one to recover.

* Generally, I think, the little harmless Lycodon aulicus (as indeed mentioned afterwards by Mr. Jerdon); and this, perhaps, from its habit of entering houses as much as from its markings.—*Cur. As. Soc.*

The above are all the venomous land snakes I have yet met with in Southern India. Of these the only ones at all common are the Cobra, the Chain Viper (Vipera Russellii), the *Bungarus candidus*, and the little *Vipera echis*. Most of the others are peculiar to the forests of India. The Trigonocephali are not usually fatal. I have known several cases of bites by *Trigonocephalus malabaricus*, and *Trig. nepa;* and none proved fatal. Great pain is experienced, and swelling usually follows, but the patient gradually recovers. I myself was bitten in the fore-finger by the *Trigonocephalus neelgherriensis;* I applied a ligature round the finger, and sucked the wound vigorously. In a minute or so the skin round the bite blackened, and in a minute or two more a perfectly circular bit of the skin came off in my mouth. I set off running immediately I was bitten, and felt no further ill effects. See Cantor's remarks on the bite of *Trig. sumatranus*, Journ. As. Soc., Calcutta, XVI, 1044-6; also Blyth, *ibid.* XX, 524.

PELAGIC.

Fam. HYDRIDÆ,—Bon.

Hydrophis colubrina—Schlegel, var. ?—n. s.

I possess what is apparently a variety of this species of sea-snake. It differs from the finished drawing of the species in Cuvier's Régne Animal (Edit. des Eléves), in the black markings meeting on the back and abdomen, thus forming a series of light-coloured oval spots on the sides; the abdominal scutæ commence nearer the mouth, having only 3 or 4 series of small scales between them and the elongated mentals; the scutæ are above 300 in number, and the rows of scales are from 35 to 45—whilst in H. colubrina the scutæ are only 246—and the rows of scales 25. My only specimen is a young one procured at Madras.

Hydrus schistosus, Daud.—Russel 2, pl. 10. Up to 4 feet long nearly. Very common at Madras.

Hydrus pelamidoides, Schlegel. Not common at Madras.

Hydrus bicolor, Schneider—Russell 1, pl. 41. Rare at Madras.

Hydrus striatus, Lacep.—Russell 2, pl. 9? Not rare at Madras, up to 6 feet in length.

Hydrus nigrocinctus, Daudin.—Russell 2, pl. 6. Common at Madras.

Hydrus Cantori, n. s.—H. nigrocinctus, var.—Cantor, J. A. S. C. XVI, 1050.

Dr. Cantor described this as a variety of the last, in his valuable Catalogue of Malay Reptiles.

I forwarded him a specimen in 1848, and he remarked as follows on it. "From the examination of this specimen, the second I have seen, I am induced to believe it a distinct species, and not a variety of nigrocinctus." It differs from this last species in the more robust make, larger scales, there being only 21 rows on the body, and larger abdominal scales especially near the head; also in the shorter triangular head, &c. &c.

I never saw it at Madras, but it is not rare at Tellicherry on the Malabar Coast. Up to 2 feet in length.

Hydrus gracilis, Shaw—Russell 2, pls. 7 and 8.

The number of rows of scales varies from 26 to 35 on the neck, and from 44 to 51 on the trunk. Scutæ 350 to 450. Scutellæ 50 to 60. Very common at Madras.

Very remarkable for the small circumference of head and neck compared to that of the body.

Very common at Madras. Up to 4 feet long.

All the above sea-snakes are venomous, and their bite to be dreaded.

Fam. BOIDÆ—Bon.

Acrochordus granulatus, (Schneider)—A. fasciatus, Shaw.

Rare—Found sometimes in back-waters.

Python molurus, (L.)—P. trivittatus, Schl.—Russell 1, pl.

22. *Boa*, or Rock snake, of Europeans in Madras.

Found all over the country. I have not seen a specimen longer than 19 feet long. This was killed in Travancore, after having swallowed a doe spotted deer.

Boa (Gongylophis) conica, Schl.—Russell 1, pl. 4.

Not rare in the Carnatic and Malabar. It is considered venomous by some of the natives. Has a very malignant aspect. Up to 18 inches long and upwards.

Xenopeltis ? trivirgatus—n. s.

Brown above, with a triple series of black marks—beneath white, black-banded; of a shining nacreous lustre throughout. Scutæ 137. Scutellæ 29. 13 rows of scales. I have only found this on the Neelgherries.

Tortrix eryx, Schlegel—var. ?

Two-headed snake of many—common. Scutæ 205. Scutellæ 36.

Cylindrophis maculatus ? ?*

Cylindrophis curticeps—n. s. ?

Differs from the last in its shorter, more triangular head, &c. &c.

Cylindrophis macroscelis—n. s. ?

Differs from both in the much larger scales. These last 3 small species are not very common. They are sometimes found on the surface of the ground in rainy weather, but are generally dug out of the earth. They are called earth-snakes by the natives.

Fam. TYPHLOPHIDÆ.

Pilidion ? montanum—n. s. ?

Above bluish-black, yellow on the sides, with a black spot on each of the 3 lower scales; abdomen banded black and white. Scutæ ? Scutellæ 15. 15 rows of scales. 15 inches long. Found only on the Neelgherries.

Uropeltis ceylonicus.

Uropeltis affinis—n. s.

Differs from the last in its smaller scales, in the abdominal scutæ being larger, and commencing sooner.

They are both rare. I procured them on the Western Coast.

Onychocephalus acutus—Dum. et Bibr.

I possess one example of this curious reptile, which I procured in the Carnatic at Nellore. Dr. Cantor remarks, "Described from an unique specimen, habitat unknown."

Typhlops braminus, (Daud.)—Russell 1, pl. 43.†

Common under stones in the rainy season, usually called earth-worm.

* This, Dr. Kelaart has sent to the Society's Museum from Ceylon. *Cur. As. Soc.*

† This group, the Argyrophis of Mr. Gray, requires to be studied, as several species appear at present to be confounded. The Society's Museum has lately received Typhlops Russellii, Gray, from Chyebasa. *Cur. As. Soc.*

Calamaria sagittaria—Cantor.

A specimen sent to Dr. Cantor was so named by him; it had only 170 Scuta and 70 Scutella. It is not rare in forests in Malabar.

Coronella tæniolata—Russell 1, pl. 19?

15 rows of smooth scales; Scutæ 185. Scutellæ 41.

This species is referred to *Tropidonotus stolatus* by Cantor, but a snake that I possess and which answers tolerably well to Russell's description and figure appears to be a true Coronella. It is common at Madras.

Xenodon venustum, n. s.?—[X. purpurascens, Schlegel].

Above olive-brown with a triple series of irregular black spots, the central one edged with pale yellow; some transverse marks on head and neck. Has 17 rows of scales. Scutæ 142. Scutellæ 31.

Rare—found on the West Coast only; 1 foot long.

Xenodon dubium—n. s.?

Of a pale earthy brown colour, lighter on the side; a series of darker marks, irregular in shape, and edged with black. Scutæ 181. Scutellæ 41. Has 15 rows of scales. Rare—I procured it in N. Canara.

Lycodon Russellii—Russell 1, pl. 35.

Scutæ 193. Scutellæ 47. 17 rows of smooth scales. Rather common in Southern India.

Lycodon aulicus, (L.)—Russell 1, pls. 16 and 26.

Has 17 rows of scales. My specimens have only from 165 to 174 scutæ and from 54 to 61 scutellæ, which correspond with Russell's nearly, viz. from 171 to 174 and 40 to 41, whilst Cantor gives from 208 to 257 and from 57 to 91. One specimen which resembles in colour Cantor's var. B, (Lycodon capucinus, Boie,) does not differ in number of the scutæ, &c. Very common all over the country, often called Carpet Snake and considered dangerous, though of course harmless.

Lycodon platurinus, (Shaw.)

Scutæ 183. Scutellæ 76. Rare in Southern India—17 rows of scales.

Lycodon nympha—Russell 1, pls. 36 and 37, bad figure.

13 rows of scales; Scutæ 234. Scutellæ 87—not rare at Madras.

Lycodon assimilis—n. s.

Very similar in colour to the two last species, viz. black with

white bands. It differs in having 23 rows of scales. Has 190 scutæ and 60 scutellæ. I have mislaid the locality of this species.

Coluber Blumenbachii, Schleg.—Russ. 1, pl. 34.

Dhamin, H.; *Sarray pamboo*, Tam.

Perhaps the most common snake in India, grows to a large size, 7 feet and upwards; frequents chiefly marshy-land, paddy-fields, &c. Scutæ 200. Scutellæ 125—17 rows of scales.

Coluber fasciolatus, Shaw.—Russell 1, pl. 21.

Scutæ 200. Scutellæ 58. Not uncommon at Madras and elsewhere in the Carnatic. I have seen it nearly 3 feet long.

Coluber pictus, Daud. Russell 1, pl. 29.

Scutæ 202. Scutellæ 91—Russ.

ARBOREAL.

Dipsas trigonata—Russell 1, pl. 15.

Tati kattaday, Tel.; *Peri Surutay*, Tam.

Scuta 235. Scutella 83. Common in the Carnatic.

Dipsas cynodon?

My specimens correspond very well with the description in Schlegel. Scutæ 240. Scutellæ 110. Rows of scales 21.

Up to—feet and upwards in length. I have only found this snake in forests on the West Coast.

Leptophis pictus, (Gmel.)—Russ. 1, pl.

Kumberi mukar, T.; *Chettooriki pambu*, Tam.

176 scutæ and 140 scutellæ—15 rows of scales. Very common in all parts of the country.

Leptophis? Bellii?—n. s.

Scutæ 173. Scutellæ 64. Green above, with dark line on the sides bordered on each side by a pale stripe—17 rows of scales. This much resembles the drawing of Ahætula Bellii in Grey and Hardwicke. I procured one specimen in a grassy plain at Jalnah. It had killed and was swallowing a small *Vipera echis*.

Leptophis ornatus, Shaw.—Russ. 2, pl. 2.

Scutæ 209. Scutellæ 129—17 rows of scales. I have only procured this very handsome snake lately in Malabar.

Leptophis? nilagiricus?—n. s.

Green above, yellow beneath. Scutæ 140. Scutellæ 73—13 rows of scales. Very common on the grassy hills of the Neelgherries.

LEPTOPHIS ? CANARENSIS ?

Green above, yellowish beneath with a streak on the sides. Scutæ 140. Scutellæ 57—15 rows of scales. Procured in North Canara.

Perhaps these two last belong more properly to *Dryinus*. Of the last Dr. Cantor remarks—"Apparently *Dryinus prasinus*, var. A." —the number of the scutæ, &c. however differs very materially.

DRYINUS NASUTUS.—Russell 1, pl. 12.

Green whip-snake. Scutæ 180; Scutellæ 158. Common all over the country. I lately saw one that had swallowed a Parroquet and became gorged.

HERPETODRYAS MALABARICUS,—n. s.

Olive brown with a dark streak along the sides, most conspicuous on the posterior portion of the body; a series of white spots on the anterior portion of the body, edged with black. Scutæ 222 ; Scutellæ 91—25 rows of scales. It is possible that this may be *H. helena*, as I possess a young one in which the markings differ somewhat, and much resemble those on Russell's figure, which is evidently a very bad one.* I have procured it in Malabar where it is not very rare.

TROPIDONOTUS STOLATUS, (L.)—Russell 1, pl. 10 and 11.

Scutæ 146; Scutellæ 61—19 rows of scales. Seldom exceeds 18 inches in length; one of the most common snakes in India.

TROPIDONOTUS SCHISTOSUS, (Daud.)—Russell 2, pl. 4.

Scutæ 140; Scutellæ 85—17 rows of scales.

TROPIDONOTUS PLUMBICOLOR, Cantor.

The colour of the living snake is leek-green. Scutæ (in a young one) 143; Scutellæ 36 ?—21 rows of scales.

Found in the Wynaad [also in Bundelkund, and about Midnapore].

TROPIDONOTUS MONTICOLUS,—n. s. ?

Green, with a series of dark spots on the trunk, one on the centre of back and another on each side, the one on the right somewhat in front, the left one posterior, some white marks on the head; Scutæ 132; Scutellæ 85—19 rows of scales; eyes large; 3 feet and upwards in length. Common in the Wynaad, (2 anterior frontals, 3 posterior ditto, lowest scales rhombic).

TROPIDONOTUS PISCATOR.—Russell, 28 and 33.

19 rows of scales; Scutæ 139; Scutellæ 83.

* COLUBER HELENA is quite distinct.—*Cur. As Soc.*

Found in wells and tanks. Very common.

Homalopsis rhynchops, (Schneider).—Russell 1, pl. 17.

Scutæ 146; Scutellæ 65. Common in estuaries.

Homalopsis enhydris, (Schneider).—Russell 1, pl. 30.

Scutæ 150; Scutellæ 58. Found in the same localities as the last.

BATRACHIDÆ.

Cæcilia oxyura,—Dum. and Bibr. Found on the West Coast, but rare.

Epicrium glutinosum, (L). Found in Malabar. 2 cirri quite distinct.*

Rana tigrina. Bull frog. Found all over India.

Rana cutipora,—Dum. and Bibr.

In tanks in the Carnatic. Of a beautiful grass green colour, with or without a central yellow stripe on the back.

Rana leschenaultii,—Dum. and Bibr. The common frog of India.

Rana crassa,—n. s.

Of a thick clumsy form, feet webbed to the extremity of the toes; limbs shorter than in R. Leschenaultii, head wider, greenish above with dusky markings. Length $3\frac{8}{10}$ths; hind leg $5\frac{1}{2}$. Rare—found in a few tanks in the Carnatic.

Rana malabarica.

Found only on the West Coast, and chiefly during the monsoon when it enters houses, and makes a great gobbling, so much like a turkey that some people call it the 'Turkey frog.'

Rana flavescens,—n. s.

Of a buff colour on the back; yellow on the sides; limbs banded; feet webbed nearly to the extremities. Length of one $3\frac{2}{10}$ths; hind leg $5\frac{1}{2}$. Of slender make, pointed muzzle.

Found frequenting mountain streams in the forests only.

* Probably a distinct species from E. glutinosum of Ceylon, as sent by Dr. Kelaart. The latter has a strongly marked pale lateral band, and the *cirri* are less developed than they are represented to be in Mr. Jerdon's drawing. Dr. Kelaart, however, obtained a second species, which may be that noticed by Mr. Jerdon; and either may be identical with the *Epicrium* from Asám and from Pinang.—*Cur. As. Soc.*

Rana curtipes,—n. s.

Head very wide; muzzle obtuse; limbs rather short; feet webbed to the ends of the toes, except the centre one. Head and back above bright buff; sides deep marroon; legs dark purple with a few white spots; abdomen white mottled. Length of one $2\frac{9}{10}$ths; hind leg $4\frac{1}{10}$th.

Found in forest only. Has a very peculiar, rather pleasing call. Chiefly seen during the monsoon.

Rana agricola,—n. s.

Feet not webbed quite to the extremity. Of a greenish colour, mottled with darker. Length of one $2\frac{1}{10}$th; hind leg $3\frac{2}{10}$ths; foot 1.

Found in inundated paddy-fields and meadows.

Rana nilagirica,—n. s.

Very much allied to the last, differs in its much longer limbs. Length 2 inches; hind leg $3\frac{7}{10}$ths.

I have only seen this frog in marshes in the Wynaad and Neelgherries.

Polypedates leucomystax.

'Chunam frog' of Europeans. Very common all over India.

Polypedates variabilis,—n. s.

Green frog of the Neelgherries.

Green, sometimes unspotted, at other times with gold spots or blackish spots; at times golden yellow with brown spots; at other times brown with darker spots.

Length $2\frac{1}{2}$ inches; hind leg 4; foot $1\frac{2}{10}$ths.

Found in the Neelgherries in the banks of streams and in shrubs.

Ixalis? glandulosa,—n. s.

A small tree frog, with very obtuse muzzle, feet slightly webbed; abdomen largely glandular, tympanum indistinct; green above, yellowish on the sides and limbs.

Length $1\frac{2}{10}$ths; hind leg $\frac{7}{10}$ths; foot $9\frac{9}{20}$ths.

Rhacophorus Reinwardtii, Dum. and Bibr.

Found in the Malabar Coast on trees, and in grass during the monsoon. Not very common.

Limnodytes? phyllophila,—n. s.

A small frog, with the subdigital disks very slightly dilated; toes

not quite completely webbed; tympanum small; reddish yellow, with the sides of the face dark purple. Length $1\frac{1}{2}$; hind leg $1\frac{8}{10}$ths; foot $\frac{11}{20}$ths.

Found in all the Western forests among decayed leaves.

Phyllomedusa? tinniens,—n. s. Tinkling frog of the Neelgherries.

Fingers opposable; feet webbed at base only; yellowish red, or sometimes blackish above; side of head dark; inner fingers yellow; length $1\frac{1}{10}$ths; hind leg $1\frac{3}{10}$ths.

Found in grass and among bushes on the Neelgherries. Has a peculiar loud clear metallic tinkling call.

Phyllomedusa? wynaadensis.

Somewhat allied to the last, differs in its larger limbs; larger tympanum, &c. Length about 1 inch. In this when the hind leg is drawn forwards, the end of the tibia reaches the muzzle; in the last it only reaches the tympanum; reddish brown above, limbs barred.

Polypedates? saxicola,—n. s.

A small frog with teeth, tympanum distinct, fingers webbed at the base; toes webbed to the extremities; pointed muzzle; dark olive green with dark marbling, and barred limbs. Length $1\frac{1}{10}$th; hind leg $1\frac{3}{4}$th; foot $\frac{5}{10}$th; femur and tibia reach beyond the muzzle.

Found on rocks in shady mountain streams in Malabar and Wynaad.

Hylædactylus montanus,—n. s.

Mottled green and brown above, Length $1\frac{7}{10}$th; hind leg 2; foot $\frac{7}{10}$th. Hab. Mountain streams in Wynaad, rare. [A very nearly affined species, if not the same, inhabits Mergui].

Hylædactylus carnaticus,—n. s.

Of small size; marbled green and brown; muzzle more acute than in the last species; length $1\frac{3}{10}$th; hind leg $1\frac{3}{10}$th; foot $5\frac{5}{10}$th. Found in the Carnatic during the monsoon, rare.

Bufo scaber, Daudin.

Common toad of India. Very abundant.

Hyperodon marmoratum.

Found in the Carnatic during the monsoon.

PYXICEPHALUS FODIENS,—n. s.

Greenish marbled with brown. Length 2 inches; hind leg $2\frac{3}{10}$ths; foot $\frac{8}{10}$ths. Found in the Carnatic, burrows in the ground for $1\frac{1}{2}$ feet or so—[Hab. also Ceylon].

PYXICEPHALUS PLUVIALIS,—n. s.

Nearly allied to the last; differs in its shorter thicker form, and shorter limbs; light greenish fawn, with dark marbling. Length of one $2\frac{2}{10}$ths; hind leg $2\frac{4}{10}$ths; feet $\frac{8}{10}$ths. I only procured this during the monsoon in the Carnatic. It is very different in appearance, though with so few essential distinctions, and the natives give a distinct name to each.

PYXICEPHALUS RUFESCENS,—n. s.

Of a rufous colour above, whitish beneath; body rough and granulose; limbs barred.

Length $1\frac{1}{2}$ inch; hind leg $2\frac{1}{10}$; foot $\frac{6}{10}$th. Not rare in gardens on the Malabar Coast.

ENGYSTOMA ORNATUM.

Some specimens of this very handsome frog were only once procured by Walter Elliot, Esq. on the Neelgherries.

Length $1\frac{4}{10}$th inch.; hind leg $1\frac{6}{10}$ths; foot $\frac{11}{20}$th.

ENGYSTOMA RUBRUM,—n. s.

Indian red above; some black marks on the legs. Length $1\frac{1}{10}$th inch; hind leg $1\frac{5}{10}$; foot $\frac{5}{10}$th.

Found in the Carnatic near rivers, in sandy banks.*

ENGYSTOMA MALABARICUM,—n. s.

Isabella colour above, varied with dark angular markings; sides dark purplish; throat ditto; limbs barred. Length $1\frac{1}{10}$th; hind leg $1\frac{6}{10}$th; foot $\frac{5}{10}$th. Found in Malabar, under stones.

ENGYSTOMA CARNATICUM,—n. s.

Nearly allied to the last, differs in the shorter muzzle, shorter hind leg, &c. Length $\frac{9}{10}$ths of an inch: hind leg $1\frac{1}{10}$th; foot $\frac{4}{10}$ths. Found in the Carnatic during the monsoon.

* Also Ceylon.—*Cur. As. Soc.*

Catalogues of Oriental Libraries, by Dr. A. Sprenger, *Secretary, Asiatic Society, Bengal.*

Certain it is that mankind would not lose much in arts and sciences, if all works in Eastern languages were destroyed. They contain few facts, if any, in Astronomy, Medicine, Mathematics, Natural History, or any other science, which are new to us. Even in poetry and philosophy, their works contain few sentiments or ideas which we can admire or would like to adopt.

A century or two ago people thought if they could only understand the language of birds, these *disinterested* bipeds would reveal to them where treasures are hidden, they would teach them the mysteries of nature, and enlighten them on the most important questions connected with our existence. In like manner some persons thought that in those venerable looking old oriental manuscripts, every science under the sun was locked up. Naturalists and orientalists have dug up their respective vineyards. Treasures they found none, but both parties have rendered the soil fertile. Naturalists, though they have learned no mysteries from the speeches of birds, have founded a noble science by dissecting their bodies, studying and comparing their physiology, observing their habits, and following up their geographical distribution. Man is a nobler object of study than birds, and the philosophy of history is a higher pursuit than the philosophy of nature. The acquaintance with the literature of the east shows us man reflected in his own creation under peculiar circumstances and through a longer period than the literatures of Europe exhibit him. The student is carried beyond the narrow limits of European prejudices and associations and enabled to enlarge them. Taking a historical view of oriental pursuits, they are of the highest philosophical importance. Moreover, in India a knowledge of the eastern languages both dead and living, and an acquaintance with their literatures, is the first condition for acting upon the natives, for making one-self useful.

It is from this wish to enlarge our knowledge of man and of his creations under various circumstances and in various periods of his historical existence, that several Governments and Institutions of Europe have of late taken measures to have *catalogues raisonnés* of

their collections of Oriental Manuscripts published, and others, we are informed, are still in preparation. In No. CCXXXV. of this Journal, the catalogue of the Asiatic Museum of St. Petersburgh has been noticed. Accounts of the catalogue of the library of Upsala and of that of Haven are in the Journal of the German Asiatic Society, and Professor Hall has promised us a notice of the first volume of the catalogue of the Royal Library of Berlin containing Sanscrit MSS. Among the catalogues which are preparing for the press is Forbes's catalogue of the Persian MSS. of the British Museum, and Morley's and Bland's catalogues of the Persian books of the India House library and the Persian books of the Bodleyan library. But the most important work in preparation, is a catalogue of the libraries of Constantinople, which is being compiled by order of the Sulṭán.

The catalogus Codicum Orient. Bibl. Acad. Lugduno-Batavæ, 1851, Autore Dozy, of which two volumes have been published, deserves a short account here, because the collection of oriental MSS. of Leyden is one of the best in Europe, and it has hitherto been by far the most useful. Professor Dozy has displayed very great judgment and learning in his labour, and his is probably the best oriental catalogue, that has yet been published.

These two volumes contain eleven chapters, and will be continued by another savant, Professor Dozy being no longer in charge of the oriental library of Leyden. I will mention here shortly a few of the most interesting books contained in each chapter with the numbers they have in the catalogue.

1 *Chapter; Encyclopædias.*

No. 2, مفاتيح العلوم by Abú 'abd Allah. Moh. b. Ahmad b. Yúsof Khwárezmy Kátib who flourished in the fourth century and gives, in 15 chapters, the heads and some of the technical terms of the principal sciences of the Musalmans. There is a copy of this book in the British Museum bound up with several other useful treatises.

No. 5. نهاية الارب في فنون الادب by Nowayry who died in 733. This is one of the most important works in Arabic literature. It contains a complete Encyclopædia of the historical sciences of the Musalmans and consisted originally of 17 volumes.

No. 20. فهرست في اخبار المصنفين من القدما والمحدثين واسما

ما صنفوا من الكتب في ساير العلوم by Mo*h*ammad b. Is*h*áq Nadym who is usually called Abú-l-Faraj Ibn Aby Ya'qúb and who compiled this book in 377, and died in 385. In the Leyden library is the third and last volume of this important work, and at Paris is the first of the *same* copy; a complete copy has been sent from Constantinople to the Paris library by Baron de Slane. This book contains short biographies of all Arabic authors and the names of all their works, and is one of the most precious relics of antiquity we possess.

2 *Chapter; Grammar.*

Nos. 39, 42, 44 and 46 are specimens of the manner in which Grammar was treated during the earliest period of Arabic literature, and they are precious on account of their rarity. There is nothing else of much importance in this chapter.

3 *Chapter; Lexicography.*

Nos. 142 and 143 are two valuable copies of two valuable works of Ibn al-Sikkyt, a grammarian of the third century, but the most important work in this chapter is No. 116—the Jamharah of Ibn Dorayd. To the best of my knowledge there is only one copy of it in India, and that not a very good one.

No. 146. كتاب لطايف الاعلام is usually ascribed to Çadr aldyn and Qúnyawy (on whom see Jámy, Nafa*h*át, No. 538) and not to Mo*h*yy aldyn Ibn al'araby. I have two copies of this work, 'abd al-Razzáq's Çúfy Dictionary is an abridgment of it.

Passing over the next three chapters, we come to Belles-lettres, here the first book of great importance is the Kámil of al-Mobarrad, No. 365, (I have seen the name written with a Kasrah "Mobarrid,") it is not only valuable for philology but also for history, containing the best account of the Khawárij. There is a very correct MS. of it at Lucnow which has been copied for me; Mr. Wright has promised to edit it. Nos. 366 containing the Mowashshà of Abú-l-*T*ayyib and 367 are still rarer and nearly as important. The latter No. contains an old copy of a work in which Ibn Dorayd, who died in 321, has collected words and idiomatic phrases referring to the saddle and bridle. This and Nos. 368 and 369 are among the few remaining specimens of the hundreds of works of the same nature, which were compiled during the first three centuries of the Islám.

Several of the treasures contained in the chapter on Arabic poetry are already known to the public, at least by name, as the Hamásah, the Dywán of the Hodzaylites, the collection of ancient poems of Ibn al'araby, &c. A splendid old copy of Tibryzy's commentary on the Hamásah is at Cawnpore, and I possess a copy of the commentary of Abú 'alyy.

The only poetical work in Persian which deserves notice is the Rawshanáy námah of Náçir Khosraw whose takhaluç was *H*ojjat (No. 630). It is stated that it was composed in 343, but سیصد must be a mistake of the copyist for چارصد, for Náçir Khosraw was a contemporary of the Fá*t*imite Khalyfah Mostançir who succeeded in 427 and died in 487, and many poems of his Dywán are in his praise.

The library of Leyden possesses great treasures in history and geography, but owing to the liberal rules of the university, they have been much explored by orientalists of all countries, and are therefore generally known.

And what has India done in the way of preserving a record of the thousands of books which are moldering in its libraries, and annually destroyed by insects ? I should not have ventured to ask this question if it could not be satisfactorily answered. Sir Henry Elliot's *Indian Historians* is a work of too high an order than that it could be called a catalogue. It is a historical book. But there are other works in progress which in extent will far surpass any thing that has been done in Europe. Dr. Ballantyne and Professor Hall are preparing a catologue raisonné of the Sanscrit MSS. of the Benares College, which in fact will be a general bibliography of Sanscrit literature, and Professor Hall is preparing at the same time a detailed account of near two thousand Hindi works of which hitherto hardly two dozens have been imperfectly known. The value of this publication for India will be incalculable. He has promised us an account of his labours, which, I hope, we shall soon receive for insertion in this Journal.

The Honourable Court of Directors has sanctioned the publication of the Catalogue of the Lucnow libraries, and 448 pages of it are printed. The sciences are not classed according to any logical arrangement, but those which are usually cultivated by the same class of men are grouped together in separate volumes, so that every

volume is in some way complete in itself and has separate indices. The great extent of the works renders such an arrangement desirable, in order that if it should not be completed, as much as may be published may be complete in itself. To every science, a chapter is prefixed containing the biographical works devoted to those men who were distinguished in that science: to the section on traditions, a chapter will be prefixed containing works on the biographies of person who collected traditions, in like manner to the section on law the biographies of Jurisconsults will be prefixed, &c. In imitation of Baron von Hammer-Purgstall and other orientalists, of biographical works, generally, a table of contents is given containing the names, principal dates and the titles of the writings of the subjects of the biographies. These chapters are therefore of considerable length. Of other works only the title of the book, a short account of the author, if none be contained in the chapter on biography, a short notice of the contents of the book, the date and the authorities on which it is founded—if they are quoted—the the size and the collection in which the book is found are mentioned. At the end of each volume three indices will be added, one of names of persons and places, one of book-titles and one of the initial lines.

The first 174 pages of the portion printed contain an account of 41 Persian Tadzkirahs, there is besides a Persian Tadzkirah mentioned under No. 62, and three or four will be mentioned in the appendix, they having come to hand after the above pages had gone through the press. Of several of these Tadzkirahs or biographies of Persian poets, a table of contents is given.

From page 175 to 192 twenty biographical works of Rékhtah poets are enumerated, and from page 195 to page 306 is a table of contents of the Rékhtah Tadzkirahs containing in alphabetical order short notices of upwards of fifteen hundred Rékhtah poets.

In page 307 begins the second chapter containing the works of Persian poets alphabetically arranged according to their takhalluç. The 142 pages which are printed of this chapter contain 236 numbers, the last name is that of Jámy, so that more than one half of the chapter remains to be printed. The remaining chapters of this volume will contain the works of Rékhtah poets, Dictionaries and Grammars of the Persian language, Inshás and tales in Persian, Grammars

and Dictionaries and Tales in Urdú, translations from Sanscrit or Hindi into Persian and Urdú, and Chaghatáy and Pushtú books.

At the end there will be an appendix of *corrigenda* and *addenda*. If the whole catalogue is completed, it will be an infinitely fuller and more correct bibliographical work of reference than *Hájy* Khalyfah's Bibliographical Dictionary.

Rev. J. Long's Catalogue Raisonné of Bengáli works has been already adverted to in this Journal, (ante vol. XXI. p. 632). It includes notices of upwards of thirteen hundred works, and will, we have no doubt, prove a valuable index to the vernacular literature of Bengal.

Notes upon a Tour in the Sikkim Himalayah Mountains, undertaken for the purpose of ascertaining the Geological Formation of Kunchinjinga and of the perpetually snow-covered peaks in its vicinity. —*By Captain* Walter Stanhope Sherwill, *Revenue Surveyor.*

An unusually severe earthquake, that occurred at Darjeeling during the month of May, 1852, threw down several thousand square yards of the South Western face of the perpetually snow-covered mountain Kunchinjinga,* exposing a dark mass of rock, rendered darker perhaps by the brilliancy of the snow surrounding it. By the aid of a good telescope, the distance being forty-five miles, I could plainly perceive that the geological formation of Kunchinjinga was not of granite, as I had read it was only a few days previous, but of a highly stratified nature, the strata being, by the aid of a telescope, distinctly visible. The statement that the snowy-mountains near Kunchinjinga were of granite was published in a Botanical Magazine published in England, Dr. J. D. Hooker being the author of

* For the derivation and meaning of this word I am indebted to Lieut. G. B. Mainwaring of the 16th Bengal Grenadiers, who, with a praiseworthy industry, has mastered the Lepcha language, and was, in 1852, engaged upon the study of the Tibetan. The word is Tibetan and means,

English pronunciation.	*Tibetan equivalents.*	*English.*
Kon	Khng-s	Snow
Chin	Chhn	full or covered.
Jong	b'jongs	Coeval or equal to

གངས་ཆེན་མཇོང

Height above the sea, 28,177 feet (Waugh), the highest measured mountain in the world.

T H I B E T

N E P A L

B H O O T A N

Kunchinjinga Mt

Junbotoo

Chowjerma

Kishee

Tendim

Singaleelah Range

Oak-Chestnut-Walnut

Oak-Olive

Oak-Olive-Chestnut-Magnolia Tree

Patches of Sandstone

GNEISS

GRAPHITIC SLATE

Great Rungeet River

DARJEELING

Gneiss highly Contorted

Hooker Copse

Teesta R.

Lat 27° 03'

Johannaddy River

Mahanaddy River

Titalia

Copper, Iron-Ore, Traces of Sandstone and Shale are met with at the foot of the Hills

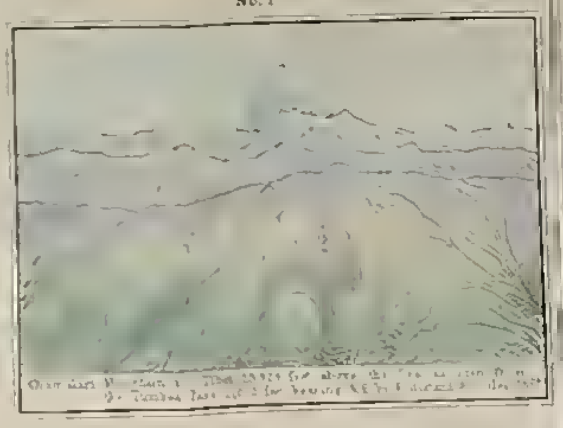
M O R U N G F O R E S T

300 feet above the Sea

SKETCH MAP
OF THE
VALLEY OF THE GREAT RUNGEET RIVER
and of the
S I N G A L E E L A H S P U R
in the
HIMALAYAN MOUNTAINS,
FROM THE NOTES OF A TRIP OF EXPLORATION BY
CAPTAIN WALTER STANHOPE SHERWILL, REV. SURV.
GEOLOGICAL FORMATION
PEARS
1852

REFERENCES

No. 1



No. 2

No. 3

Curious Specimen of Horizontal Gneiss Rock at 12000 feet
8 Miles North of RANGLAMAMO Mt

No. 4

KUNCHINJINGA Mountain 20177 feet Distant 104 miles
Specimen of GNEISS ROCK at the Snowline 18000 feet

No. 5

Great Pass in the Nepal Snowy Range at 17000 feet
S.W. from near Tambik Pass

the statement. Being anxious to settle the question I determined to travel as far North toward the foot of the snowy range as possible, and thus by diminishing the distance between myself and the exposed flanks of the mountain to obtain a clearer and nearer view of its lithological formation.

Being quite aware from the peculiar shape of the mountain and of its neighbouring peaks, that by advancing towards the snows by the valleys leading up towards Kunchinjinga, I should speedily lose sight of the mountain altogether, I determined to advance along the crest of the great meridianal spur Singaleela, which, from Darjeeling, appears to be connected directly with Kunchinjinga. Dr. Hooker's map of Sikkim also leads one to suppose that such is the fact, such however, is not the case as will be shewn hereafter.

2nd August, 1852. Having waited patiently for nearly three months since the earthquake exposed the flank of Kunchinjinga in order to allow the snow to reach its highest summer limit, I started this morning at 8.30 A. M. accompanied by Mr. Robert Smart, my second assistant in the Survey. Having just completed the Survey of the British Hill Territory, and having had several very fatiguing trips in the hills we were both in good walking trim, and had by our former experience learnt to travel lightly.

As we left the station of Darjeeling* the sun was shining most brilliantly, illuminating the snowy range to a silvery whiteness. As we turned the shoulder of Birch Hill, the most northerly point of the station, a splendid Panorama of all the country to the west and north of Darjeeling lay before us, a scene perhaps unequalled in beauty in the whole world. To the west the Singaleela range with its numerous peaks of 12,000 feet in height, its thousand buttresses composed of swelling mountains clothed with fir and rhododendron forests, shut out our view. To the north and in the centre of the Panorama stands Kunchinjinga, 28,177 feet in height, flanked on either side by numerous peaks scarcely inferior in height. To the east, the snowy range trending away to the south, and which is adorned with many fine bold and imposing peaks, forms the limit to the view. The lower unsnowed but forest-clad mountains Powhunry, Tendong, Pemionchi, Hee, Chakoong, Kirmee, and a hundred others

* i. e. Dorje the sceptre of the priesthood, "ling,," a place, "The holy spot."

all separated by deep valleys, through which flow impetuous torrents, and in one of which was visible the Great Rungeet pouring along 6,000 feet below us, form the most appropriate, because grand and beautiful foreground to the lofty, and perpetually snow-covered Himalayah, some of whose perpetually snow-covered peaks are only thirty miles distant. The air was so pure that the distance appeared reduced to five or six miles, and with a telescope rocks that had been hurled down by earthquakes, were seen reposing upon the green glaciers between Kunchinjinga and Pudeem mountains, doubtless on their way to the Moraines at the foot of the glaciers.

The descent from Darjeeling by the Tuqvor-spur to the little Rungeet river, is by a good Government road, and can be ridden upon the whole way down, which we did passing rapidly through the various botanical regions, or through oak, chesnut, maple, olive, walnut, birch, magnolia, to palms, tree-ferns, ratans: at 5,000 cultivation is met with, comprising barley, wheat, maize, buckwheat, rice, &c. then through Gordonia, pandanus, banian-trees, wormwood, twelve feet in height, to the Little Rungeet river 1,996 feet above the sea, which we reached in two hours and a quarter, having descended 5,169 feet.

The forest at 6,000 is peculiarly beautiful; the oaks, magnolias and other large trees being covered with gigantic pothos, epyphitical ferns, arums, and enormous creepers resembling ship's cables; the underwood consists of the tree-fern, some of which measure fifty feet in height and fifteen feet in girth at the base of the stem. The gracefulness of this botanical beauty can only be described by the pencil not by words.

Temperature of the air at Darjeeling 65° Faht.; at the little Rungeet at noon 89°; at 2 P. M. 91° 50′; temperature of the water 71°.

The little Rungeet which rises from the mountain Tongloo falls into the great Rungeet, three miles further down, and is here crossed by a substantial cane-bridge. The main chains supporting the bridge are composed of five ratan-canes each; the sides are of split cane hanging from either main chain as loops, two feet apart and three feet deep; into these loops, the platform is laid composed of three bamboos, the size of a man's arm, laid side to side; the section of the bridge resembling the letter V.; in the angle or base of the letter the traveller finds footing. This being a Government bridge

and kept in proper order, the platform or bridge is about a foot in width. Those bridges that are constructed by the natives have only one single bamboo for the feet to rest upon; and across these frail bridges, the most wild and turbulent streams are crossed with safety. Outriggers, to prevent the main chains being brought together with the weight of the passenger, are rigged out at every ten or twelve feet, in the following manner: under the platform, and at right angles to it or parallel to the stream, strong bamboos are passed, and from their extremities to the main chains, split ratan-ropes are firmly tied; this prevents the hanging loop or bridge from shutting up and choking the passenger. The piers of these bridges are generally two convenient trees, through whose branches the main chains are passed and pegged into the ground on the opposite side.

The bridge over the Rungeet is about fifty yards in span, and fifteen feet above the stream. Across this narrow bridge I was surprised to see a hill dog trot, apparently quite regardless of the raging torrent beneath him.

The water being too rapid for the passage of our ponies, they were sent back from the right bank of the river, and from this spot our wanderings commenced on foot.

At this spot which is twenty-two miles in a direct line from the plains, and nearly 2,000 feet above the sea, I observed termites or white-ants who, under the shelter of their pierced earthen covering, were destroying the bark of an oak-tree. The many varieties of lepidoptera and dragon-flies that were fluttering about the gneiss rocks were remarkable for their great numbers and beauty.

On our way down the hill our attention was markedly arrested bya flock of birds—which our Lepchas described as being about the size of a black-bird and of a black and white plumage, for we did not get a glimpse of them—whose united voices exactly resembled a set of human maniacs screaming and laughing in horrid chorus. I never remember to have heard such a peculiarly wild and attention-rivetting sound as the voice of these birds; it was perfectly startling.

Left the Rungeet at 2 P. M. and ascended to the Goke guard-house, in an hour. The forest is particularly beautiful, the fici on a grand scale being the most remarkable feature in the forest. It is interesting to trace amongst the various specimens of this natural

order, the gradual but alternately certain destruction that they bring upon the largest and tallest trees in the forest. In places the young fig, only a few inches in height, may be seen at the foot of a noble oak as a humble plant; a little further on, it is seen as a handsome creeper embracing the oak with a thousand tendrils, which expanding and thickening with age, at last coalesce, forming a solid mass of wood which speedily strangles its original support; which, by decaying and falling away, leaves the fig standing, a hollow cylinder sixty or seventy feet in height, with an umbrageous crown of leaves and branches, a far more noble-looking tree than the oak it has killed. Others again trust to themselves entirely, and seek no foreign support; this species is met with at 4,000 feet above the sea; very giants in botany; they generally rest upon three, five or more beautifully-arched stems forty or fifty feet apart, which unite perhaps seventy feet from the ground into one common trunk; from this spot the branches spring to about the same height as the point of junction is from the ground. The beauty of these trees is much added to, by being generally covered with the gigantic pothos, or bignonias, or buteas, or with other enormous creepers whose long stems are seen hanging in wild festoons, some like golden threads and others like ragged and frayed cables of ships: some of the finest specimens of these figs are to be seen close to the staging Bungalow at Kursion, on the road up from the plains to Darjeeling.

The Goke spur, wherever the road has laid bare the rocks, is found to be composed of a red micaceous schist, and towards the summit, 2,757 feet, of blue slate highly micaceous and separated from the upper or red schist by beds of hornstone.

At Goke there are eight houses and a guard-house, inhabited by the families of the sepoys on guard at this post. The guard consist of about eight men detached from the sappers and miners at Darjeeling, their duty is to guard the frontier at this spot, and to give the alarm at the approach of any armed men from Sikkim, and to prevent any of the British subjects being taken away as slaves into Sikkim. Similar guards are posted all along the Sikkim frontier, generally at spots where cane-bridges cross the Rungeet and Rummam rivers.

To the north of the Goke spur, and looking down into the valley of the Rummam river, which is seen and heard roaring along its

rocky bed, the eye wanders over a dense and beautiful forest. The huge buttresses thrown down from Singaleelah shut in the view looking up the valley, and on the opposite side of the Rummam, the steep Chakoong gneiss mountain exhibits numerous land-slips of great beauty. Chakoong is noted for its travertine lime deposits, which appear in the small streams flowing from its steep sides. Our entire march for to-morrow is in view, and a formidable-looking route it is. The Burpung mountain on the Heeloo range was pointed out to us as the spot for our next encampment, which cannot be less than 8,000 feet in height and distant five miles; but these five miles we have to traverse in the hot, dark, and miasmatic valley of the Rummam.

In the evening I observed several of those strange insects, bocydium, that are covered with snow-white and downy quill-like processes radiating in all directions from their backs. Any attempt to secure the pretty creatures for observation, even supposing they did not escape by hopping away, was a failure; as all their beauty was speedily destroyed with even the most gentle treatment, the slightest touch being sufficient to destroy all their snow-white covering.

The noise of the cicadas a thousand feet below us in the hot tropical valleys was quite deafening; their peculiar cry is quite distinct from the cicadas of Darjeeling, being louder, more metallic and of longer duration; much more cheerful and more pleasing to the ear. Two Buceros were seen flying over Little Rungeet; these curious birds build their nests in hollow trees, and defend them with great bravery. The Lepchas secure the living birds by putting a net over the orifice of their nests, and sell them at Darjeeling.

From the guard-house looking south, a fine cascade is seen dashing down the Tuqvor spur.

Cultivated plants observed at Goke were tobacco, tomato, stramonium, banghun, sém bean, Indian corn, red spinach, kuddoo, chillies, and French marigold. Wormwood and black pepper were seen wild. Before the doors of several of the houses were baskets containing the new shoots of the bamboo gathered before they force themselves above ground. The shoots are collected, put into baskets, the mouths of which are laden with heavy stones, and placed in the sun for several days, when fermentation takes place; the shoots are then

eaten as pickles, forming a pleasing acidulous adjunct to the Limboo's simple rice diet. The fresh shoots, which I tasted, resemble a new and sweet walnut.

3rd August, 1852, direction North-west.

At six this morning we descended the steep northern face of the Goke spur by a footpath, along which the Sikkimites attempted an entry into Darjeeling, during the late disturbances. I measured the slope of the path and found it to be 30°, a most uncomfortable gradient for a rough and narrow footpath flanked on one hand by a nearly precipitous descent, down which Mr. Smart and myself both rolled, until stopped by the dense underwood. Our road lay through a dark forest of noble trees, principally Gordonia, called by the Lepchas "sum brung kun," whose smooth, upright, and perfectly straight stems present fine specimens of forest trees. Most of these trees were encircled at various heights by epiphytical ferns, growing in a crown-like form completely round the stem. Each frond of this elegant fern measures five feet in length, and from the great elegance of its shape serves to adorn the tree that bears it. The underwood was principally composed of the gigantic bamboo, fici, bauhinias and ferns; the whole so thick, matted and tangled as to render the forest as dark as late twilight; not a ray of sunshine could penetrate or shine upon us; but I noticed that wherever a stray beam of sunshine did force its way through the tangled masses of foliage overhead, that it tinged the ground with a deep purple or garnet colour. The noise from the cicadas was quite oppressive and wearisome. One was caught and, as I conjectured yesterday, was of a totally different species from those seen at Darjeeling. It had transparent wings, and was three inches in length. On its sides are too long horny plates, and upon pressing these plates whilst the animal continued to cry, a modulation of the extraordinary and wild sound emitted by this strange fly was caused, bearing however no resemblance to harmony. Under skilful hands and by delicate manipulation, a tune might be extorted from this cicada, thus in a measure verifying the old fable of the cicada having been used as a supplementary note to the Lyre.

The underwood abounded with the yellow webs of the large red and black Epirœ, or bird-eating spiders, each web containing a spider.

A troop of red monkeys were gambolling and shouting in the trees; their voice is quite different from that of the common red monkey of the plains.

Three quarters of an hour after leaving Goke we crossed the Teryook stream at its junction with the Rummam river, and after travelling along the banks of the noisy, boiling and foaming Rummam for an hour more, we crossed to its left bank by a very frail and dangerous cane bridge of about 300 feet span, and commenced the steep ascent of Chakoong. We now stood in the Rajah of Sikkim's territory.

The Rummam immediately above the bridge comes tearing round a sharp corner of the mountain, and with one bound dashes over a group of gneiss rocks. The trees dipping their branches into the very water, the lofty forest-clad mountains on all sides, from whose very bosom, the river appears to dash at once, the roar and noise of the water—altogether present as pretty a picture as can be well imagined.

After a toilsome ascent of several thousand feet through forest trees and through several clearances planted with cotton, we reached two Lepcha huts, where we were most kindly received and invited to shelter ourselves from the burning sun, and to partake of the delicious "chee" or acidulous infusion of the Murooa (Eleusine), which is always presented in a joint of a bamboo, from which receptacle it is sucked up through a hollow reed so cut at the sides as not to permit the small grains to pass up into the mouth. The liquor resembles in taste, dilute Hock or Sauterne, and is very refreshing. It is slightly intoxicating, and is seldom seen above 6,000 feet elevation.

The huts of the Bhotia and Lepcha reminded me of the huts of the Rajmahal hill tribes. Having no caste, no great secrecy is sought for in the construction of the house, which consists of one large room thirty or forty feet square, raised upon wooden posts, the walls, roofing, beams, rafters, flooring, and fastenings being all composed of bamboo; the thatch is of grass. There are generally two or more fire-places in the room composed of loose stones upon a mound of earth, the whole retained in position by a square fender of bamboo.

In the house we visited, there were two women, many children,

and about ten men. Wandering round about the house were cows, pigs, poultry, goats and dogs. In the interior of the house there were two fire-places, at both of which food was being cooked, consisting of rice and tea. Tea in these mountains is drank after the following extraordinary manner. Into a large earthen cooking-pot, full of hot water, a quantity of black tea that has been chopped from the end of a brick of tea, is thrown, together with a little salt, butter and barley-meal; this mess after being well stirred, is served up in a teapot, each partaker of the tea producing his own wooden tea-cup from the bosom folds of his capacious clothes. In various parts of the house, depending from the ceiling were balls of cotton, various little bamboo baskets,—a half-finished woven piece of cotton cloth, earthen cooking pots, gourds, wooden spoons, a cotton-cleaner, a spinning-wheel, several large Chinese hats, nine feet in circumferance, fishing nets, heads of millet, a book of Boodhist prayers, a few English bottles, a pair of cymbals, bows and arrows, bead necklaces, large Lepcha knives, or Bán, hatchets, a drum, several blocks of wood used as tables, a few bamboo mats and a deer skin:—such is the simple property of a Lepcha, one of the happiest, merriest, and most humane of our species.

Close to our hut we could hear the roar of a cataract, the scenery round about the house was most pleasing.

After reposing during the heat of the day with the friendly Lepcha family, we started and in an hour reached a Lepcha Lama's house or Goompa, an immense building divided into two compartments. The Lama being absent, the whole house was delivered up to us; we took possession of one room about thirty feet square nicely boarded with broad and well laid planks. At the East end of the room was an altar, but divested of many of its usual utensils. There were nevertheless many holy-water brass cups, eight books of prayers, in a stand close by the altar, a sacred drum with its curious crooked drumstick, a pair of yak horns, cymbals, brass images representing gods, bells, conch-shells, charms and a dorje or the brass sceptre of the priesthood, resembling an English constable's hand-staff, surmounted by a regal crown; besides these articles forming the furniture of a Boodhist altar, there were English Eau-de-cologne bottles, a tea-cup, a blacking bottle, a two-foot ruler, and lastly, a

French deal box, that had once held brandy, and addressed in good English to "Mr. W. Martin, Darjeeling." The usual human thigh bone trumpets were locked up, they being considered too precious to be left about. These bone trumpets, if possible, are the thigh bones of Lamas, some of them are highly ornamented with brass work brought from Thibet. The two condyles at the extremity of the bone are pierced and the bone hollowed out and when about to be used, a small quantity of water is poured down the bone to make it sound clear. The sound emitted is like that from a brazen horn, and as a small hand drum, with pellets of clay or brass tied upon strings depending from the rim and serving as drumsticks, is generally used in the other hand, the noise produced is stunning. In several Goompas or monasteries, I have requested the Lamas to blow up the bone trumpets, to which requests they have always good naturedly acceded, terminating their performance with a hearty fit of laughter at their own strange and wild noise.

The whole of the walls of our room were decorated with mystic squares, triangles, and other figures of white, yellow, and black pigments; the door was a block of wood turning on its own heel which was stepped into a wooden socket, the walls were composed of planks and wattles covered with mud and pierced with two windows with sliding shutters. The Lama receives five rupees from the Sikkim Rajah annually.

This Goompa or monastery is situated near the large landslip that is visible from Darjeeling, this landslip, which is several thousand feet in height and one hundred broad, has a pretty stream of water flowing amongst its rocks; when heavy rain takes place the rocks begin to move downwards, causing a low rumbling sound, loud enough to awaken the members resident at the Goompa. The view from this spot looking back upon Darjeeling, only nine miles distant, the deep valleys at our feet many thousands of feet deep, the lofty Tonglo mountain to the South West and the foaming cataract on the landslip, well repaid us for two days' toil and the suffocating heat of the valleys.

Around the neck of one of the Lepcha children, hung as a charm, I observed, the following curious collection of oddities, a leopard's and a barking deer's canine teeth, an ornamented brass bead, a piece

of ginger, a clove of garlic, and the hard seeds of a forest tree, all strung upon a cotton thread. All the men, women and children who could afford it had the small silver current British Government coins, eight, four, and two anna pieces soldered on to brass rings, and worn either on the fingers or round the neck. To those who had no silver coins, I made a present of a quantity.

4th August.—Left the Goompa at 6.30 A. M. passed some good Limboo huts and clearances principally sown with cotton and murrooa, and commenced a stiff ascent. On passing the Limboo huts, we found men, women and children all hard at work, husking grain; fine English looking cows, pigs and poultry were lying about or strolling round the neat houses, which are built of split bamboo roofed with the long and broad leaves of the wild ginger and cardamom which abound in the forests at this elevation, the roofs are guyed to the ground with long rope-like rattans, to enable them to resist the powerful blasts of wind that descend the mountains with enormous power, and that without one moment's notice.

The ascent of Syrioong Burpung, such is the name of this portion of the Hee mountain, occupied us an hour; the ascent the whole way being through fine fields of Indian-corn and three kinds of murrooa. On the crest of Syrioong the heavy forest commences, and at this spot is a small cairn of stones, marking the boundary between the Jageer or estate of Lepcha Pongring, who resides at Tullam on the banks of the Rummam, and of the lands of the Rajah of Sikkim. At 10 A. M. we halted to breakfast at a beautiful waterfall, with a fine body of water dashing down the side of the forest-clad mountain by eight or nine leaps. A small portion of this waterfall is seen from Darjeeling as a white speck on the face of the mountain.

After crossing Syrioong the footpath runs through a dense underwood of rose bushes, stinging nettles, black mud, and running streams, through which we were obliged to wade; our legs and feet getting covered with numerous leeches, and our hands and faces stung by nettles and peepsas.

The peepsa is a small dipterous fly of a black and metallic green colour with spotted legs and a small head. It bites without any pain, attacking any available part of the body, upon which it feeds

for about three minutes, caressing the part the whole time by raising and depressing their delicate fore legs alternately, as if thoroughly enjoying the sanguineous draught; when their bodies are distended with blood, they fly away, leaving a small round purple spot of extravasated blood, very irritating, and, with some people, attended with considerable inflammation. If the fly is disturbed before it has had a full meal, a small flow of blood takes place, and relieves the bitten part. There are several kinds of peepsas, some are so small that they are barely visible to the naked eye; this kind however give a most stinging bite, and, although not seen, are felt in a very decided manner. The peepsas range from 2,000 to 8,000 feet.

A hasty breakfast being despatched, for it was impossible to stand still without being covered with leeches, we proceeded till eleven o'clock, when, being fully drenched by a smart shower, and by crushing through the wet underwood, we halted, lit a fire and dried ourselves; our legs, arms and bodies smarting from leech-bites and from the abundant wounds of the formidable stinging nettles which sting through the strongest clothes.

During our halt, our Lepcha guide made a breakfast of roasted spinach that he had collected in the murrooa fields in the morning. Rolling the spinach up in some large leaves he thrust the bundle into the hot ashes, where it remained ten minutes; he then withdrew the bitter feast and consumed it, adding raw but crushed stinging nettle tops as a sauce to the whole. It would require more boldness than most people possess to induce any stranger in the hills to attempt to put any portion of such a formidable-looking plant as the Sikkim stinging nettle into his mouth for transmission to the stomach. The leaves are armed with innumerable sharp spikes a quarter of an inch in length; not only are they spread over the whole of the upper surface of the leaves, but they also appear on the point of each tooth of the deeply serrated edge of the leaf, and upon the leaf stalks and stem of the plant. Each spike at its base is provided with a small white bladder or gland containing the poison. The plant attains the height of four feet; with a leaf upwards of a foot in length. Their wound causes much pain, and sometimes violent sneezing and fever; one kind in particular mentioned by Dr. Campbell, and named the "mellumba," produces running at the eyes,

nose, sneezing, fever and sometimes death. In addition to the above pungent food, my Lepcha consumed young and tender fern tops, a white fungus found upon trees, a sharp acid plant, and several other leaves and roots. A Lepcha affirms that he cannot starve as long as he is on the hills; this appears to be true, as he makes almost the whole vegetable kingdom subservient to his appetite.

Left the fire at 1 P. M., at 2 P. M. we were on the summit of Rutto, a wooden mountain; after rather a level walk of two hours, we halted for the night at 4 P. M. a few paces from the left bank of the source of the Rishi, which stream falls into the Great Rungeet river. The Barometer gave our elevation 8,030 feet, Thermometer 67° at 4 P. M. or just beyond the region of the leeches. Just as we had got our small tent up, heavy rain commenced to fall which continued during the greater portion of the night, penetrating our small tent and wetting our bedding. A good supper and a sound sleep refreshed us, nor did we much care for the sprinkling we got during the night. Near our tent was a tempting L'hap, or cave, formed by an overhanging mass of gneiss rock; but as it was not found large enough for us and our fifteen Lepchas, we cleared away the jungle, pitched the tent, slung the barometer and turned in for the night. I felt satisfied that our Lepchas were enjoying no worse fare than ourselves; they had two tents furnished by me for their protection; we had no servants to cook for us, no beds, no comforts, beyond a good layer of ferns to lie upon, and a blanket to cover us. A strong decoction of coffee morning and evening, with a handful of bread rusks and a slice of ham or bacon, forming our entire food during the twenty-four hours.

Lucifer matches, flint and steel, and several other modes of procuring fire being utterly unavailing in these damp mountains, the Lepchas were never at a loss to supply us with that necessary element, so conducive to comfort and life; for upon halting, our merry guides and coolies produced fire by causing one vertical piece of dry wood that was sharpened almost to a point to revolve rapidly in a mortise cut in another horizontal piece of wood; both pieces of wood were highly dried and smoked at their homes and exactly resembled two round rulers. The rapid revolution of the upright piece of wood upon the horizontal piece, produces by friction a dry sawdust, which, after a minute's working round and round, catches fire. The

wood resembles willow and is procured from a shrub that grows in the hot valleys and generally from the banks of the mountain torrents. Two men work the upright piece of wood, the other is placed upon the ground, or more generally upon the large Lepcha knife. The upright stick is seized between the palms of the hands, and made to revolve rapidly first to the right and then to the left, the pressure used causing the hands to descend from the top to the bottom of the stick; upon the hands reaching the lower stick, the second man commences from the top; and so on, in quick succession, until fire is produced; one mortise or hole produces fire four times, when a new one is made, the old one being worn through.

5th August, 1852.—Started at 8 A. M. in a North Westerly direction, and in three quarters of an hour we were upon the summit of Heeloo, about 8,500 feet (Heethloo of Hooker's map), at which spot were boundary stones separating two small estates of Sikkim. From this spot we commenced a rapid descent, which soon brought us again upon our tormentors the leeches, which swarmed upon every leaf, upon every stone. In an hour I had received fifty bites upon the ancles and legs; and allowing that only one in ten that managed to get upon my person bit me, I must have had five hundred of these troublesome and loathsome animals upon my person within an hour.

The leech of the Himálayah is first met with at 4,000 feet elevation, it is of a small black species, and, when young, is as thin as a needle and about an inch in length; when full grown it is still very small not measuring more than two inches in length, even when gorged with blood—at 5,000 feet their numbers increase; but at 6 and 7,000 feet up to nearly 8,000, they swarm in myriads, every leaf, bush and stone being covered with these annelides. From 8,000 to nearly 10,000 there is a hiatus, at which elevation these animals are not found, but from 10 to 11,000 feet, another species is found, but not very abundant; it is of a snuff brown colour with a black line down the back and a white stripe down each side of the body. This is not such a blood-thirsty animal as the black one, but is more sluggish.

The Lepchas affirm that the leeches spring from the bushes on to the traveller; this is a mistake, they *fall* upon a passer-by from

boughs over his head, and with the greatest activity cling to the shoe or foot, although only on the ground during the short period required to make a step. We tried tobacco leaves, dried snuff, of which we carried mulls full; we tried having a man behind to watch our naked legs, for it is impossible to keep the calves of the legs covered, otherwise every leech that managed to get upon your person would have a feast; but all to no purpose. The bites were as numerous as ever; although from the effects of the tobacco, I have turned out from my shoes at the end of a day's journey, thirty or forty dead and completely dried up leeches. If the leg is thoroughly protected with leather gaiters, the leech will be driven to bite higher up, and will insinuate itself up the sleeves or down the neck; in fact there is no remedy yet discovered that will keep them off your person. They are not seen during the winter, nor during very heavy rain: between the showers of the rainy season is the period of their greatest activity.

At noon we were a few hundred feet above the Limboo village Hee, having descended 3,000 feet, and now stood opposite to the noble mountain on which are situated the monasteries of Pemionchi and Chanachelling, on the northern side of the Kullait river. The Thermometer stood at 75°, and the power of the sun was so great as to necessitate the use of an umbrella. A pretty Bhootea woman with a child on her back brought us from her house, where she and her husband lived whilst tending a herd of cows, a large bamboo of fresh milk probably holding a couple of quarts, and subsequently she brought us two bamboos of the delicious chee, only to be enjoyed where there is great heat. A present of a quantity of silver two-anna pieces seemed to please her very much, for she ran for her husband, a regular Mongolian with a goitre, who, she assured us, would act as our guide for a short distance.

As dysentery was raging at Hee, our people begged of us not to go to the village, as they believe that the disease is infectious; indeed not one of our Lepchas would have followed us had we insisted upon proceeding in that direction; so having enjoyed the view of the magnificent mountain, and having taken the bearings of the Goompas that were perched 4,000 feet over our heads, our guide led us through the forest in a westerly direction.

Soon after leaving the cow-herd's hut we came upon two upright posts, the height of a man, stuck upon either side of the footpath and connected at the top with a horizontal post, from which depended two bundles of sticks, a foot in length, each bundle containing fifteen sticks; near these bundles were two wooden cudgels, also hanging by strips of rattan—a few feet removed from this group were two other poles erected on either side of the road, but unconnected with any horizontal bar. The meaning of these posts and sticks is as follows:—Any one coming from the direction of the two disconnected poles may pass on free and unmolested; but any one daring to pass from the other side, which points to the infected village, and in this case pointing to the dysentery-infected Hee; would be assuredly beaten with the two pendant cudgels under which he or she passes, and moreover would be fined thirty rupees, the number of pieces of wood tied up in the two bundles. Thus whenever small-pox, dysentery or any other complaint breaks out in a village, a strict sanitory cordon is drawn around the infected village, and no one is allowed to move out.

At 1-30 P. M. halted on the banks of the Mik, a tributary of much beauty to the kullait river, an affluent of the Great Rungeet. Over the Mik is a small bridge of rough trees with a bamboo bannister, the stream is twenty or thirty feet broad, and dashes by a series of leaps over a group of gneiss rocks. The noise was deafening, but the scene beautiful.

Just before reaching the Mik, I broke down and secured a large handsome fruit of a cucurbitaceous plant that was twining up a tree, the leaves were palmated, fruit about one foot across, and had the appearance of a musk-melon that had been pressed from both ends until considerably flattened. The Lepchas called it *kuthoor phort;* they immediately, but with some difficulty, dashed the fruit to pieces on the rocks, extracted from the inside five or six large red seeds, two inches in length, which, when broken open, I found to contain a milk-white kernel tasting like a new walnut. The Lepchas put the stones into the fire and, when roasted, offered them to us; they were delicious.

The case of the stones is as hard as a walnut shell, veined with deep sutures like a peach stone, which it resembles in colour.

Having washed all the leeches off our legs, we started and ascended a very steep and rocky mountain, and at 4 P. M. halted at a group of Lepcha huts named Rudhoo at an elevation of 6,517 feet. We took possession of a Lepcha house, the owner of which was absent. The view from this spot is very beautiful; five thousand feet below us the Kullait river, a mass of foam from its headlong speed, was visible, looking both up and down the valley. Immediately to the north of us and shutting out all view of the snowy range, stood the imposing steep and rocky mountain Pemionchi; magnificent forests of oak, chesnut and walnut clothing its steep sides. Immediately opposite to our house, we could see a fine cascade dashing down one of the deep ravines in the face of the mountain. The monasteries on the summit, the Cazi's village and residence near the summit, the numerous deep dells and ravines with which the sides of the mountain are indented, the distant mountains looking towards the East, and Heeloo, over which we had travelled this day, the little village of Hee overhanging the river—all combined to form as pretty a picture as we could desire to look upon. The Kullait river rises from the Singaleela range, flows between the Hee and Pemionchi mountains in a valley with an average depth of 6,000 feet for twenty-four miles, when it falls into Rungeet. Every spur descending from these two fine mountains has a separate name, and the whole of them are cultivated up to 5,000 feet, or 1,500 feet below where we stood, with rice, Indian-corn, and murrooa.

The mountains in the valley of the Kullait are far more grand and steep than any I have yet met with in the lower Himalayah. Pemionchi is composed of a bright and glossy micaceous schist; Heeloo of gneiss.

During this day's march, and as we were proceeding across a hill torrent in a most orderly manner, a young merry Lepcha behind me gave a loud scream, which seemed to electrify the whole of our Lepchas; down went bag and baggage from every shoulder, my guide, who was dressed as a non-working man in scarlet and finery, commenced most irreverently to strip off his finery, and to my horror almost threw my mountain Barometer into the nearest bush—when he had stripped himself he dashed into the stream, and commenced diving his hands under every stone near him or thrusting a

long stick under the more distant ones, whilst the other Lepchas were busy throwing branches of trees and bushes into all the small channels where any animal could possibly find a passage. The shouting and screaming that was kept up rendered it an impossibility to get an answer from any of the Lepchas; at last after my frequent enquiries as to what they had seen, my guide, with open mouth and eyes, told me that it was a fish with hands and legs that they sought; in other words they had seen one of the large brown edible hill frogs which, to judge by the immense sensation caused by its appearance, must indeed be relished by a Lepcha. The search, I am sorry to say, was a fruitless one.

Our homely meal this evening was added to by our Lepchas, who brought us a quantity of the roasted shoots of the young bamboo, which are put into the ashes until thoroughly heated; these shoots, which are conical in shape, and of the size of a man's forearm, or a foot in length and four inches in diameter at the bottom of the cone, are deliciously tender and sweet, resembling an artichoke in tenderness, and a good young cabbage mixed with new walnuts in taste. The only parts that are not edible are the Septa dividing the joints. These shoots and the roasted seeds of the Kuthoor Phort served up upon a large leaf were most welcome additions to our salt supper.

6*th August*, 1852.—Left our Lepcha hut at 7 A. M. The hut we had slept in had its walls composed of large sheets of bark, some as much as four feet broad and seven in length. This hut and two others constitute the village of Budhoo.

Just as we were starting, the Lepchas of Budhoo brought us as presents a large live cock, baskets of rice and some milk. The latter being very acceptable I took it, making them a present in return; and having given a silver coin to each member of a small troop of children, we proceeded in a westerly direction or up the valley of the Kullait, hoping by this route to reach the summit of the Singahleelah range. Immediately upon leaving the huts, we entered a fine forest of oak, chesnut, walnut, birch, olive and other fine forest trees; our path was about 3,000 feet above the Kullait which we could hear roaring below, as it dashed over the huge rounded masses of gneiss which compose its bed. Numerous kokla or green pigeons

inhabit these forests; their note is like a plaintive run upon a flageolet.

At the entrance to all the Lepcha clearances I observed forked sticks about eight feet in height supporting numerous wooden swords, minature baskets full of rice, eggs, the crops of fowls filled with rice, little bundles of herbs and flowers, fowls' legs and small baskets of raw cotton; these are offerings made to an invisible being who is said to reside on the banks of the Cholamo Lake in Thibet, whence the Teesta river (Lachen) takes its rise, and who is said to wield a great sword, with which he deals out death and destruction, as well as sickness and famine. The wooden swords are to deprecate his wrath; the productions of the earth and of their farms are offered partly as free-will offerings of gratitude for their abundant harvests, and partly as votive offerings.

At 8 A. M. we crossed a foaming cascade, which was descending over gneiss rocks with a headlong pace down the face of the mountain towards the Kullait. At 9 A. M. we were at the bottom of a deep hot valley, in which flows the Rennier stream, this is a large deep and rocky river flowing from Heeloo. Looking up the valley I perceived that the forest trees, crowning the heights many thousand feet above us, were all leafless, the foliage having been destroyed by the snow. The Rennier is crossed by a large fallen tree thrown from bank to bank, notched to prevent the feet from slipping; with an apology for a bannister, consisting of a few sticks tied together in the rudest manner with creepers, which frail support a Lepcha was obliged to pull quite tight whilst being used, otherwise it would be of little use to a traveller crossing such a boiling, howling chauldron, as raged below us.

The banks of the stream presented hornstone, and in the bed were blocks of a very beautiful gneiss, the component parts of which were intense black mica and pure white quartz.

A little below the bridge there was a strong wooden palisade supporting a quantity of elongated conical fishing baskets and extending quite across the river, destined for the capture of the edible frogs.

At 11. 30 A. M. after tediously cutting a path through a regular tropical growth of underwood, we reached a small stone fort prettily perched upon a knoll commanding a complete view both up and

down the valley of the Kullait, a wild and beautiful scene. The fort, which is built of flat slabs of gneiss rock, is fifty feet square with walls eight feet in height, with a square bastion in the centre of each face; the walls are pierced for musketry. Within the fort are two houses the residence of a Bhooteah, by name Cheoong Lethoo, who styles himself the Sirdar or chief of Singaleelah, and of the valley of the Kullait; he receives no pay from the Rajah of Sikkim, but has to collect soldiers from his district, when required, which, I imagine, is not often the case. This little stronghold is surrounded by fields of Indian corn, rice and murrooa. Immediately under the walls were cucumbers and chillies, whilst all beyond this small cleared space is dense forest. The fort was built by the present owner's father, who was a man of note in Sikkim. As we approached the fort, the Sirdar was seen parading up and down upon the top of the walls, gun in hand, his basket hat, which was highly ornamented with sparkling plates of mica, shining like a helmet in the sun. He seemed wonder-struck at seeing our long line of fifteen coolies and two Sirdars, headed by two Europeans, invading his forest fastness, where from the commencement to the close of the year a stranger is never seen. Our presence seemed to distress him very much, and it was some time before he would condescend to answer any of our questions regarding the road up to the summit of Singaleelah. A present of gunpowder, shot and ball for his old English single-barrelled gun seemed to please him, as he soon after volunteered to be our guide to a village where his wife and family were residing a few miles further up the valley, and where we should be obliged to halt for the night. This was most fortunate, as, without his assistance, we never could possibly have found the footpath which crosses and recrosses streams and forest tracts, in some places without a trace of a footpath.

From the fort we descended to the banks of the Kullait, which river we skirted for a short distance until we came upon the spot where the Sungroo and Sungsor streams, both flowing from the south, fall into the Nyu, a feeder of the Kullait, only a few yards from each other. The noise of the three streams, filled as they were by the late heavy rains, can only be understood by a visit to the spot. The roar and confusion caused by the falling, bounding and foaming

water, the forests, the strange attire of our party, every member of which was bleeding profusely from both legs from the leech-bites, formed a strange, unpleasant, though curiously wild picture. Both streams are crossed by trimmed trees; between the two streams a stone wall pierced with embrasures crosses the road, flanked by the Nyu river on one side and by the steep and wooded mountain on the other. This defence was erected by the Sirdar's father to repel the Goorkas, who more than once have threatened Sikkim with invasion, since their great invasion of 1787 A. D.

Close to the stone wall above-mentioned is a Mendong, a solid stone edifice resembling a wall; they are found all over Sikkim; they are generally about twelve or fifteen feet in length, six feet high and two deep, with a centre distinguished by being thicker and higher than the sides; on the faces near the top are inserted large tablets with the mystic words: "Om mane pemi hom," carved in high relief. As the inscription of course begins at opposite ends on each side, the Bhooteahs are careful in passing, that they do not trace the words backwards;* the left hand is always kept next to the Mendong when passing one.

An hour's walk along the banks of the Nyu river brought us to the ascent that leads to the last houses in the Kullait valley, 6,500 feet above the sea; at the houses we halted for the night, sending our men ahead to clear away the jungle, as the path from long disuse is reported as overgrown and impassable.

The path to-day passed over much gneiss rock, and occasionally large detached slabs of the same rock were seen; some of the blocks have minute garnets disseminated.

We had a neat little granary assigned to us as our quarters; the house stood upon high posts and was well stored with baskets full of ripe barley and wheat in the ear, also cotton; the walls were open mat work, and the heavens were visible through a scanty reed thatch; the whole room was nevertheless comfortable, dry and redolent of harvest. At sunset we had an audience of the Sirdar and of the villagers in general: we sat upon nice soft cushions provided by the Sirdar, stuffed with musk-deer hair and placed upon the bare rocks. We conversed through interpreters for some hours, principally about

* See Turner's Embassy to Tibet, pages 97, 98.

the unfortunate, because misguided, Rajah of Sikkim, about L'hassa, the grand Lama, the pass of Tumbok into Nepal, which we expected to reach the next day, and upon a variety of other subjects. The Sirdar showed with much amusing importance sundry Tibetan looking letters, stamped with the Rajah's vermillion seal, forbidding Cheeoong Lethoo, Sirdar of Singaleelah, to allow any one to pass either up or down the Tumbok pass; we told him it was impossible to retrace our steps, the fatigue we had undergone ascending and descending the steep mountains, amounting to 10,000 feet of descent and 17,500 feet of ascent in five days, the innumerable leech-bites we had received, amounting to several hundreds on each leg, the intolerable heat of the valleys, and the constant wading through the icy cold streams and from never being clothed in dry clothes had so knocked us up, that we were determined to enjoy a little of the cool breezes on the summit of Singaleelah; we informed him that if we found we could not get along the crest of Singaleelah we would return by the Kullait; this cheered him up amazingly; but when I told him that if I succeeded in cutting my way along the crest I should return by Pemionchi, his countenance fell; he begged of me not to risk my safety in going upon Singaleelah which, he declared, was a land of rocks and desolation, and a spot not fitted for man to wander in. Poor Cheeoong Lethoo sat the picture of despair at our obstinacy, and with the determination of a true Mongol he kept on passing and re-passing over his beardless chin and that with rapidity, a handsome pair of flat brass L'hassa beard-plucking pincers, ornamented with Tibetan characters, a violent jerk now and then proclaiming that a stray hair had actually been secured and rooted out; and to ascertain this comforting fact, the edge of the pincers were passed over his lips; the fact being satisfactorily settled to Cheeong's satisfaction that he had actually captured a solitary hair, another search was immediately taken in hand.

Amongst his other papers the Sirdar produced a picture about one foot in length, painted upon fine linen. It was from L'hassa, the drawing representing a great number of gods and goddesses, rivers, mountains, and a variety of confused and mystical subjects; on the back of the picture were the revered words "Om, a, hoom" in large bright vermillion letters. The picture, the Sirdar affirmed, cost

£50 sterling (500 rupees), and to it he appeared to attach much value; the mystic words as written

	om	Intelligence, arm, power	or God,
	ā	The word	
	hoom	The heart or love	

mean God; or as Le père Calmette in his "Lettres édifiantes," Tome 14th, page 9, says, "voici ce que j' appris de la religion du Thibet; "ils appellent, Dieu Koncioser, et ils semblent avoir quelque ide'e "de l'adorable Trinité car tantôt ils le nomment Koncikocick, Dieu "un; et tantôt Koncioksum, Dieu Trin. Ils se servent d'une espèce "de chapelet sur lequel ils prononcent ces paroles; Om, ha, hum. "Lorsqu'on leur en demande l'explication ils repondent que 'Om' "signifie intelligence ou bras, c'est à dire puissance; que 'ha,' est "la parole; que 'hum' est le cœur ou l'amour et que ces trois mots "signifient Dieu."

The Sirdar was a boy when Captain Weston came up the Kullait in 1822, to settle the boundary between Nepal and Sikkim at the head of the Kullait valley or at the Tumbok Pass. By the treaty of 1815, between Nepal and Sikkim, a large portion of the Sikkim Hills and Morung that had been ceded to the British Government in perpetuity by the Nepaulese Court, and at the same time made over by the British Government in full sovereignty to the Sikkim Rajah, required to have the boundaries settled.

The Sirdar had also escorted Dr. Hooker from the Tumbok Pass to the Teesta river when returning from his tour in eastern Nepal in 1849, and at last consented to escort us to the summit of the Tumbook Pass.

Towards the close of the long talk, I made the Sirdar a present of money, and to every man, woman and child, amounting in all to thirty individuals, I distributed two, four and eight-anna silver coins; and in return, we were presented with a live kid, bamboo shoots, rice and plantains.

At this spot there are only two houses besides our little granary; in the house of the Sirdar nearly thirty people were accommodated during the night with food and lodging, men, women, and children all sleeping in the one room that constitutes the entire house.

Two miles north from the Sirdar's house, and several thousand feet below us, the Nyu and Kullait rivers unite, our route lay up the Nyu, the true Kullait valley from whence the river rises being too precipitous to attempt to reach Singaleelah by.

7th August, 1852.—Started at 7.30 A. M. up the valley of the Nyu with Cheeoong Lethoo, Sirdar, and an old merry Limboo with a long white beard, as our guides. The ascent was very steep, and the path had to be cleared the whole way, not having been used for three years; the principal underwood was ferns, polygona and a plant whose leaves are eaten as a spinach by the Lepchas. At 9 we reached a spot in the forest where stood the remains of an old guard-house built by our Sirdar's father, for the purpose of watching the movements of the Goorkas. From this spot, the greater part of the valley of the Kullait is visible: as we stood to take breath, the merry old Limboo, who was armed with a bow and quiver full of arrows and a very long and handsome knife, presented me with a pinch of snuff deliciously scented with pounded cloves, and contained in a neat horn mull. At 9.30 we entered a fine open forest of noble birch trees, the ground was free from underwood and nearly level. At the foot of many of the trees we saw the marks of wild hogs, deer, bears and wild dogs; green pigeons (koklah) we heard cooing overhead in the trees, and high over a neighbouring mountain a black eagle was seen soaring, and beneath him numerous swallows were flitting to and fro. In this forest we passed the remains of a hut in which Dr. Hooker had put up for the night in 1849, and close to which is another stone breastwork thrown right across the road. The denseness of the foliage of these forests, may be imagined from the fact that although a fine clear sun was shining overhead, not a ray could reach the ground along which we were travelling.

Our road now lay along the banks of the Nyu, a feeder of the Kullait, which rises at the Tumbook Pass, a foaming hill torrent about fifty feet broad with a cataract or miniature waterfall every twenty paces; the earth literally shook beneath the weight of the falling water.

Crossed the Tiksee at its junction with the Nyu, fording it with much difficulty from the fearful rapidity and strength of the descending water. The method of crossing these rapid streams, is to

send some of the steadiest and strongest men into the stream, who by the aid of poles manage to steady themselves and form a line completely across the stream with their faces towards the source; in front of this living barricade the weaker men, those heavily laden and travellers are passed safely over. At 12.15 P. M. crossed in a similar manner the Sikna; also at its junction with the Nyu, and at 12.45 P. M. crossed over to the left bank of the Nyu by a fallen tree.

Halted here for half an hour; the Barometer gave an elevation of 8,321 feet, Ther. 62° in the shade.

The rocks in the bed of the Nyu were almost entirely composed of gneiss of great beauty and fineness, consisting of white quartz, white, pink, green and rose felspar; golden, silvery and black mica; garnets, and in one specimen some beautiful actinolite of a pale green colour. At 4 P. M. we entered the region of Rhododendrons, associated with which I noticed tea trees in blossom, maple, Buccinicum hypericum in full blossom, Hydrangea, Daphne or paper-tree, numerous flowering shrubs and an underwood of the cheem bamboo of whose roasted tops, our Lepchas gave us a delicious feast in the evening. We pitched our tents in the Rhododendron forest on a small piece of level land named Tumbok, from whence the name of the Pass a few thousand feet above us. Our elevation was 9,660 feet, Ther. 67°, we have ascended 3,160 feet since the morning, leaving our tormentors, the leeches, at 7,000 feet. Few people who have not travelled in the forests of Sikkim can imagine the perfect repose we enjoyed when we got beyond the region of leeches; the incessant watching for these tormentors, the impossibility of standing still, or of even walking slowly when amongst them, is fatiguing in the extreme; all pleasure is destroyed; beautiful scenery, plants, flowers all are disregarded, in order to prevent a cluster of these loathsome creatures clinging round your ancles. Watching their movements, brushing them off, the continued sprinkling of dry snuff over the stockings, which is washed off again at every stream, is more than enough for the undivided attention of any one.

By observation I have learnt to save myself many hundreds of bites, but, I am sorry to say, at the expense of those with me; it is *never to walk behind any one*, but to lead the line, which always travels in Indian file. Immediately a footstep has touched the path

the leeches are roused and they spring up from under every leaf, from under every stone, and after two or more human beings have passed, the leeches are seen hurrying towards the path from the neighbouring bushes as far as eight and ten feet distant. When they reach the foot path they stand up perfectly rigid and quite ready to grasp the first foot that falls near them. A stranger would mistake the rigid little black things in the path for twigs or small pieces of wood. The person leading the line seldom gets bitten, the animals not being roused. During heavy rain, frost or bright sunshine the leeches do not appear; a cloudy or a moderately showery day is their liveliest time.

During the march, our guide took us off the road up a very steep bank to inspect a collection of wild bee-hives. After much scrambling and by the assistance of hooked sticks that were hooked on to the roots of the trees overhead, we managed to reach a narrow ledge with a deep valley in front of us. Immediately on our left and separated from us by a deep chasm, was a perpendicular wall of rock, over which a fine waterfall was pouring its full stream; almost within the reach of the water was a cave formed by an overhanging rock, from the roof of which depended twenty flat and black looking combs, three feet in length, covered with innumerable bees busy manufacturing their honey, while thousands were on the wing going and coming. The sight of these insects, only a few feet removed from where we stood, made me shudder; as it painfully brought to my mind a mad race, I was once made to run for miles down hill after having inadvertently disturbed a nest of these pugnacious little creatures. Besides being covered both on the head and hands with wounds, I had upon that occasion twenty-four stings removed from merely round my eyes. I therefore hastily made a sketch of the curious group, and descended from the ledge as fast as possible. These bee-hives are the property of the Sikkim Rajah; the wax is taken once a year by smoking the bees out, and yields him a revenue of ninety rupees per annum. The honey is eaten by the wax collector or thrown away.

8th August, 1852.—An hour and a half of sharp climbing carried us to the summit of Singaleelah* where the Tumbok Pass leads

* Means "Birch tree."

from Sikkim into Nepal. Barometer gave an elevation of 10,792 feet, Thermometer 64°.

On our way up we were shown two rocks between which the narrow footpath runs; and where our guide informed us that a stout Nepalese Soubah, who was travelling in this direction, was unable, without great manœuvering, to force his portly personage, much to the merriment of his followers and of Cheeoong Lethoo Sirdar, who related the story, as we halted for breath, with great gusto.

At 10,000 feet we fell in with the pale-coloured leech that inhabits this elevation, but, as they are scarce and sluggish, we paid little heed to them.

The Tumbok Pass is a depression in the Singaleelah range flanked on either side by high mountains, that to the south "Melido" or "Singaleelah" is four miles distant and rises to 12,329 W. feet;* that to the north, distant two miles, is nameless and is about 12,000 feet in height. The immediate summit of the Pass is destitute of trees, the forest being for two or three hundred yards on each side of the footpath replaced by grassy banks and slopes covered with a bright assemblage of purple geraniums, white roses, primrose, everlasting chrysanthemum of a buff colour, lily of the valley, forget-me-not, thistle, numerous pretty wild flowers whose names I am unacquainted with, a large white Passion flower-looking creeper, hemlock, holly, raspberry, arums, campanula, two kinds of buccinium, ferns, lichens, mosses, grass, carex, fennel, dock, ranunculus, anemone, a shrub bearing an elegant cluster of red bells, and a delicate lily-of-the-valley-looking plant bearing a pink or white cluster of minute bells. The trees near at hand were arboreous rhododendron, maple, a mimosa-looking tree, bearing a cluster of brown berries (Pyrus Americana?) and several others; wild garlic grows in great abundance with a very beautiful purple flower; this herb was gathered in large quantities and consumed by the Lepchas.

A few feet below the summit of the Pass on the Nepal side, there is a deep black looking tarn surrounded by such deep forest that we could not conveniently get to it. The Sirdar and coolies all held

* W. When applied to heights, indicates heights ascertained by Colonel Waugh, Surveyor General.

up their hands in the attitude of prayer when they saw the water, and remained in that position muttering to themselves for several minutes.

The Sirdar after showing us the cairn of stones erected by Captain C. T. G. Weston in 1822, (?) and having shown us the boundary between Nepal and Sikkim, took his leave and returned home, taking with him as presents a pair of scissors, a sharp scalpel, a penknife, a quantity of gunpowder and shot, and a bottle of brandy.

On the cairn of stones are three carved slabs of gneiss, the carvings representing Boodh in the attitude of meditation, and several other Hindoo gods and some very indistinct figures, none of which were visible until I had destroyed, with boiling water, a very tough and flat lichen, that had spread over the whole of the slabs.

On a slab of flinty slate, we engraved our names and date of visit.

The view looking into Nepal is extensive and very beautiful, the spurs of almost all the mountains up to 5000 feet being much more cleared and cultivated than those in Sikkim, bespeaking a denser population. The grandeur of the view, looking back the way we had come or to the east, can hardly be described in words. The eastern snowy range was out in all its glory; there was not a cloud to obscure a single peak. Gipmochee 14,509 W. was bare of snow; Cholah 17,319 W. was covered with snow for about 1000 feet; further north all was one wintery scene of snow, and the lofty Chumalari 23,929 W. distant 80 miles and far in Thibet, towered over all the peaks in advance of him. I have given a slight sketch of this mountain upon the accompanying map, as it appears from the Tumbok Pass. To the north, nothing was visible but the sharply pointed and snowy peak, Nursing 19,139 W. distant 23 miles and covered with perpetual snow, the higher crest of Singaleelah shutting out our view to the north.

The valley of the Kullait from its great depth appeared bathed in a cobalt tinge; Hee, Tendong and many other fine mountains seen from Darjeeling were now seen in flank by us; and on our right a fine waterfall, the source of the Nyu, was dashing down the fir clad Melida mountain which is 12,329 feet in height.

Our tent was pitched upon a bed of geraniums in full flower, thousands of whose pretty blossoms were trodden under foot. Gad-

flies of a large size were very abundant, but they gave us no trouble beyond an occasional bite.

As we had had only a very short march and intending to remain all day on the Pass, the Lepchas commenced playing hop-step and a jump; running races, jumping distances and playing all sorts of tricks, like so many good-natured school-boys; whilst the Nepalese Hindoo coolies shrunk away to sleep under the trees.

The Lepcha is a most desirable companion in travelling, neither heat nor rain nor cold, nor any thing else appears to ruffle his even temper. I have travelled with them in the height of the rains when for fifteen days they never had a dry stitch of clothes on their backs, and yet no word of murmur was ever heard from their lips. They travelled the whole of these days through drenching rain, carrying heavy burdens; and at night often in vain endeavouring to dry their clothes, their legs streaming with blood, they would without a murmur, but with much laughing and joking, lie down on the wet ground under a cotton covering, stretched upon two poles, and sleep till the morning.

During the night I heard the hooting of owls; bats and shrews were also heard. I procured a very handsome speckled crow with a white and black tail; small birds were very scarce.

9th August, 1852.—Direction north along the crest of Singaleelah. The morning was most lovely, the air pure and transparent and the temperature delicious; although this trip has been undertaken in the height of the rains, we have as yet only had a few showers since leaving Darjeeling.

The same beautiful view that we had sat for hours enjoying the evening before was still before us; Chumalari towering over every thing. This singular, isolated mountain was recognized this morning by several of my Lepchas who had been to Phari at its base.

As we proceeded we noticed a bank of snow-white clouds twenty miles in length and twelve thousand feet in height, impelled by the full force of the most southwest monsoon rolling up the eastern flank of the eastern snowy range, and as the clouds poured over the western side upon the lower hills of Sikkim, it had the exact appearance of an extensive cataract pouring over the mountains into the deep valley of the Teesta river; a cataract twenty miles long and 12,000 feet in height; it was a glorious sight.

As we ascended the grassy knoll that overhung our tents, the snowy range of Nepal was revealed to our sight, with all its attendant beauties of deep valleys and blue mountains for a foreground. For three and a half hours we had to cut our way through a forest of rhododendrons, red currant trees in full fruit though not ripe, maple, juniper, birch, white rose, cherry trees in full fruit, with an underwood of Aconitum palmatum or bikh, the root of which is a deadly poison, and of which our Lepchas dug up a quantity ; a purple-flowered garlic, many beautiful flowers, the forget-me-not, the poppy-like garnet-coloured and yellow mecanopsis, and a great variety of wild flowers. The roots of this deadly aconitum are collected by the hill-men (Puharias) I believe in the spring, and exported to Calcutta and to other places, where it sells for one rupee the seer. Its uses were laughingly described to me by my merry Lepcha guide, as "useful to sportsmen for destroying elephants and tigers, useful to the rich for putting troublesome relations out of the way, and useful to jealous husbands for the purpose of destroying faithless wives."

Its poisonous power is so great that a Lepcha died at Darjeeling, some months ago, who when crossing the hot valleys had allowed the root which was carried across his shoulder in an open cane-basket, to rub against his moist naked body ; during this time he imbibed through the pores of the skin sufficient of the poisonous principle to cause his death.

At 10 A. M. we arrived at a grassy spot, where the remains of a Gurung's house stood. The Gurungs are a pastoral race of Hindoos residing in Nepal, who, during the summer, drive up to the base of the snows large flocks of sheep, where they depasture the grass found as high as 14,000 feet, and gradually retreat to lower elevations as the summer draws to a close.

From this spot we found a good footpath leading along the crest of Singaleelah ; we had passed over five high peaks and now stood upon a very high one with immense blocks of moss-capped gneiss protruding through the soil ; which latter was a carpet of beautiful flowers, the pretty Veronica predominating. Halted an hour to breakfast and to rest and at 11 A. M. commenced the ascent of Sughoo mountain, passing through a forest of small rhododendrons

of many kinds, only one of which was in blossom, bearing a small purple flower three quarters of an inch across, and with a leaf only one quarter of an inch in length, I also saw a quantity of a bright yellow heartsease. Reached the summit of Sughoo at noon, from whence we commenced descending, and halted for the night under some fine large cherry trees at an elevation of 11,458 feet, Ther. 65°, 1 P. M. Sughoo is the culminant point of the great Pemionchi spur that ends in the great Rungeet, and which spur is sixteen miles in length from west to east. Its western extremity being 1,200 feet above the sea, and its eastern extremity about 2,000 only.

We were now sixteen miles from the perpetual snow line, but could see nothing, as we were enveloped in a thick cloud.

(To be continued.)

Note on the Ruins at Maunkyala,—by Major JAMES ABBOTT, *Boundary Commissioner, Punjab.*

My tent being pitched at the tope of Maunkyala on 7th April last, I set out to examine more particularly the village and its neighbourhood. For although I had previously visited the spot more than once, I could learn of the villagers nothing confirmatory of the report, which places several smaller topes in that neighbourhood, and which would make it the site of a city that has since disappeared. During the morning several zemindars came to visit me. They, as usual, denied the existence of any other topes than the principal; but allowed that near the village of Maunkyala, building stones occurred in great number at the depth of from three to seven feet. My first object was to visit one of the diggings for such stones. It occurred on the south-west of the village, distant from it about one hundred and fifty yards. The depth at which the stones occurred was about five feet, the super-incumbent soil being a sandy clay, manured from the village. I was informed that the same occurs on digging at any portion of the village glacis; by which I mean that land which is manured from the village.

The village, as at present it exists, contains about eighty houses closely congregated together, and built entirely of the debris of the

ancient habitations. The space in which these building materials occur may be an area half or three quarters of a mile in circuit, a space which might have contained a good-sized village of two or three hundred houses. A street occurs in the village paved with massive slabs. But as this is at the very summit of the tumulus upon which the village stands, it may have been made since the destruction of the original buildings. Outside the village, however, on the north-west, the paved street appears to be original; for on one side are the remains of a foundation elaborately constructed of squared stone without cement, but accurately fitted together.

This village occupies an elevated site partly natural, partly artificial, about four hundred yards north of the Maunkyala Tope. No one, on examining superficially this site, could conjecture that beneath it are the ruins abovementioned. The soil shows no admixture with particles of brick, pottery or building stone. It appears like the natural undisturbed soil of the country.

The stones which lie beneath the soil are of two kinds, the common unsquared building stone, of which houses are built in this neighbourhood, and large slabs of sandstone carefully squared, some of them from two to four feet in length by a cubit in breadth. These occur in such numbers as to leave no doubt that a considerable building has here existed, very different in structure from the dwelling houses of the present century.

On carefully observing the surface of the neighbourhood, several mounds are apparent, which, on examination, prove to be the ruins of religious or sepulchral edifices. All of these have, I believe, been violated by that antiquarian frensy which spares neither religion nor piety, but rudely spoils alike the sepulchre and the shrine, to gratify the avarice of curiosity or of ambition. This sacrilege cannot be too much execrated. The veneration which attaches to sepulchres is so closely interwoven with religion, that its demolition endangers interests the most sacred to humanity. If we can warp our hearts to take delight in plundering the dead, how shall we respect the rights of the living?—that solemn, time-honored legion who have preceded us to the unknown shore, who have explored for us the mystic path, who have dared the perils of regions without a name, that we might profit by their success or their error, and

tread more confidently the mazes of eternity. How can we reconcile it with our conscience, with our principles, with our feelings, to drag their dust forth rudely from the tomb, or to mutilate and deface those sacred monuments which were hallowed to their hearts by association with the Author of all good? Do we rob them because they have none to act as champions for them, because there is none to call us to account? to sue us at law? If so, it is a cowardly and an unmanly plea.

The number of these mutilated monuments I reckoned to be eight or nine, but there may be others which I did not observe. Several of these have been regular topes, though now for the most part despoiled of their squared stone: a fate from which the main tope has been saved, only by the cumbrous weight of its materials.

There are also a large number of wells in this neighbourhood, frequently of oblong figure and lined with squared stones. Each of these wells may have belonged to some shrine, or have been dug as a votive offering to the religion of the spot.

We have now no means of ascertaining the traditions of Maunkyala. We know not whether the supposed sanctity of the spot led to the erection of the main tope, or whether it was the consequence of the existence there, of so considerable a shrine. But whatever the cause, it has led to the erection of many such shrines or sepulchres, and to the excavation of many wells.

The Boodhists evidently delighted in water. As their religion seems to have emanated from the worship of Fire: so water, as one of the elements, seems to have been necessary to their ritual, and is found in either tank or well at all of their shrines. Many of those at Maunkyala may have been gifts to the main shrine; others belong to separate shrines of which the vestiges remain: and others may have been the work of votaries, to whom in consequence of the scarcity of water at that spot, the work had been enjoined by the priests. My small camp, of less than forty persons, daily exhausted the principal well. A few of these wells may have been designed for irrigation.

From a careful examination of the spot, I cannot see any evidence of the existence here of a city. The area occupied by submerged ruins would not have comprised a very considerable village: whilst

the comparatively large number of wrought stones, denotes some costly structure which might have occupied the entire site. I rather incline to think these, the ruins of the monastery of Maiukialan described by Hiang Tsang as existing in the 6th century.

It is probable that every considerable tope was the shrine of a neighbouring monastery, where were deposited the relics of each saint of the order, as he died. The original villages of this estate may be those which still exist there: and Maunkyala itself as a village may be altogether posterior to the ruin of the monastery from the debris of which it is erected.

The arguments upon which some writers have attempted to prove the modern village of Tukhtpurri to be the ancient Taxila refute themselves. It is asserted that Tukhtpurri *is* Taxila, because at the distance of six miles, viz. at Maunkyala are the ruins of a large city. Were this the case, Maunkyala might be Taxila. But in the name Maunkyala, we have no resemblance to that of Taxila; and at Tukhtpurri, which has some resemblance to the name sought, we have no ruins at all. The two places have no connection whatever, the one with the other. Tukhtpurri has no Boodhistic remains, but is built on the site of a modern Gukkur village, a mile off the high road.

Whatever the origin of the veneration felt by Boodhists for the site of Maunkyala, we find it taken up and adopted by the Gukkur princes of the Dhangulli branch, who have established their cemetery about four miles to westward of the tope, in a spot remarkable for a rock of the sandstone formation, which there crops out of the soil in the figure of a natural wall.

J. Abbott.

P. S.—At Maunkyala very few Bactro or Scytho Greek coins are found; but from the little town of Mulpoor, distant three or four miles, some were brought me, which appear to have been received by Kuttries from the peasantry who find them in old village sites. Of these I observed the following:—

The dregs of the copper coinage of the Kanerkean Dynasty,	many
Soter Megas,	a few
Ayas,	a few

The copper coin which appears to belong to the Cashmerian Dynasties of Indo-Greeks, but is common also in the Sind Sagur Doaba,..... many
Copper coinage of Baraoro, ... a few
The coins of Sri Ram, ... a few

The prevailing coin at Mulpoor is a minute bronze coin, worth about half a farthing, having on one side a rude image of Kadphises or Kanerkes, and on the other what appears intended for a figure of plenty seated. I have not met with it elsewhere.

I have visited Maunkyala several times, but have found very few coins or relics in that neighbourhood.

Literary Intelligence.

The 2nd No. (vol. vii.) of the 'Zeitschrift' of the German Oriental Society contains the first half of a paper by Professor Neumann on early Chinese civilization. Dr. Grotefend criticises Col. Rawlinson's reading of the Behistun inscriptions. Dr. Max Müller notices the first portion of Dr. Ballantyne's Edition of the Mahábháshya. There is a paper by Dr. Hitzig on Gazzali's Ihja-ulum-al-din, and another by Dr. Grotefend Piper on the I-king of Confucius.

Among the notices, there is a communication from Dr. Weber of Berlin, exposing another fictitious publication similar to that of St. Croix in 1778. Some Danish missionaries imposed on by a Tranquebar Brahmin published in the Missions berichte aus Ostindien (Halle 1742) a paper entitled, 'An abstract of the Yadsur Vedam, one of the four Law-books of the Brahmins.' There is also a criticism of Pertsch's Chronicle of the family of Rajah Krishna Chandra of Nuddeah, just published at Berlin. The Catalogues of MSS. in the Berlin and Leyden Libraries, which are the subject of two other interesting notices, will be more particularly mentioned hereafter.

An Oriental Society has been founded at Constantinople. Its members already number forty, and its first meeting was held on the 11th February last. The Journal commenced by M. Cayol, is henceforward to appear under the Society's auspices.

The 3rd No. of the same publication contains but three papers. Dr. Max Müller concludes his contributions to the knowledge of Indian philosophy, a paper commenced some time ago. Dr. Haug begins an article which will be welcome to Zend students; he gives a translation of and commentary on the forty-fourth Chapter of the Yaçna. The third paper is by Professor Dillmann on the History of the Kingdom of Abyssinia.

Among the notices, is a very interesting one, by Professor Lassen, of the translation just published by Julien of the Life and Travels, in India, of Hiouen Thsang; the first vol. of the work is daily expected from Europe.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL,

For September, 1853.

The Society met on the 7th instant at the usual hour.

J. R. Colvin, Esq. V. P., in the Chair.

Dr. Porter was introduced as a Visitor by Dr. A. Sprenger.

The proceedings of the last month were read and confirmed.

The accounts and vouchers for the month of July were laid on the table.

Donations were announced:—

1st.—From J. A. Cockburn, Esq. Superintendent, Barrackpore Park: The Carcass of a Leopard, *Felis leopardus*.

2nd.—From Mon. C. Holmboe, Secretary of the Royal University of Christiana: The latest publications of the University as per list in the Library Report.

3rd.—From Hodgson Pratt, Esq. Officiating Under-Secretary to the Government of Bengal, specimens of copper smelted in Dhulbhoom, a district in the South West Frontier Agency, together with reports on the quality of the same by the Assay and Mint Masters.

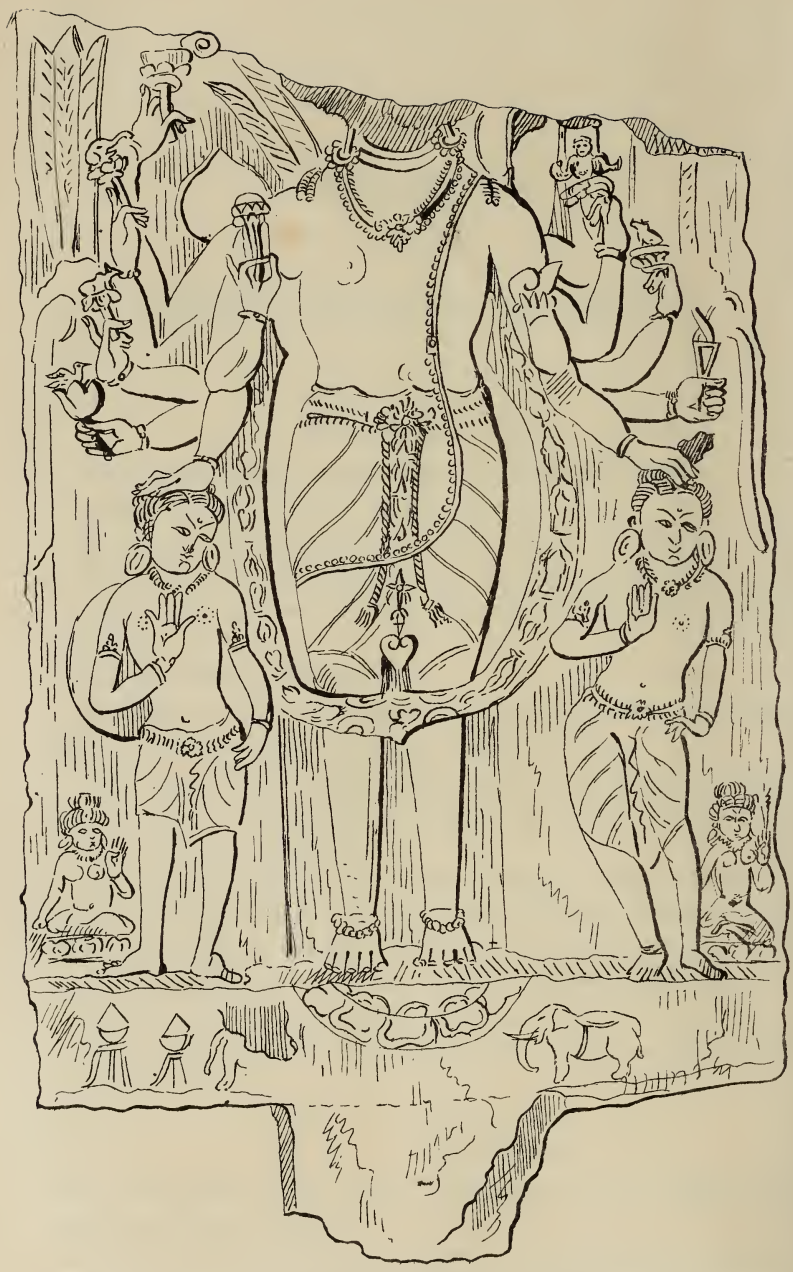
The following is an extract from the Assay Master's report.

"I have the honor to report that their (the specimens') pure contents are as under:

No. 1	90 per cent.
No. 2	88 ditto ditto;

they both contain sulphur and iron, and seem to be fair specimens of metal imperfectly refined."

The Mint Master adds that on trial at the laminating rollers of the Mint both specimens were found unmalleable.



Remains of a 12 armed Idol found on the Site of an ancient City built by Rajah Mŭhēe Pāl at Ghysabad near Moorshedabad.

Black Antique Lith. Press.

4th.—From Captain Layard, two slabs of basalt inscribed with Páli characters.

The following is an extract from Captain L.'s letter:

"I yesterday put on board a boat belonging to Messrs. J. and R. Watson which leaves Berhampore this morning, two stones from Ghysabad, on which you will distinguish a few characters *apparently* Páli in shape. I have had the stones much reduced in size, as they were over-large and heavy for carriage; but this cutting has in no way interferred with the inscriptions on them. I may again mention that the stones were built into rude steps leading up to a small Durgah, in which is said to be the tomb of Sultan Ghyas-ood-deen. The ground near the Durgah is covered with the debris of an ancient Hindu temple of Tribeni. I doubt the tomb at Ghysabad being that of Ghyas-ood-deen. One Ghyas-ood-deen reigned A. H. 769 and was buried with his two sons Zayn-oolab ideen and Wahaz-ood-deen at Peroa in a mosque called the Eklakhee. Among the early conquerors of Bengal I find a Sultan "Hœsam-ood-deen avuz Ghyas-ood-deen;" but he was killed near Gour in battle, by Nassir-ood-deen (the prince reigned in 609, A. H.), and was probably buried on the spot. It was near the Durgah that the small gold coins were found, which I sent to you last cold weather; others have been found lately. A twelve-armed figure, of which the enclosed is a sketch, was found during the last dry season in the bed of an old tank. The carving is rude and unfinished, and the figure here and there defective, as you may perceive. In the hand holding the sacred shell, I fancy the idol must represent Vishnu or rather his incarnation, as I know of no twelve-armed god amongst the numberless Hindu deities, nor can any pundit here enlighten me! You will see that the hands hold the saw, the boar, the lotus, a bird, a half human figure, an elephant's head, a shell and some undistinguishable object, imperfect on the stone. I have not sent the idol, as it is, as you see, mutilated (of course by Kala Pahar), but will do so if you think it worth preserving in the Museum. I think I mentioned to you before, that the country inland around Ghysabad bespeaks the site of an ancient Hindu city; numerous dry tanks, blocks of black stone, broken bricks and pottery, with the remains of fountains and roads, are every where to be seen. The name of the city I could not discover, but it is

said to have been founded by Rajáh Muhee Pál. This Rajáh may have been one of the successors of Sumoodru Pál, the Yogee, who followed Vikrama Sen and his son Vikramaditya."

It was proposed by the Council that Captain Layard should be thanked for the two inscriptions and requested to forward, to the Museum, the twelve-armed figure mentioned in his letter.

5th.—From Bábu Rádhánáth Shikdár through Capt. Thuillier, Deputy Surveyor General, Meteorological Registers kept at the Surveyor General's Office, Calcutta, for January and February last.

Mr. Woodrow proposed that measures be taken to procure a return of the fall of rain at places such as Cherra Punjee and Darjeeling.

Ordered that the Secretary have extracts taken from the Registers in the Office of the Medical Board to be published in a condensed form in the Journal of the Society.

The following gentlemen duly proposed and seconded at the last meeting were balloted for and elected ordinary members:

Captain J. C. Haughton, 54th N. I.

George A. Plowden, Esq. C. S.

Lieut. C. H. Dickens, Bengal Artillery.

The Council submitted the following reports.

1st.—Recommending the publication of the Suryya Siddhánta in the Bibliotheca Indica, under the editorship of Mr. E. Hall.

2nd.—Submitting, for confirmation, draft of a rule for regulating the circulation and retention, by members, of books from the library.

The rule is as follows:—

"All books, plates, &c. taken from the library by parties resident within twenty miles from Calcutta, to be returned for inspection by the 1st January in each year, and to be returnable on the Librarian's demand at the end of three months from date of issue. Where however the books, &c. may not be required for loan to another applicant, they may be retained on re-application for successive periods of three months till the end of the year.

"These applications shall certify to the books, &c. being forthcoming and in good order; and in future the receipt for delivery of all library works shall contain the valuation of the work borrowed according to the Librarian's valuation Catalogue. Books taken by

parties resident beyond twenty miles from Calcutta to be returnable on demand, at the end of three months from the date of issue as above provided, but the Council may, in regard to books issued to such parties, dispense with their actual return by the 1st January in each year, on being satisfied that the books are in good order, and that the Society is not likely to suffer by their not being recalled to the library.

"In order to carry out the valuation part of these provisions, the Committee desire that the Librarian will commence immediately on the systematic valuation of the whole library, and proceed therewith gradually under the direction of the Secretaries until the valuation be complete as to all the printed works."

Resolved that the recommendations of the Council be adopted.

Read letters:—

6th.—From J. J. Gray, Esq. Goamaty, Maldah, announcing that he has obtained a MS. copy of the History of Bengal by Gholam Hosein entitled "Ryaz-us-Saláteen" and promising to send it to the Society.

7th.—From Dr. Fayrer, Rangoon, forwarding copies of Meteorological Registers kept at the Rangoon Field Hospital, for the months of May and June, 1853.

8th.—From Hodgson Pratt, Esq. Officiating Under-Secretary to the Government of Bengal, enclosing correspondence on the subject of iron found in the Raneegunge district.

9th.—From Captain J. C. Haughton, Cheybassa, submitting the following note on a ruined city in Singbhoom.—

"In No. 103 (Vol. IX. p. 694 et seq.) of the Asiatic Society's Journal for 1840 is a note by the late Mr. Torrens, appended to Capt. Tickell's memoir on the Colehan, soliciting further information regarding the antiquities of Singhbhoom, and, in No. 186 of 1848, a native report of the existence of a ruined city in this quarter is noticed. Having traversed Singhbhoom in almost every direction, I am able to furnish some negative information on the subject, which I now offer for those who take an interest in the question.

"The only remains in the country, known to me, which have any pretensions to antiquity are those at Benee Sagur, Kèsna and Nagra. The two former places have been noticed by Capt. Tickell and

do not, in my opinion, merit particular consideration. Capt. Tickell is said to have sent the Society a gold coin from Kèsna, but I could not learn that any other of gold, silver, or copper had ever been found at Kèsna, Benee Sagar, or Nagra. The offer of a reward produced some small thorn-like pieces of gold, a portion of a gold ring and some stone beads at Kèsna, but elsewhere nothing.

"At Nagra, twenty-three miles S. S. E. from Chyebassa, in the jungles, are some heaps of brick in fragments, spread over a sufficient extent to warrant the supposition, that a town of moderate size once existed there. The remains of a stone-lined tank would indicate some wealth and civilization, but the ruins afford no defineable trace of temple or other building. The former inhabitants of the Purgunnah having been expelled in modern times by the Coles, there is now no local tradition regarding the place. Trees of a century or two's growth flourish on the spot.

"I had some hope that information as to these ancient towns might be gleaned from the Bunsawullee of the Raja of Porahat, or from the local Pundits, but my enquiries have not been attended with success.

"I conclude that if any ruins of importance exist in this direction, they are to be looked for further South in Mohrbunj or Keunjer. The nearest known to me are those of Kiching in Keunjer, and in the opposite direction at various places in Sirgooja, about one hundred miles to the N. W. of this."

10th.—Read extract from a private letter from Col. Rawlinson, dated Baghdad, 5th July, 1853, containing allusions of interest to the progress of his researches in Assyrian Antiquities.

The Librarian and the Curator of the Zoological Department of the Museum submitted their usual monthly reports.

Read and confirmed. *October 5th*, 1853.

(Signed) J. R. Colvin.

Report of Curator, Zoological Department, for August Meeting.

1. W. Theobald, Esq. Jr., late of the Punjab Salt Range Survey, has favoured the Society with a collection of mammalia and birds chiefly obtained in the Salt Range, with also a few skins from Kashmir.

The mammalia consist of Pteropus edulis (v. *Edwardsii)*, Myotis

PALLIDIVENTRIS, (Hodgson),* in spirit, "from limestone caves near Matar Nag, N. of Islamabad" (Kashmir),—VULPES FLAVESCENS (?), Gray,†—HERPESTES NYULA, Hodgson, var. (with bright rufous face and tail-tip),‡—H. AUROPUNCTATUS, Hodgson,—FELIS CHAUS, Guld. (v. *Jacquemontii*, Is. Cuvoff., &c.),—F. HUTTONI, nobis, *J. A. S.* XV, 169,§—ERINACEUS

* Extremely close to the European M. PIPISTRELLUS, but may readily be distinguished by the much greater length of the fore-thumb, which, with its claw, measures nearly $\frac{1}{4}$ in. (not following the curvature of the claw). The general hue of fur of the upper-parts appears to run greyer or less fulvous, and of the under-parts to be more albescent, than in the European Pipistrelle; but there may be considerable variation of shades of colour. Capt. Hutton's Masuri Pipistrelle (*J. A. S.* XXI, 360), is again distinct, being of a much darker colour than the two others, and it is especially characterized by the diminutive size of the foot, which, with claws, scarcely exceeds $\frac{3}{16}$ in.,—MYOTIS PARVIPES, nobis, *n. s.* In other respects the three species are very closely affined.

† Much brighter-coloured than Afghan specimens, and the tints purer and more strongly contrasted; the legs much paler, or more rufescent and less nigrescent, than in the larger V. MONTANUS of the sub-Himalayas generally. Size, and the proportions of skull, the same as in the Fox of Afghanistan and Persia.

‡ Mr. Gray has recently noticed two *Herpestidine* animals from Ceylon (*Ann. Mag. N. H.*, July, 1853, p. 47). One, his HERPESTES SMITHII, *Mag. Nat. Hist.* 1837, II, 578,=*H. rubiginosus*, Kelaart, v. *Ellioti*, nobis, *J. A. S.* XX, 162, 184, XXI, 348, and inhabits also the Nilgiris and Travancore. The other, CYNICTIS MACARTHIÆ, Gray (*loc. cit.*), does not seem to be H. FULVESCENS (v. *flavidens*), Kelaart, *J. A. S.* XX, 162, 184, XXI, 348; but may nevertheless prove to be no other. A CYNICTIS, however, should have no fifth toe to the hind-foot, which exists in H. FULVESCENS.

§ This seems to be the same small Cat, affined to the domestic races, as that of which an imperfect skin was procured by Capt. Thomas Hutton at Kandahar; but the fur of Capt. Hutton's specimen is much longer, indicating probably the winter vesture, whereas Mr. Theobald's specimen has short fur, and might well pass for a variety of the domestic Cat, which perhaps it is. I incline, however, to the opinion that it is probably one of several wild types which have merged in domestication to produce the domestic Cat. Now the resemblance of the domestic Cat of Bengal, and I believe of India generally (if not also of Egypt, Barbary, and even Spain?), to the wild F. MANICULATA, Rüppell, is most manifest; but this is far from being the case with the tame Cats of northern Europe, the resemblance of which to the European wild Cat (F. SYLVESTRIS, Aldrovand,) becomes much stronger to an eye familiarized with the appearance of the domestic Cats of India, than to that of an observer unacquainted with the latter. It is not probable that

COLLARIS, Gray, Hardw. *Ill. Ind. Zool.*,*—SCIURUS PALMARUM, L. *(verus)*, —MUS DUBIUS, Hodgson (apparently, from Aliábad Serai, top of Pir

F. SYLVESTRIS has more than contributed to the production of the domestic breed of northern Europe; yet sufficiently to have influenced the characters of that breed, by frequent intermixture probably in times when the domestic Cat was introduced and continued rare, while F. SYLVESTRIS was far more abundant than at present. The domestic Cats of India interbreed occasionally with F. CHAUS, and also with F. RUBIGINOSA of the Coromandel coast and Ceylon, as I have been assured by Mr. Walter Elliot (vide *J. A. S.* XVII, 247, 559).—Since the preceding note was penned, I have received the following notice from Mr. Theobald, in answer to some enquiries which I made of him.—"The FELIS HUTTONI is one of the three common wild Cats well known to *Shikáris* in the Salt Range, —viz. F. HUTTONI, F. CHAUS, and a large black species which I have not seen. I also shot one which is similar to, but, I think, smaller than F. CHAUS: I have only, however, the head of it."—The word "black" here probably refers merely to a dark colour.—"I should add that the F HUTTONI has red eyes."

* The species is founded on the figure cited, and has never been described. General Hardwicke's specimen was from the Doab. Capt. Hutton's Hedgehog from Buhawulpur (*J. A. S.* XIV, 351), referred dubiously to E. COLLARIS, is probably distinct and new. Mr. Gray's British Museum specimen, from "Madras," presented by Mr. Walter Elliot, is probably E. MICROPUS, nobis (*J. A. S.* XV, 170), from the Nilgiris; whence also the example in the Society's museum, the locality of which is stated to have been unknown, *loc. cit.* (vide *J. A. S.* V, 191); and this southern species, though proximately affined to E. COLLARIS, is very obviously distinct from it. Perhaps, however, Capt. Hutton's third specimen of supposed COLLARIS (*J. A. S.* XIV, 351,) may be no other, as formerly suggested (in XV, 570). It is by no means probable that a second species of Hedgehog inhabits the Nilgiris. In Nepal, Mr. Hodgson enumerates three species of this genus, E. SPATANGUS and E. GRAYI of Bennet, and E. COLLARIS, Gray (*Calc. Journ. Nat. Hist.* IV, 288). In Capt. Hutton's supposed E. COLLARIS from Buhawulpur, the quills were "white on the basal half, and jet-black on the upper half;" in Mr. Theobald's three specimens from the Punjab Salt Range, the quills have their terminal third black, also the extreme base, and the rest whitish with a broad dusky ring, about equal to each whitish ring above and below it. In other respects they accord, as well as can be made out, with Hardwicke's figure. Unfortunately, there are no skulls with them (though one has since been promised by Mr. Theobald); and one of the skins is too much injured to be of any use, though the other two have been mounted. Length of tarsus, to tips of claws, 1¼ in. Mr. Gray also mentions an ERINACEUS MENTALIS, Black-chinned Hedgehog," from the Himalaya: but with this we are wholly unacquainted.

Panjal Pass), *—M. Theobaldi, nobis, *n. s.*,†—Hystrix hirsutirostris, Brandt (*H. leucurus*, Sykes), 2 skulls,—Ovis Vignei, nobis, skins of old female and of young male, also some skulls and frontlets,—Capra sakin, (the Himalayan Ibex), skull of a female,—Gazella cora, H. Smith (*H. Bennettii*, Sykes), skull and horns of male,—and skulls of Sus indicus, Gray.

The most interesting of the birds are a specimen of the recently described Nucifraga multimaculata, Gould, from Kashmir,—ditto of the *Seesee* Partridge, Ammoperdix Bonhami, from the Panjab Salt Range,—a small Bunting, Euspiza, perhaps new,‡—a new Mirafra, sent entire in spirit, as also a skin,§—Accentor atrogularis, nobis,—and Corydalla rufula, (Jerdon); the last being a species which was discovered on the Nilgiris, but whose chief range would now appear to be the N. W. Himalaya.

Also a fresh-water Crab (Thelpheusa).

3. Fulwar Skipwith, Esq., C. S. Skin of Rhizomys pruinosus, nobis, *J. A. S.* XX, 519, from Sylhet.

* The same Mouse, to all appearance, as one sent by Capt. Sherwill from Darjiling (*ante*. p. 409); but certainly not the young of M. urbanus, Hodgson, the description of which seems to indicate the M. Manei, Gray, or common House Mouse of all India.

† Like M. gerbillinus, nobis (*ante* p. 410); but larger, with comparatively shorter tail and larger feet. Dimensions of an adult female.—Length of head and body 2⅞ in.; tail 2⅝ in.; ears ½ in.; tarse and toes $\frac{11}{16}$ in.

‡ Euspiza, female. Length 5⅛ in.; of wing nearly 3 in.; and tail 2¼ in. Brown, with narrow medial dusky streaks to coronal feathers, and a conspicuous pale narrow supercilium: shoulder of wing and margins of the alars deep maronne-brown: lower parts rufescent, streakless. Legs pale.

§ M. phœnicuroides, nobis. Affined to M. phœnicura, Franklin, but the general hue less rufescent; the under-parts pale fulvous-grey, albescent on throat; tail brown, faintly rufescent at its extreme base, and on the exterior web of the outermost feather; broad margins to inner webs of the primaries and secondaries, with the axillaries, also pale rufescent, imparting this hue to the inner surface of the wing. Wing 3⅞ in., the short first primary 1⅛ in., and 1⅝ in. shorter than the second, which is ¼ in. less than the next three, which are equal. Tail 2¾ in.; bill to gape ⅝ in.; tarse ⅞ in.; and hind-claw $\frac{5}{16}$ in. Hab. Kashmir.

There are also the wings and feet of a large female Carpodacus (apparently); the wings measuring 4⅝ in., with tertiaries 1⅜ in. shorter than the primaries; and tarse 1 in.

4. Capt. M. Turnbull. A fresh specimen of SCIURUS HYPOLEUCOS, Horsf., "from the Straits." Sumatra is the habitat of this species; and not Madagascar, as stated by Col. Hamilton Smith, in his volume on mammalia in the 'Naturalist's Library.' It belongs to the true S. E. Asiatic type of gigantic Squirrels.

5. Mr. J. Harley. A dead LORIUS DOMICELLA.

6. From Barrackpore. Dead specimens of NYCTICEBUS TARDIGRADUS, HYSTRIX BENGALENSIS, and PHASIANUS TORQUATUS.

7. From myself. Various specimens in spirit procured by C. S. Bowring, Esq., in Hongkong. Among them is a small Bat, which is probably SCOTOPHILUS IRRETITUS *(Vespertilio irretitus*, Cantor, *Ann. Nat. Hist.* IX, 481). Form typical, with two pairs of permanent upper incisors. Entire length of female $3\frac{1}{8}$ in., of which tail $1\frac{1}{8}$ in. Expanse $8\frac{1}{8}$ in. Forearm $1\frac{5}{16}$ in. Tarse $\frac{9}{16}$ in. Ears (posteriorly) $\frac{3}{8}$ in. Colour brown-black, with slight pale tips to the fur of the upper-parts; below somewhat less deep-coloured, with the pale tips to the fur more developed, and towards the vent and base of thighs the prevailing hue is whitish. Ears, limbs and membranes uniformly blackish. V. IRRETITUS from Chusan, as described by Dr. Cantor, accords in dimensions; but the fur of the upper-parts is given as "soft brownish-grey; that of the abdomen dust-coloured." According to my recollection, however, of Dr. Cantor's specimen, it was as dark as the female now before me; for I especially remember suspecting its identity with the common minute species of all India, SC. COROMANDELIANUS, (F. Cuv.), which I have likewise seen from Singapore.

Of reptiles, are included an apparently new Scinque (PLESTIODON QUADRILINEATUM, nobis),—a small HEMIDACTYLUS,—CORONELLA RUSSELLII, COLUBER RADIATUS; DIPSAS MULTIMACULATA, TROPIDONOTUS UMBRATUS, and HYDRUS STRIATUS, with also a few INSECTA and other sundries which do not need to be here enumerated.

E. BLYTH.

LIBRARY.

Additions to the Library during the past month have been the following:—

Presented.

Observations made at the Magnetical and Meteorological Observatory at Hobart Town in Van Diemen's Land. Printed under the superintendence of Col. E. Sabine, vol III. London, 1853.—BY THE BRITISH GOVERNMENT.

Jury-Institutionen i Storbritanien, Canada og de forenede Stater af

Amerika. Vol. II. Christiania, 1851.—By the Royal University of Christiania.

Uber Micha den Morastheten und Seine prophetische Schrift von Dr. C. P. Caspari. 2nd part. Christiania, 1852, 8vo.—By the same.

Nyt Magazin for Naturvidenskaberne. Vol. 7. p. 1.—By the same.

Fortegnelse over Jordegods og andre Herlighéder tilhörende erkebiskopsstolen i nidaros affattet ved erkebiskop aslak bolts Foranstaltning mellem aarene 1832 og 1849. P. A. Munch. Christiania, 1852.—By the same.

Det norske Sprogs væsentligste Ordforraad, sammenlignet med Sanskrit og andre Sprog af samme Æt. Bidrag til en norsk etymologisk Ordbog, af C. A. Holmboe. Wien, 1852, 4to.—By the Author.

Memoires de l'Academie des Sciences, Arts et Belles Lettres de Dijon, Année, 1850.—By the Academy.

Selections from the Public Correspondence of the Board of Administration for the affairs of the Punjab. No. 4, 4 copies.—By the Board.

Selections from the Records of the Bengal Government, No. XII. Embankments of the Damooda. 2 copies.—By the Bengal Government.

Journal Asiatique, No. 3.—By the Socie'te' Asiatique.

Bibidhártha Sangraha, No. 21.—By the Editor.

Satyárnab, Vol. III.—By the Rev. J. Long.

Vedánta Darsana, Nos. 7, 8.—By the Editor.

Ditto ditto.—By Ba'bu Jadavakrishna Sinha.

Annual Report of the Tattwabodhiná Sabhá for 1774 Saka.—By the Sabha'.

Tattwabodhiní Patriká, No. 120.—By the same.

The Upadesaka, No. 81.—By the Editor.

The Missionary, Nos. 8, 9.—By the Editor.

The Oriental Baptist, No. 81.—By the Editor.

The Oriental Christian Spectator for July, 1853.—By the Editor.

The Calcutta Christian Observer for Sept. 1853.—By the Editor.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, for the months of Jan. and Feb., 1853.—By Ba'bu Ra'dha'na'th Sikda'r.

The Citizen for August and Sept. 1853.—By the Editor.

The Purnachandrodaya for Ditto.—By the Editor.

Exchanged.

The London, Edinburgh and Dublin Philosophical Magazine, Nos. 34, 5, 6.

Jameson's Journal, No. 102.

Purchased.

Comptes Rendus, Nos. 19 to 26.
Journal des Savants for May and June, 1853.
The Annals and Magazine of Natural History for June and July, 1853.
Maurice on the Religions of the World.
Christomathie aus Sanskritwerken.—Von T. Benfey.
Vollstandige Grammatik der Sanskritsprache.—Von T. Benfey.
Williams's English Sanskrita Dictionary.

Ra'jendrala'l Mittra.

For October, 1853.

The Society met on the 5th instant, at the usual hour.

J. R. Colvin, Esq., V. P., in the Chair.

The proceedings of the last month were read and confirmed, and the accounts and vouchers for the month of July laid on the table.

Presentations were received—

1st. From J. Ackermann, Esq., Secretary of the Society of Antiquaries, London, the latest publications of the Society (vide Library Report).

2nd. From the Government of India, through T. Oldham, Esq., Superintendent of Geological Survey, specimens of rocks and earths from the gold bearing districts in the vicinity of Mount Ophir, Malacca, collected by T. Braddell, Esq., Assistant Resident.

3rd. From the Bombay Government through Lieut. E. F. Fergusson, I. N., Superintendent of the Government Observatory, Magnetical and Meteorological Observations made at the Bombay Observatory during 1850.

4th. From the Bengal Government through W. Gordon Young, Esq. Under-Secretary, a Map of the district of Purneah surveyed by Messrs. FitzPatrick and J. J. Pemberton.

5th. From Captain Young, Rangoon, a large slab of marble, bearing a figure of the impression of the foot of Guadama.

6th. From the British Government through Her Majesty's

Minister for Foreign Affairs, two copies of a sketch of the Bornu or Kanuri language, with dialogues, translations and vocabulary drawn up by Mr. Norris, translator of foreign languages in the Foreign Office, from papers sent to England by the late Mr. James Richardson while employed in the interior of Africa.

Mr. Addington's letter points out "that the grammatical sketch is confined to the Bornu language, and the lithographic fac-similes contain materials for a work in the Hansa or Soudanese language also; of which language, however, there is already a Grammar in print by the Rev. Mr. Schöu."

7th. From Major Saunders Alexius Abbott through Major J. Abbott, three silver Greek coins.

The following is an extract from Major J. Abbott's letter.

"I have the pleasure to send, in this packet from my brother Major Saunders Alexius Abbott, Deputy Commissioner of Hoshiarpoor, a silver coin which I do not remember to have seen described. It is a hemidrachm of the Arianian king Dionusos, and seems entitled to hold place immediately after the coinage of Apollodotos and immediately before that of Zoilos. As, however, I am travelling and have no means of reference to the list of coins, my memory may deceive me as to its rarity.

"Like the circular hemidrachms of Apollodotos the execution is very rude and far inferior to that of the copper coinage of the latter king.

The type is as follows:

Head of the King facing the East.

ΒΑΣΙΛΕΩΣΣΩΤΗΡΟΣΔΙΟΝΥΣΙΟΥ.

R. Pallas with the Ægis thundering.

"Four coins of this type, with about thirty other silver coins of the same figures and size, were found together by a little boy, as he dug in the bank of a village near Anundpoor, Makowal, on the left bank of the Sutlej above Roopur. Of these coins one was of Lusias, several were of Zoilos, and the rest were of Apollodotos. All so much resembled one another (that of Lusias excepted) as to be easily mistaken for coins of a single type.

"The use of the title Soter and the appearance of Pallas thundering, seem to ally these coins with the coinage of Menander, Apol-

lodotos and Zoilos, while the occurrence of the coins together, seems to give additional probability to the alliance.

" I have the pleasure to add in my brother's name a coin of Zoilos found with the above and another of Apollodotos. The latter, differing somewhat in type from those in my collection, may possibly be acceptable to the Society."

8th. From Major Turton, specimen of a fossil root from Prome (vide Proceedings for July last.)

9th. From Major Baker, on the part of Major H. Fraser, specimens of fossil shells from the banks of the Irrawaddy at Prome.

10th. From Dr. Fayrer, Rangoon, a Burmese water jar of curious construction.

11th. From Captain Layard, a twelve-armed figure found in a tank at Ghysabad (vide Proceedings for the last month.)

12th. From E. C. Craster, Esq., C. S., a gold coin of Toghlak Shah found in the ruins of Gour.

Read a note from G. R. French, Esq. requesting to withdraw his name from the list of members.

Communications were received :—

1st. From Walter Elliot, Esq. Vizagapatam, enclosing a list of Tamil and Canarese works, published at the press of the London Missionary Society, Ballery.

2nd. From Bábu Rádhánáth Sikdár, Superintendent of the Observatory, through Captain Thuillier, enclosing Meteorological Registers kept at the Surveyor General's Office, Calcutta, for the months of March, April, May, June, July and August, 1853.

3rd. From W. Muir, Esq. enclosing copy of Meteorological Register kept at the Government Secretariat Office, Agra, for the month of May, 1853.

4th. From Major J. Abbott, Deputy Commissioner in the Hazara, communicating note of an investigation which he has recently made of the ruins at Maunkyala.

Resolved that the paper be published in the Journal.

5th. From G. Couper, Esq., Officiating Secretary to the Government of India, enclosing correspondence, received from the Bombay Government, on the subject of chintz printing at Tatta in Scinde.

6th. From Norton Shaw, Esq., Secretary, Geographical Society, London, acknowledging receipt of Journal No. 39.

7th. From John Barlow, Esq., Secretary Royal Institution, London, acknowledging receipt of the Catalogue of Birds.

8th. From H. Piddington, Esq., Curator, Museum of Economic Geology, submitting a note on Nepalite, believed to be a new mineral from the neighbourhood of Kathmandoo.

The Curators and the Librarian submitted reports of additions made to their respective departments during the past month.

Thanks having been voted for the above donations and communications, the meeting adjourned.

Read and confirmed,

(Signed) J. W. COLVILE.

Nov. 2nd, 1853.

Report of Zoological Curator for September Meeting.

At the last meeting of the Society, it was mentioned by the President that Dr. A. Campbell of Darjiling had forwarded some skins for our museum, of mammalia from Tibet. These have since come to hand, and two of them seem to pertain to species hitherto undescribed.

One is an imperfect skin of a Bear, termed by Dr. Campbell the "Blue Bear of Tibet. The people assure me," he writes, "that it is not an accidental colour, but that it is a well known species, distinct from TIBETANUS, and from the white one or Arctic species" (qu. ISABELLINUS, mentioned subsequently by Dr. Campbell). "I am trying to get a skull, and a perfect skin for the Society." This Bear has a fine coat, of longer and softer fur than in cis-Himalayan TIBETANUS, but not so long nor shaggy as in fine specimens of ISABELLINUS: the colour black, with hoary or light brown tips which impart a very characteristic appearance; hence PRUINOSUS would be an appropriate name, if it prove to be a distinct species. The hoary tips to the fur disappear upon the limbs, which are wholly black (so much of them at least as are shewn in the specimen); and there is the same narrow white V-like mark on the breast as in the Himalayan Bear known as U. TIBETANUS,—of which my impression is that this Tibetan animal will prove to be a trans-nivean variety, and that the name TIBETANUS, therefore, is more correctly applicable to the species than has been supposed.

Two Badger skins are sent, evidently of distinct species and even genera. One is the TAXIDEA LEUCURUS described and figured by Mr. Hodgson in *J. A. S.* XVI, 763. The other is a true MELES affined to the European Badger, but which I adjudge to be distinct because it has a

white throat, whereas the European Badger (of which we possess two mounted specimens for comparison) has constantly a black throat. From the TAXIDEA of Tibet it differs altogether, as much as the European Badger differs from the N. American TAXIDEA: it has smaller and much less tufted ears, a shorter and much less brushy tail, and the fur shorter and coarser, though of finer texture than in the European Badger, with much woolly hair at its base. General colour as in MELES TAXUS, but the throat white as aforesaid, and the markings of the face are different. In M. TAXUS the head is white, and a broad and well defined blackish-brown band commences midway to the eye and muzzle, is continued through the eye and ear, and gradually disappears upon the shoulder; the bands of the two sides leaving a broad and well defined white interspace, which contracts and is gradually lost posterior to the ears. In the Tibetan Badger (M. ALBOGULARIS, nobis), the white interspace referred to contracts immediately behind the eyes, and continues as a narrow and ill defined band so far as between the ears only; the lateral dark bands proportionally expanding behind the eyes, and all merging in the grizzled hue of the back from the occiput, and not from the shoulder backward as in M. TAXUS. In the European Badger the cheeks are broadly white, bordered above by the dark band through the eye, and below by the black throat. In the Tibetan Badger there is little white below the eye, and this ill-defined; and it is bordered below by a narrow dark band, beyond which is the white throat. I do not doubt that these distinctions will prove permanent, as the European Badger is not subject to vary in its peculiar markings (though some affined animals, as the American Skunks and African Zorilles, certainly do, to a greater or less extent in different species). The Tibetan Badger is probably also a smaller animal than that of Europe.*

While examining our series of the Badger group, my attention was attracted to another undescribed species, which I have recognised as dis-

* *N. B.* It would seem that Mr. Hodgson has figured the exterior of the Tibetan TAXIDEA, and the skull of the Tibetan MELES as that of the TAXIDEA; little suspecting the existence of a true MELES also in Tibet. In this case, the Tibetan true Badger would be fully as large as that of Europe. It is also probable that the identical specimens were forwarded to the Hon'ble Company's museum by Mr. Hodgson, being those noticed by Mr. Gray in *Ann. Mag. N. H.* Sept. 1853, p. 221. There can, assuredly, not be the least doubt of the specifical, if not generic, distinctness of the two Tibetan specimens now sent by Dr. Campbell, although the skulls of both are unfortunately wanting.

tinct for many years, but awaited further information concerning its distribution, &c., before bringing it to notice in the Society's Journal. This is a second species of *Bhaloo-soor* or Hog-badger, which may be designated—

ARCTONYX TAXOIDES, nobis, *n. s.* Adult about half the size of the adult of A. COLLARIS, F. Cuv. : having a much longer and finer coat, very like that of the European Badger but softer, though not so long and soft as in TAXIDEA ; the muzzle less broad and Hog-like than in A. COLLARIS ; the ears also are proportionally smaller than in that species ; the tail is shorter ; and the colours and markings, though similar, are much brighter. Greatest length of skull of a fully adult (but not aged) male of A. COLLARIS, $6\frac{3}{8}$ in. ; greatest breadth of zygomata, posteriorly, $3\frac{1}{16}$ in. ; length of bony palate 4 in. ; width at posterior great molar $1\frac{1}{8}$ in. In an aged female A. COLLARIS, the same admeasurements are $6\frac{1}{8}$, $3\frac{5}{8}$, $3\frac{7}{8}$, and $1\frac{1}{16}$ in. In a fully adult female of A. TAXOIDES, $4\frac{3}{4}$, $2\frac{3}{8}$, $2\frac{3}{4}$ and $\frac{13}{16}$ in. Dentition of the upper jaw similar in the two species : in the lower jaw, the interspace between the second and third præmolars is proportionally much greater in A. COLLARIS than in A. TAXOIDES. Lastly, the large species attains with age a strongly marked sagittal crest, which I doubt is ever seen in the other. Our two specimens of A. TAXOIDES are respectively from Asám and Arakan ; so that both species inhabit the same range of territory, and are probably commonest in Sylhet.

Two other skins sent by Dr. Campbell are those of the Tibetan Lynx (F. ISABELLINA, nobis, *J. A. S.* XVI, 1178), and of the FELIS MACROCELIS (v. *macroceloides*, Hodgson). Of the latter, we previously possessed two mounted specimens, both sent from Darjiling ; and a skin from the Ya-ma-dong mountains which separate Arakan from Pegu. I also lately saw two living specimens from Upper Asám ; and have been assured, on good authority, that the species is not uncommon in the north of China. Mr. Hodgson states it to inhabit Tibet ; and it was originally discovered by Raffles in the mountains of Sumatra. At least, no satisfactory distinction has been pointed out between MACROCELIS of Sumatra and MACROCELOIDES of Tibet ; and as the latter is positively the same from Upper Asám and the mountains of *Arakan*, there would be nought remarkable in its range extending along the mountainous spine of the Malayan peninsula and that also of Sumatra. A nearly affined but much smaller species, common in the Malayan Peninsula, is F. MARMORATA ; and this also we have from Upper Asám ! (*J. A. S.* XVII, 83.) Both are about the most eminently arboreal of the Cat tribe, judging from the Asámese specimens which I saw alive, and which were most graceful and accomplished climbers, with much of the action,

probably, of the diminutive PRIONODON. The large F. UNCIA has also nearly the same proportions, with similar very long and well furred tail; and it may prove to be equally arboreal in the mountain pine-forests. The proper ground Cats for little wooded districts are the Lynxes, which are the extreme opposites in structure to the true Leopard group, wherein the three preceding species are comprised. Yet even the Lynxes are not bad climbers; whereas there are some few Cats, as the three largest of all, the Lion, Tiger, and Jaguar, which never ascend trees, as the Leopard does so very commonly. That the Cheeta (F. JUBATA) is no climber, is much less to be wondered at.

Together with the male specimen of the *Shou*, or Tibetan Stag, presented on a former occasion by Dr. Campbell,—the horns of which are far from having attained a first-rate magnitude, as shewn by Mr. Hodgson's figure and description in *J. A. S.* X, 722, as well as by his subsequent description, *ibid.* XX, 388,—I have now the pleasure of exhibiting for comparison a noble frontlet and horns of the *Wapiti* Stag of N. America, C. CANADENSIS. To any person who has made a study of the subject, and is conversant with the essential distinctions observable among the horns of different species of Deer, over and above the variations to which all are liable, those specifical distinctions are exceedingly well marked in the horns of the *Shou* and of the *Wapiti*. As long ago stated by me of a fine Stag-horn from Kashmir, the species being (as I now feel more than ever confident) the same as that of Tibet, of Persia (where known as the *Maral*), and in all probability that of the southern parts of Siberia and of the north of China,—"the general character of horn [of the great Asiatic Stag] is intermediate to that of the *Wapiti* and European Stag, but agreeing more nearly with the latter in its kind of granulated surface."* With the horns of all three species now before me, aided by familiar recollection of numerous horns of C. ELAPHUS, the typical character of the latter, or European Stag, is to have the most roughly granulated surface to the horn, decidedly; in the Asian Stag, the rugosity is well marked, but smoothened a good deal, so as to be much less harsh to the feel; and in the N. American Stag there is scarcely any roughness whatever, the horn being smoother than in the Fallow Deer. Hence I suspect that, in the great majority of instances, these horns might be readily enough distinguished by the *feel* alone. Next, the tendency to flatten, or palmate, in the crown of the *Wapiti* horn is very decided, from the base of the median on "royal antler" upward or onward. The utmost transverse depth of this palmature, at the base of the main fork of the crown, in the

* *Proc. Zool. Soc.* 1840, p. 80.

pair of *Wapiti* horns now exhibited, amounts to 7 in., by $1\frac{1}{2}$ in. breadth. Nothing of the kind is ever seen in the European Stag, nor (it would seem) in the Asian species. Again, the tendency in the *Wapiti* is to have the crown not only flattened, but further subdivided than in the Asian *Shou*, in which, we may now venture to affirm, it rarely more than simply bifurcates; but Capt. Cunningham assured Mr. Hodgson that "the Kashmir Stag has, sometimes, a double fork at the top of its horns."* Such is shewn in the *Wapiti* horns now before the meeting; the crown first bifurcating, with a considerable amount of palmation as already described, this flattening being continued on each branch, and the hinder of these again bifurcating, while the anterior bifurcates imperfectly on the left horn, and tends towards the same form on the right horn; the posterior prong of the anterior main branch of each crown being the defective one. Next (and this I remember well to be characteristic of the *Wapiti*), the posterior main branch of the crown does not slant somewhat abruptly inwards, like the usually undivided posterior prong of the (in general) simply bifurcating crown of the Asian *Shou*, but inclines directly backward and somewhat downward, with a tendency to subdivide again and again, as shewn in the otherwise abnormal *Wapiti* horn (No. 4) figured in *J. A. S.* X, plate 4, p. 750. Another marked and distinctive character of an average *Shou* horn is the comparatively very abrupt bend of the beam from the base of the median or royal antler, which, with the equally abrupt slant inward of the posterior prong of the bifurcating crown, imparts a sort of lyrate aspect to the pair, very different from the more even curvature of beam seen in the *Wapiti*. Lastly, still another character very commonly present in *Wapiti* horns, and scarcely if ever seen in those of the *Shou* and European Stag, consists in the presence of a small snag between the bases of the brow and bez antlers, and a little to the front; which is distinctly shewn, though small, in both horns of the pair before us.

2. To Babu Rajendra Mallika, we are indebted for a fine stuffed specimen of a young Cassowary, retaining much of the brown plumage of youth, though at the time of its death it was putting forth the black plumage of maturity; and the two are throughout intermixed in the specimen. Also a dead Rose-breasted Cockatoo (Cacatua eos); and a broken egg of Cygnus atratus.

3. From Dr. Fayrer, late of Rangoon. A few specimens in spirit, comprising Elaps melanurus, Homolopsis hydrina, Cantor, Bungarus candidus, Scorpio afer, and a few other sundries.

* *J. A. S.* XX, 393.

4. Capt. S. R. Tickell, now of Maulmain. A skin of the great Fire-back Pheasant, or Macartney cock (EUPLOCOMUS IGNITUS), and one of ARDETTA SINENSIS.

E. BLYTH.

LIBRARY.

The following additions have been made to the library since the last meeting.

Presented.

Report of the British Association for the Advancement of Science for 1852.—BY THE ASSOCIATION.

Catalogue of Stars near the Ecliptic observed at Markree, during the years 1851-52, and whose places are supposed to be hitherto unpublished, Vol. II. containing 15,298 stars. Dublin, 1853.—BY THE BRITISH GOVERNMENT.

Nuovo Dizionario Italiano-Francesco,-Armeno-Turco, compilato sui Migliori Vocabolarii di queste Quattro lingue dai Padri della congregazione Mechitaristica. Vienna, 1846, Royal 8vo.—BY J. AVDALL, ESQ.

Zeitscrift der Deutschen morgenländischen Gesellschaft, VII. Band, 3 heft.—BY THE SOCIETY.

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Journal Asiatique, June, 1853.—BY THE SOCIE'TE' ASIATIQUE.

Address at the Anniversary meeting of the Royal Geographical Society, by Sir R. Murchison.—BY THE SOCIETY.

Quarterly Journal of the Geological Society, Nos. 34, 35.—BY THE SOCIETY.

Address delivered at the Anniversary meeting of the Geological Society of London on the 18th of February, 1853, by W. Hopkins, Esq.—BY THE SAME.

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Journal of the Indian Archipelago for February and March, 2 copies.—BY THE GOVERNMENT OF BENGAL.

Oriental Christian Spectator for September.—BY THE EDITOR.

The Upadeshak, No. 83.—BY THE EDITOR.

The Oriental Baptist, No. 83.—BY THE EDITOR.

The Missionary for October, 1853.—BY THE EDITOR.

Tuttwabodhiní Patriká, No. 123.—BY THE TUTTWABODHINI' SOBHA'.

Bibidhártha Sangraha, No. 21.—BY THE EDITOR.

Purnachundrodaya for October.—BY THE EDITOR.

The Citizen for October, 1853.—BY THE PUBLISHER.

Exchanged.

The Philosophical Magazine, No. 37.
The Calcutta Review, No. 41.

Purchased.

The Annals and Magazine of Natural History for August.
Comptes Rendus, Nos. 1 to 4 for July, 1853.
Edinburgh Review, No. 199.

RA'JENDRALA'L MITTRA.

Abstract of Meteorological Observations for the month of April, 1853.

Rangoon, 1*st May*, 1853.

Thermometer Sunrise.			Thermometer 9 A. M.			Thermometer Noon.			Thermometer 3 P. M.			Thermometer Sunset.			Thermometer 9 P. M.			Remarks.
Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	
79	75	77	93	81	84.612	100	92	95.947	100	94	96	85	One observation.		85	81	82.8	On the 18th a violent squall of wind and rain .90 inch fell. Several houses crushed by the storm. Weather during the month fine, but cloudy, wind prevailing S. W. in afternoon N. E. and N. W. in mornings: Frequently fresh breezes.
77	74	75.764	82	75	78.584	81	77	79.35	85	75	80.717	79	Ditto.		80	74	78	
Barometer Sunrise.			Barometer 9 A. M.			Barometer Noon.			Barometer 3 P. M.			Barometer Sunset.			Barometer 9 P. M.			
Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	Maximum.	Minimum.	Min. of preceding observations.	
No instrument.																		

J. Fayrer, M. D. *Asst. Surgeon, Field Hospital, Rangoon.*

Date.	Sunrise.						9 A. M.					Noon.				
	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Rain.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.
	Wet.	Dry.					Wet.	Dry.				Wet.	Dry.			
1	74	75	..	....	....	..	78	84	..	....	....	78	92	..	S. W. fog.	Cumuli.
2	75	76	..	Calm.	Cumuli.	..	..	..	..	N. W. lt.	Cumuli.	78	93	..	Ditto.	Ditto.
3	75	77	..	Ditto.	Ditto.	..	77	80	..	Ditto.	Cirri.	79	96	..	W. fog.	Ditto.
4	75	76	..	N. W. lt.	Hazy.	..	75	83	..	Ditto.	Clear.	80	92	..	S. W. do.	Ditto.
5	75	76	..	Ditto.	Calm.	..	..	..	..	....	....	..	..	..	....	....
6	76	77	..	Ditto.	Clear.	..	79	87	..	W. lt.	Cirri.	79	95.5	..	W. lt.	Cumuli.
7	..	..	..	Ditto.	Cloudy.	..	82	85	..	Ditto.	Cumuli.	..	..	..	....	....
8	..	..	..	Ditto.	Hazy.	..	..	..	..	....	....	81	95	..	W. lt.	Cumuli.
9	..	..	..	Ditto.	Ditto.	..	79	84	..	W. lt.	Cirri.	79	97	..	Ditto.	Ditto.
10	76	78	..	Ditto.	Ditto.	..	..	..	..	Ditto.	Ditto.	81	100	..	Ditto.	Ditto.
11	76	78	..	Ditto.	Ditto.	..	79	83	..	Ditto.	Ditto.	81	100	..	S. W. lt.	....
12	77	79	..	Ditto.	Ditto.	..	..	..	..	....	....	..	..	..	....	....
13	76	77	..	Ditto.	Ditto.	..	78	81	..	N. W. lt.	Cumuli.	..	..	..	....	....
14	76	77	..	N. E. lt.	Clear.	..	79	80	..	Ditto.	Ditto.					
15	..	..	..	....	....	..	..	..	..	....	....	..	..	..	....	....
16	..	..	..	....	....	..	81	86	..	N. W. lt.	Cumuli.	..	..	..	....	....
17	..	..	..	....	....	..	79	85	..	Ditto.	Ditto.	78	98	..	S. W. fog.	Cirri.
18	76	79	..	....	....	..	79	84	..	Ditto.	Ditto.	79	95	..	S. W. lt.	Ditto.
19	76	78	..	N. E. lt.	Clear.	.90	..	..	..	....	....	82.5	94	..	Ditto.	Clear.
20																
21	76	77	..	N. E. lt.	Clear.	..	79	93	..	N. W. lt.	Cumuli.					
22	76.5	76	..	....	....	..	76	86	..	Ditto.	Cirri.					
23	..	..	..	....	....	..	82	84	..	Ditto.	Ditto.	..	96	..	S. W. lt.	Cumuli.
24	75	75	..	N. E. lt.	Cirri.	..	77	85	..	Ditto.	Ditto.	79	88.5	..	Ditto.	Clear.
25	75	77	..	Ditto.	Ditto.	..	..	..	..	....	....	80	97.5	..	Ditto.	Ditto.
26	..	..	..	....	Ditto.	..	..	..	..	....	....	81	98	..	Ditto.	Ditto.
27	..	..	..	....	Ditto.	..	..	..	..	....	....	..	..	..	....	....
28	..	..	..	....	Ditto.	..	..	..	..	....	....	78	99	..	S. W. lt.	Cumuli.
29	74	76	..	N. E. lt.	Ditto.	..	77	85	..	S. W. lt.	Cumuli.	77	97.5	..	S. W. fog.	Ditto.
30	76	78	..	N. W. fog.	Clear.	..	78.5	88	W. fog.	Cumuli.	Hazy.	78	99	..	Ditto.	Ditto.
Total.	1439.5	1463.2	..	....	....	..	1414.5	1523	..	....	....	1428.5	1823.0	..	....	....
Mean.	75.764	77	..	....	....	..	78.584	84.612	..	....	....	7935	95.947	..	....	....

Meteorological Remarks for the month of April, 1853—(Continued.)

3 P. M.					Sunset.					9 P. M.					Remarks.
Thermometer		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Aneroid Barometer.	Force and direction of Wind.	Aspect of Sky.	
Wet.	Dry.				Wet.	Dry.				Wet.	Dry.				
78	95	..	S. W. fog.	Cumuli.	..	..	..	Thunder.	Stm. rain.	74	81	S.W. f.	Cumuli.	Cirri.	
80	94	..	Ditto.	Ditto.	..	..	..	S. W. fog.	Cumuli.	..	..	..	..	Cumuli.	Pleasant cool air.
..	..	..	....	..	79	85	..	..	..	77	81	..	Cumuli.	Ditto.	
83	95	..	S. W. fog.	Cumuli.	..	..	..	..	..	78	81	Calm.	..	Ditto.	Thunder, shower.
80	96	..	S. W. lt.	Ditto.	..	..	..	..	..	80	83	..	Cumuli.	Clear.	
83	97	..	Ditto.	Ditto.	..	..	..	..	..	..	..	..	..	..	Fresh breeze.
..	..	..	....	..	..	..	..	..	..	..	..	..	..	..	Ditto.
83	94	..	S. W. fog.	Cumuli.	..	..	..	..	..	..	..	..	..	..	Ditto.
83	97	..	Ditto.	Cirri.	..	..	..	..	..	..	..	..	..	..	Ditto.
..	..	..	....	..	..	..	..	..	..	80	84	..	S. W. lt.	Clear.	
84	97	..	W. fog.	Clear.	..	..	..	..	..	80	85	..	Ditto.	Ditto.	
80	100	..	S. W. lt.	Ditto.											
85	98	..	Ditto.	Ditto.											
81	95	..	S. W. lt.	Clear.											
79	100	..	Ditto.	Ditto.	..	..	..	..	..	80	85	..	S. W. lt.	Clear.	
83	93	..	Ditto.	Ditto.											
85	92	..	S. W. fog.	Fr. brz.	..	..	..	..	..	79	83	..	S. W. lt.	Cirri.	Lightning in S. E.
78	86	..	S. W. lt.	Cumuli.											A violent storm of wind, thunder and rain, squall shifting from N. E. to the N. West and doing much damage to the houses inside stockade. Near the river but little felt .90 of an inch rain fell in the afternoon of the 18th at 3 P. M. to 5.
81	99														
75															
82	96	..	S. W. fog.	Cloudy.											
82	97	..	Ditto.	Ditto.											
82	99	..	S. W. lt.	Cumuli.											
81	95	..	Ditto.	Ditto.	..	..	..	..	..	77	83	..	S. W. lt.	Clear.	
78	100	..	Ditto.	Ditto.	..	..	..	..	..	75	82	..	Ditto.	Ditto.	
78.5	100	..	S. W. fr.	Ditto.											
1855.5	2112	..	....	..	..	..	..	..	..	780	828				
80 717	96.	..	....	..	..	..	..	..	..	78.	82.8				

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February, 1853.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Date.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer.			Mean Dry Bulb Thermometer.	Range of the Temperature.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.960	30.052	29.875	0.177	66.4	78.6	51.9	26.7
2	.915	29.991	.843	.148	67.4	80.0	51.7	28.3
3	.961	30.046	.908	.138	69.2	80.6	56.0	24.6
4	.936	.028	.866	.162	70.9	81.5	53.5	28.0
5	.905	29.988	.858	.130	72.8	83.2	57.4	25.8
6	*Sunday.*							
7	.944	30.020	.902	.118	70.6	79.2	62.8	16.4
8	.957	.036	.901	.135	69.4	79.4	58.4	21.0
9	.952	.031	.897	.134	69.5	80.8	56.0	24.8
10	.950	.028	.889	.139	70.3	80.8	57.4	23.4
11	.937	.009	.885	.124	71.8	83.2	57.5	25.7
12	.886	29.974	.808	.166	73.1	83.0	60.5	22.5
13	*Sunday.*							
14	.857	.943	.794	.149	74.8	87.0	60.3	26.7
15	.837	.922	.766	.156	74.6	87.4	60.6	26.8
16	.798	.873	.727	.146	76.1	89.2	62.0	27.2
17	.840	.917	.784	.133	77.1	89.4	61.0	28.4
18	.905	.978	.857	.121	79.6	90.6	67.4	23.2
19	.888	.978	.805	.173	80.6	92.7	66.9	25.8
20	*Sunday.*							
21	.871	.969	.804	.165	77.4	90.7	65.8	24.9
22	.845	.938	.777	.161	78.2	91.0	66.8	24.2
23	.874	.967	.818	.149	78.3	90.8	64.3	26.5
24	.909	.990	.853	.137	76.8	90.0	63.0	27.0
25	.979	30.056	.926	.130	77.4	90.2	64.9	25.3
26	.998	.100	.929	.171	77.7	90.3	62.4	27.9
27	*Sunday.*							
28	.943	.016	.886	.130	81.1	93.5	67.6	25.9

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February, 1853.—*(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	60.6	5.8	56.7	9.7	0.468	5.18	1.99	0.722
2	61.1	6.3	56.9	10.5	0.472	5.20	2.19	.704
3	61.8	7.4	56.9	12.3	0.471	5.19	2.62	.665
4	64.3	6.6	60.3	10.6	0.528	5.80	2.43	.705
5	67.5	5.3	64.7	8.1	0.610	6.69	2.02	.768
6	*Sunday.*							
7	66.0	4.6	63.4	7.2	0.586	6.44	1.71	.790
8	62.9	6.5	58.8	10.6	0.502	5.53	2.33	.704
9	62.2	7.3	57.4	12.1	0.480	5.28	2.60	.670
10	63.4	6.9	59.1	11.2	0.508	5.58	2.50	.691
11	65.6	6.2	62.1	9.7	0.560	6.14	2.31	.727
12	65.6	7.5	61.3	11.8	0.545	5.97	2.82	.679
13	*Sunday.*							
14	65.6	9.2	60.2	14.6	0.526	5.73	3.53	.619
15	64.8	9.8	58.8	15.8	0.502	5.47	3.73	.595
16	65.7	10.4	59.5	16.6	0.515	5.58	4.05	.579
17	68.0	9.1	63.0	14.1	0.578	6.27	3.65	.632
18	72.6	7.0	69.3	10.3	0.711	7.67	3.02	.717
19	71.1	9.5	66.4	14.2	0.645	6.97	4.04	.633
20	*Sunday.*							
21	64.7	12.7	56.6	20.8	0.467	5.06	4.95	.505
22	65.8	12.4	58.3	19.9	0.494	5.34	4.91	.521
23	67.6	10.7	61.6	16.7	0.551	5.96	4.32	.580
24	64.9	11.9	57.4	19.4	0.480	5.20	4.63	.529
25	64.5	12.9	56.2	21.2	0.460	4.99	5.02	.499
26	65.0	12.7	57.0	20.7	0.473	5.12	4.98	.507
27	*Sunday.*							
28	69.5	11.6	63.3	17.8	0.584	6.28	4.89	.562

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February, 1853—*(Continued.)*

Date.	Max. Solar radiation.	Rain.	Prevailing direction of the Wind.	General aspect of the Sky.
	o	Inc.		
1	95.3	..	S. W. or S. E.	Nearly cloudless.
2	95.0	..	S. or S. W.	Cloudless.
3	97.7	..	S. W. or W. or Calm.	Cloudless till 6 A. M. scattered \ i till 5 P. M. cloudless afterwards. [wards.
4	92.2	..	Calm or S. or W.	Scattered \ i till 6 P. M. cloudless after-
5	95.2	..	Calm or S.	Cloudless till 8 A. M. scattered \ i or _ i till 7 P. M. cloudless afterwards.
6	*Sunday.*			
7	93.5	..	S. or N. W.	Cloudless till 10 A. M. scattered ∩ i till 4 P. M. cloudless afterwards.
8	93.7	..	N. or N. W.	Cloudless.
9	94.9	..	N. W. high from 1 till 3 P. M.	Cloudless till 11 A. M. scattered \ i till 7. P M. cloudless afterwards.
10	96.3	..	Calm or N. W. high at noon and 1 P. M.	Cloudless. [7 P. M. cloudless afterwards.
11	..	..	Calm or N. W.	Cloudless till 8 A. M. scattered \ i till
12	..	..	N. W. or W. or S. W.	Cloudless till 6 A. M. scattered \ i till 7 P. M. cloudless afterwards.
13	*Sunday.*			
14	..	..	W.	Nearly cloudless the whole day.
15	..	..	S. W. or W. or N. W.	Cloudless.
16	..	..	W. or S. W. high at 1 and 2 P. M.	Cloudless.
17	..	..	S. or W. or S. E.	Cloudless.
18	..	..	S. or W.	Cloudless till 3 A. M. overcast till 5 A. M. scattered _ i or ∩ i till 9 A. M. cloudless afterwards. [wards.
19	..	..	S. or S. W.	Cloudless till 4 P. M. scattered ∩ i after-
20	*Sunday.*			
21	..	..	S. W. or N. W.	Nearly cloudless, occasionally scattered ∽ [i or _ i. [less afterwards.
22	..	..	Calm or N. W. or S. W.	Scattered ∽ i till 7 A. M. nearly cloud-
23	..	..	S. W. or N. W. or W.	Cloudless.
24	..	..	W. or N. W.	Cloudless.
25	..	..	S. or N. or N. W.	Cloudless. [or _ i.
26	..	..	W. or N. W.	Nearly cloudless, occasionally scattered \ i
27	*Sunday.*			
28	..	..	S. or N. W.	Cloudless barring little \ i at 9 A. M. and noon.

\ i ..... Cirri.
∩ i ..... Cumuli.
— i ..... Strati.
∽ i ..... Cirro-cumuli.
_ i ..... Cirro-strati.
~ i ..... Cumulo-strati.
∽ i ..... Nímbí.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1853.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Date.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer.			Mean Dry Bulb Thermometer.	Range of the Temperature.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.949	30.031	29.893	0.138	82.1	93.2	67.0	26.2
2	.943	.045	.861	0.184	78.5	89.5	67.5	22.0
3	.913	.006	.829	0.177	76.9	90.0	62.4	27.6
4	.880	29.962	.807	0.155	77.6	90.7	64.5	26.2
5	.877	.974	.786	0.188	77.9	90.4	64.4	26.0
6	*Sunday.*							
7	.886	.952	.843	0.109	83.3	95.4	64.3	31.1
8	.878	.954	.830	0.124	83.0	95.0	69.9	25.1
9	.893	.965	.837	0.128	82.4	94.8	68.5	26.3
10	.885	.972	.821	0.151	83.5	95.5	70.0	25.5
11	.899	.987	.831	0.156	80.1	92.0	67.5	24.5
12	.858	.949	.778	0.171	79.8	93.6	64.8	28.8
13	*Sunday.*							
14	.801	.858	.739	0.119	85.2	96.2	75.3	20.9
15	.843	.916	.788	0.128	83.6	96.6	71.5	25.1
16	.886	.974	.828	0.146	82.3	93.3	70.5	22.8
17	.871	.954	.809	0.145	82.9	95.6	69.0	26.6
18	.883	.966	.819	0.147	84.2	97.0	68.7	28.3
19	.892	.982	.814	0.168	84.8	97.3	69.3	28.0
20	*Sunday.*							
21	.842	.926	.770	0.156	84.2	95.5	73.0	22.5
22	.831	.910	.775	0.135	84.4	95.7	74.0	21.7
23	.829	.916	.736	0.180	85.7	99.3	74.3	25.0
24	.777	.849	.696	0.153	86.3	98.6	74.3	24.3
25	*Good Friday.*							
26	762	.847	.702	0.145	85.9	99.0	73.6	25.4
27	*Sunday.*							
28	.773	.847	.721	0.126	84.4	92.7	74.5	18.2
29	.761	.830	.695	0.135	85.7	95.7	75.4	20.3
30	.747	.806	.690	0.116	85.9	95.5	75.4	20.1
31	.757	.829	.698	0.131	85.7	96.0	76.5	19.5

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1853.—*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	69.9	12.2	63.5	18.6	0.587	6.30	5.21	0.547
2	63.4	15.1	53.1	25.4	0.415	4.50	5.85	.435
3	63.2	13.7	54.0	22.9	0.427	4.64	5.22	.471
4	64.4	13.2	55.8	21.8	0.455	4.92	5.15	.489
5	68.6	9.3	63.6	14.3	0.590	6.39	3.77	.629
6	*Sunday.*							
7	73.1	10.2	68.3	15.0	0.687	7.37	4.56	.618
8	69.6	13.4	62.3	20.7	0.565	6.04	5.78	.511
9	68.8	13.6	61.3	21.1	0.545	5.86	5.75	.505
10	67.6	15.9	58.2	25.3	0.492	5.28	6.72	.440
11	65.9	14.2	57.1	23.0	0.475	5.11	5.73	.471
12	66.9	12.9	59.3	20.5	0.511	5.50	5.25	.512
13	*Sunday.*							
14	74.7	10.5	70.0	15.2	0.727	7.76	4.85	.615
15	70.4	13.2	63.5	20.1	0.587	6.29	5.74	.523
16	68.3	14.0	60.4	21.9	0.529	5.69	5.89	.491
17	67.6	15.3	58.6	24.3	0.499	5.35	6.44	.454
18	70.1	14.1	62.6	21.6	0.569	6.09	6.15	.498
19	71.6	13.2	65.0	19.8	0.616	6.60	5.86	.530
20	*Sunday.*							
21	74.5	9.7	70.2	14.0	0.731	7.82	4.42	.639
22	77.1	7.3	74.2	10.2	0.831	8.91	3.40	.724
23	76.8	8.9	73.2	12.5	0.805	8.59	4.21	.671
24	78.8	7.5	75.9	10.4	0.879	9.38	3.64	.720
25	*Good Friday.*							
26	76.6	9.3	72.8	13.1	0.794	8.48	4.39	.659
27	*Sunday.*							
28	78.9	5.5	76.8	7.6	0.905	9.67	2.64	.786
29	79.7	6.0	77.5	8.2	0.924	9.88	2.92	.772
30	79.9	6.0	77.7	8.2	0.930	9.94	2.93	.772
31	79.7	6.0	77.5	8.2	0.924	9.88	2.92	.772

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1853—*Continued.*

Date.	Max. Solar radiation.	Rain.	Prevailing direction of the Wind.	General aspect of the Sky.
	o	Inc.		
1	....	..	S. W. or N. E.	Scattered \ i and \— i till 10 A. M. cloudless till 2 P. M. Scattered \ i till 8 P. M. cloudless afterwards.
2	....	..	N. W.	Cloudless or little \ i or \— i till 8 A. M. cloudless afterwards.
3	....	..	N. W. or W. or S. W.	Cloudless or scattered \ i occasionally.
4	....	..	S. W. or W.	Cloudless till 6 A. M. scattered \ i till 1 P. M. cloudless afterwards.
5	....	..	S. W. or calm.	Cloudless till 8 A. M. scattered ~ i or \— i till 3 P. M. and nearly cloudless afterwards.
6	*Sunday.*			
7	....	..	S. or S. W. or N. W. high S. wind at midnight.	Variable sky till 8 A. M. being cloudless or overcast. Cloudless till 3 P. M. all kinds of clouds afterwards.
8	....	..	S. E. or N. W. or S. W.	Cloudy till 6 A. M. scattered \— i afterwards.
9	....	..	W. or S. W.	Scatd. \— i till 5 P. M. overcast afterwards.
10	....	..	W. or S. W. or N. W. high W. wind at 2 P. M.	Overcast till 2 A. M. cloudless afterwards.
11	....	..	S. W. or N. W. or W.	Cloudless.
12	....	..	S. W.	Ditto.
13	*Sunday.*			[cloudless afterwards.
14	....	..	S. W. or calm, or N. W.	Cloudless till 2 A. M. overcast till 6 A. M.
15	....	..	Calm, N. W. or S. W.	Cloudless.
16	....	..	N. or S. W. or calm.	Ditto.
17	....	..	W. or S. W.	Ditto.
18	....	..	S. W. or W.	Ditto.
19	....	..	Ditto.	Ditto.
20	*Sunday.*			
21	....	..	S. or S. S. E.	Nearly cloudless.
22	....	..	S. occasionally blowing sharp.	Ditto.
23	....	..	S. or S. W.	Ditto.
24	....	..	S. blowing sharp 8 A. M. to 3 P. M. and high at 9 P. M.	Ditto.
25	*Good Friday.*			
26	....	..	S. blowing high at 3 A. M.	Cloudless till 7 A. M. scattered \ i afterwards.
27	*Sunday.*			[wards.
28	....	..	S.	Cloudless till 5 A. M. scattered \ i after-
29	....	..	S. constantly blowing sharp.	Scattered \ i—overcast at 1 and 9 P. M.
30	....	..	Ditto.	Scattered \ i—occasionally overcast.
31	....	..	S. blowing sharp before sunrise.	Cloudless and occasionally scattered \— i.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April, 1853.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Date.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer.			Mean Dry Bulb Thermometer.	Range of the Temperature.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.727	29.806	29.628	0.178	86.6	96.8	76.3	20.5
2	.673	.750	.593	.157	88.3	99.5	76.3	23.2
3	*Sunday.*							
4	.786	.865	.716	.149	86.1	95.0	76.8	18.2
5	.722	.794	.635	.159	86.6	96.0	78.4	17.6
6	.771	.867	.682	.185	83.6	94.6	77.5	17.1
7	.853	.932	.792	.140	80.5	90.5	68.2	22.3
8	.870	.960	.795	.165	83.6	94.0	72.5	21.5
9	.852	.933	.770	.163	85.2	95.3	73.8	21.5
10	*Sunday.*							
11	.813	.893	.732	.161	86.3	98.0	74.3	23.7
12	.747	.824	.655	.169	87.7	101.4	75.0	26.4
13	.683	.747	.600	.147	89.8	102.8	77.4	25.4
14	.708	.803	.648	.155	89.2	99.2	77.0	22.2
15	.756	.820	.699	.121	84.8	90.3	78.4	11.9
16	.778	.873	.712	.161	85.5	95.5	65.0	30.5
17	*Sunday.*							
18	.783	.873	.706	.167	87.3	97.7	76.8	20.9
19	.731	.805	.653	.152	87.8	99.6	77.0	22.6
20	.734	.837	.632	.205	86.8	98.4	77.5	20.9
21	.777	.842	.681	.161	84.0	94.6	74.0	20.6
22	.730	.793	.644	.149	88.2	99.6	74.0	25.6
23	.722	.797	.612	.185	88.7	99.5	72.3	27.2
24	*Sunday.*							
25	.738	.814	.681	.133	84.1	93.0	73.2	19.8
26	.742	.811	.678	.133	87.1	98.0	76.5	21.5
27	.714	.785	.626	.159	87.6	98.7	76.6	22.1
28	.652	.725	.567	.158	88.5	98.1	78.0	20.1
29	.624	.695	.551	.144	89.6	100.0	79.2	20.8
30	.605	.684	.515	.169	90.6	103.0	80.1	22.9

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April, 1853.—*(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	79.0	7.6	76.1	10.5	0.884	9.42	3.72	0.717
2	78.5	9.8	74.7	13.6	0.845	8.97	4.83	.650
3	*Sunday.*							
4	79.9	6.2	77.6	8.5	0.928	9.89	3.06	.764
5	80.0	6.6	77.6	9.0	0.927	9.89	3.25	.753
6	77.1	6.5	74.5	9.1	0.840	9.01	3.02	.749
7	72.6	7.9	68.9	11.6	0.701	7.55	3.43	.688
8	75.9	7.7	72.7	10.9	0.792	8.49	3.54	.706
9	76.6	8.6	73.1	12.1	0.802	8.58	4.03	.680
10	*Sunday.*							
11	77.4	8.9	73.8	12.5	0.822	8.75	4.27	.672
12	77.4	10.3	73.2	14.5	0.806	8.56	5.00	.631
13	77.6	12.2	72.7	17.1	0.791	8.38	6.04	.581
14	74.9	14.3	68.4	20.8	0.690	7.30	6.86	.516
15	74.8	10.0	70.4	14.4	0.736	7.87	4.59	.632
16	74.7	10.8	69.9	15.6	0.724	7.72	5.00	.607
17	*Sunday.*							
18	77.2	10.1	73.1	14.2	0.802	8.54	4.87	.637
19	78.8	9.0	75.3	12.5	0.863	9.16	4.44	.674
20	78.0	8.8	74.5	12.3	0.841	8.96	4.25	.678
21	75.4	8.6	71.7	12.3	0.768	8.23	3.94	.676
22	77.6	10.6	73.3	14.9	0.809	8.57	5.19	.623
23	79.0	9.7	75.3	13.4	0.861	9.16	4.80	.656
24	*Sunday.*							
25	75.5	8.6	71.8	12.3	0.771	8.25	3.96	.676
26	78.1	9.0	74.6	12.5	0.842	8.96	4.37	.672
27	79.2	8.4	76.0	11.6	0.881	9.37	4.15	.693
28	80.5	8.0	77.6	10.9	0.927	9.85	4.03	.710
29	82.0	7.6	79.4	10.2	0.982	10.41	3.92	.726
30	81.8	8.8	78.7	11.9	0.961	10.16	4.60	.688

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April, 1853—(Continued.)

Date.	Max. Solar radiation.	Rain.	Prevailing direction of the Wind.	General aspect of the Sky.
	o	Inc.		[7 P. M. cloudless afterwards.
1	....	..	S. and high at 7 P. M.	Cloudless till 4 A. M. scattered _ i till
2	....	..	S. W. or S. E. or S.	Cloudless till 6 A. M. scattered _ i till
3	*Sunday.*			5 P. M. cloudless afterwards.
4	....	..	S. or S. E.	Cloudless till 5 A. M. overcast till 1 P. M. cloudless till 6 P. M. cloudy afterwards.
5	....	..	S. or S. E. and blowing high at midnight.	Cloudy. [or overcast afterwards.
6	....	..	S. E. or S.	Nearly cloudless till 8 A. M. scattered ∩ i
7	101.5	..	E. or S. E. or N. E. blowing high at midnight.	Overcast till 9 A. M. scattered \ i and ∩ i till 7 P. M. cloudless afterwards. [8 P. M. cloudless afterwards.
8	107.0	..	S. E. or S.	Cloudless till 6 A. M. scattered ∩ i till
9	114.5	..	S. or S. E.	Cloudless till 3 A. M. scattered \ i or _ i till 2 P. M. ∩ i till 7 P. M. cloudless afterwards.
10	*Sunday.*			[3 P. M. nearly cloudless afterwards.
11	118.4	..	S.	Cloudless till 4 A. M. scattered \ i till
12	122.0	..	S.	Cloudless till 4 P. M. scattered \ i till 7 P. M. cloudless afterwards.
13	122.0	0.20	E. or S. W.	Scattered _ i or overcast.
14	124.2	..	S. W. or N. W. or S. E.	Scattered _ i till 2 A. M. cloudless till 8 A. M. all kinds of clouds afterwards.
15	....	..	Calm. [or S.	Cloudy. [afterwards.
16	107.8	..	W. or N. W. or S. W.	Cloudy till 4 A. M. all kinds of clouds
17	*Sunday.*			[cloudless afterwards.
18	112.8	..	S. W. or S. E. or S.	Cloudless till 10 A. M. ∩ i or \ i till 7 P. M.
19	118.0	..	S.	Overcast at 3 A. M cloudless till 11 A. M. scattered ∩ i till 5 P. M. cloudless or thin clouds afterwards. [afterwards.
20	115.0	..	S.	Cloudless 11 A. M. scattered _ i or cloudy
21	115.0	..	S. or S. E. or S. W.	Overcast till 10 A. M. scattered ∩ i afterwards with thunder and lightning.
22	122.2	..	S. or S. E.	Cloudy or \ i till 7 A. M. cloudless till noon, scattered ∩ i afterwards.
23	....	..	Ditto.	Cloudless till 7 A. M. scattered ∩ i or cloudy afterwards.
24	*Sunday.*	..	.....	About 2 P M. a heavy shower of hailstone and rain with much lightning (forked) and thunder.
25	120.6	0.80	S. or S. W. or S. E.	Cloudy.
26	124.4	..	S. or S. S. E. or S. S. W.	Scattered ∩ i or cloudy till 6 P. M. cloudless afterwards.
27	117.0	..	S. or S. E.	Nearly cloudless. [afterwards.
28	121.0	..	Ditto.	Cloudless till 3 A. M. scattered _ i or ∩ i
29	116.0	..	S.	Nearly cloudless.
30	127.0	..	S.	Cloudless till 7 A. M. scattered _ i till 5 P. M. nearly cloudless afterwards.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of May, 1853.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Date.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer.			Mean Dry Bulb Thermometer.	Range of the Temperature.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	*Sunday.*							
2	29.668	29.746	29.610	0.136	90.1	102.0	80.5	21.5
3	.662	.736	.599	.137	89.5	97.5	81.5	16.0
4	.600	.677	.520	.157	89.7	99.6	80.9	18.7
5	.607	.686	.531	.155	88.4	96.0	80.8	15.2
6	.658	.724	.595	.129	89.3	99.5	80.8	18.7
7	.756	.839	.682	.157	89.3	99.4	80.2	19.2
8	*Sunday.*							
9	.679	.743	.544	.199	88.9	99.9	74.6	25.3
10	.702	.771	.637	.134	86.7	97.4	76.9	20.5
11	.728	.848	.580	.268	84.8	95.5	75.8	19.7
12	.670	.741	.604	.137	84.3	94.5	70.4	24.1
13	.653	.723	.581	.142	85.2	94.5	74.0	20.5
14	.625	.679	.547	.132	89.7	98.5	78.5	20.0
15	*Sunday.*							
16	.652	.721	.565	.156	91.3	101.4	80.9	20.5
17	.699	.788	.633	.155	91.0	101.2	78.9	22.3
18	.690	.769	.606	.163	92.0	101.3	81.5	19.8
19	.658	.729	.585	.144	91.3	102.7	78.7	24.0
20	.663	.723	.595	.128	91.2	101.0	81.0	20.0
21	.697	.749	.652	.097	90.7	101.2	..	..
22	*Sunday.*							
23	.714	.785	.632	.153	91.6	103.0	81.5	21.5
24	.716	.789	.624	.165	91.8	102.6	81.3	21.3
25	.682	.774	.578	.196	91.0	101.2	82.4	18.8
26	.606	.684	.520	.164	90.4	99.6	80.3	19.3
27	.587	.665	.481	.184	89.5	99.8	81.2	18.6
28	.649	.796	.578	.218	84.3	97.5	75.6	21.9
29	*Sunday.*							
30	.686	.775	.585	.190	85.8	95.2	74.5	20.7
31	.655	.719	.562	.157	87.4	96.3	74 0	22.3

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of May, 1853—(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	*Sunday.*							
2	82.2	7.9	79.4	10.7	0.984	10.39	4.15	0.715
3	82.0	7.5	79.4	10.1	0.983	10.41	3.88	.728
4	82.6	7.1	80.2	9.5	1.007	10.66	3.71	.742
5	82.1	6.3	79.9	8.5	0.998	10.59	3.25	.765
6	82.2	7.1	79.7	9.6	0.993	10.51	3.70	.740
7	81.9	7.4	79.3	10.0	0.979	10.38	3.83	.730
8	*Sunday.*							
9	76.9	12.0	71.9	17.0	0.773	8.19	5.85	.583
10	77.3	9.4	73.5	13.2	0.813	8.67	4.51	.658
11	77.3	7.5	74.3	10.5	0.835	8.92	3.54	.716
12	77.4	6.9	74.6	9.7	0.844	9.02	3.26	.735
13	80.2	5.0	78.4	6.8	0.952	10.17	2.44	.807
14	83.3	6.4	81.2	8.5	1.039	11.01	3.36	.766
15	*Sunday.*							
16	81.7	9.6	78.3	13.0	0.949	10.01	5.05	.665
17	76.2	14.8	69.7	21.3	0.720	7.60	7.33	.509
18	79.3	12.7	74.3	17.7	0.836	8.79	6.57	.572
19	80.2	11.1	76.0	15.3	0.883	9.31	5.75	.618
20	82.9	8.3	80.1	11.1	1.004	10.60	4.42	.706
21	83.6	7.1	81.2	9.5	1.041	10.99	3.81	.743
22	*Sunday.*							
23	82.6	9.0	79.5	12.1	0.986	10.40	4.79	.685
24	84.1	7.7	81.6	10.2	1.052	11.11	4.16	.728
25	81.1	9.9	77.5	13.5	0.926	9.76	5.17	.654
26	82.1	8.3	79.2	11.2	0.976	10.33	4.34	.704
27	82.0	7.5	79.4	10.1	0.983	10.41	3.88	.728
28	78.4	5.9	76.2	8.1	0.886	9.51	2.77	.774
29	*Sunday.*							
30	77.9	7.9	74.8	11.0	0 848	9.06	3.77	.706
31	79.8	7.6	77.0	10.4	0.909	9.69	3.76	.720

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of May, 1853—(Continued.)

Date.	Max. Solar radiation.	Rain.	Prevailing direction of the Wind.	General aspect of the Sky.
	o	Inc.		
1	*Sunday.*			
2	117.0	..	S. or S. E. occasionally blowing sharp.	Cloudy till 4 A. M. Cloudless afterwards.
3	115.0	..	Ditto.	[wards. Overcast till 6 A. M. nearly cloudless after-
4	116.0	..	Ditto.	Scattered clouds till 8 A. M. nearly cloudless afterwards.
5	113.0	..	Ditto.	Cloudless till 4 A. M. flying clouds or cloudy, lightning and thundering till 7 P. M. cloudless afterwards.
6	115.0	..	Ditto.	Flying clouds or scattered \i or ∩i or overcast till 7 P. M. cloudless afterwards.
7	115.0	..	S.	Cloudless till 8 A. M. flying clouds till
8	*Sunday.*			8 P. M. cloudless afterwards.
9	116.8	0.08	S. or S. S. W. or S. S. E. occasionally sharp.	Cloudy with rain and thunder till 9 A. M. cloudless till 4 P. M. cloudy with rain and thunder afterwards.
10	120.0	0.10	E. or S. or N. E.	Cloudy or overcast till 8 P. M. nearly cloudless afterwards.
11	113.4	..	S. E. or S. occasionally high.	Cloudless till 4 A. M. cloudy with rain and thunder afterwards.
12	118.3	0.96	S. E. or S.	Overcast or cloudy till 7 A. M. cloudless till noon, scattered _i afterwards.
13	113.0	0.70	S. E. or S. occasionally sharp.	Cloudy with occasional rain, thunder and lightning. [7 P. M. cloudless afterwards.
14	125.0	..	S. or S. E.	Cloudless till 4 A. M. scattered clouds till
15	*Sunday.*			
16	124.0	..	S. E. or S.	Cloudless or patches of \i or ∩i.
17	124.0	..	S. E. or N. W.	Cloudless.
18	119.3	..	S. or S. W. or calm.	Ditto.
19	130.0	..	S. or S. W.	Cloudless or scattered \i.
20	118.2	..	S. or S. E.	Nearly cloudless till 7 A. M. scattered ∩i, or cloudy afterwards. [afterwards.
21	122.0	..	Ditto.	Nearly cloudless till noon, scattered clouds
22	*Sunday.*			
23	125.0	..	S.	Flying clouds till 7 A. M. cloudless till 1 P. M. cloudy with rain and thunder till 8 P. M. cloudless afterwards. [wards.
24	124.0	..	S. or S. E.	Nearly cloudless till 2 P. M. cloudy after-
25	126.4	..	Ditto.	Cloudy.
26	115.4	..	S. E. or S.	All kinds of clouds.
27	124.0	..	Ditto high at 5 P. M.	Cloudy and drizzling at 8 P. M. [zling.
28	119.0	0.50	S. E. or S. or E.	Cloudy or overcast with occasional driz-
29	*Sunday.*	0.08		
30	120.0	..	S. or S. W. or N. E.	Raining at midnight, and cloudy till 6 A. M. Scattered _i or \i till 8 P. M. cloudless afterwards.
31	125.0	..	Calm or S.	Cloudless till 2 A. M. scattered clouds, or cloudy or overcast afterwards.

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Notes upon a Tour in the Sikkim Himalayah Mountains, undertaken for the purpose of ascertaining the Geological Formation of Kunchinjinga and of the perpetually snow-covered peaks in its vicinity. —*By Captain* WALTER STANHOPE SHERWILL, *Revenue Surveyor.*

(Concluded from page 570.)

August 10*th*, 1852.—Direction north, still along the crest of Singaleelah; started at 7 A. M. on a beautiful sunny morning, the weather delicious and the air very pure, of which I took advantage, and obtained the following bearings; Tassiding Goompa east, Darjeeling south-east, the houses being quite distinct and visible, and only twenty-four miles distant by direct distance, but these twenty-four miles have cost us seven long and laborious marches, or at the very lowest computation, one hundred and forty-five miles of windings and twistings of ascents and descents. Tendong* mountain E. 11° S. The survey Flag Staff on the Tonglo† mountain S. 11° E. Sundhukphoo mountain S. 11° W.

To the south-east the Teesta river was distinctly visible in the plains south of the Morung Forest. To the north Kunchinjinga towered over the high peaks of Singaleelah.

Looking to the west, the snowy range of Nepal, grander in its proportions, if any thing, than the Darjeeling range, Kunchinjinga always excepted, and the cultivated valleys of Nepal and some very remarkable rocky and sterile peaks standing between the perpetual snows and the upper limits of vegetation, presented us with a view

* *Ten* "permanent," *Dong* "resting-place." † *Tonglo* "Cotton tree."

that very speedily made us forget all the labour we had gone through the previous week. As we proceeded we looked down into the deep blue valley of the Rungbi, which at this point is about 10,000 feet deep. The eye, in looking down these stupendous valleys, wanders from the tough arctic lichen and snow rhododendron at the observer's feet over fine forests of fir trees, rhododendron, birch, oak, on the slopes of the mountains, down to the tropical trees and plants, plantains, bamboos and gigantic grasses in the valleys. The scenery was now rapidly changing; instead of the suffocating heat of the valleys with their abundant tropical vegetation, we were breathing a bracing pure air, with the Thermometer standing at 41°; the trees were small; of soil there was but a very scanty sprinkling under our feet, and looking either to the east or the west a wild confused snowy scene, treeless mountains, rocky peaks destitute of vegetation, bare precipices and deep—profoundly deep—valleys had replaced our hitherto confined view.

At 8-30 we arrived at a foot path descending towards Nepal; at this spot were the remains of a Gurung's hut and a small shallow pool of water measuring 150 by 30 feet.

At this spot I measured a cherry tree and ascertained it to be twelve feet in circumference. Plants and trees met with this morning were rhododendrons of many kinds, from the rhododendron with a leaf fourteen inches in length with a deep ferruginous tinge on the under side of the leaf to the small aromatic rhododendron with a leaf only $\frac{1}{8}$th of an inch in length, bearing a purple flower; yellow hearts-ease, rose, hypericum of several kinds, one thorny with a yellow flower, thistle, hemlock, yellow-flowered potentilla, dock garlic with a pink flower, and many others.

The sheep track to-day was almost entirely over bare gneiss rock, in which were fine crystals of schorl.

During this march we passed several caves in the gneiss called by the Lepchas, L'haps, into which they, with solemn faces assured us, their Lamas can with a lighted candle in hand, travel subterraneously from one mountain to another—no one besides the Lamas possessing this faculty.

At 11 A. M. we came upon the tracks of the Sippiyook or wild sheep, an enormous animal judging by his foot-print, at a spot where

the ridge of Singaleelah is split into two ridges, the whole being composed of precipices and naked masses of gneiss rock affording in its crevices a place for a sweetly scented rhododendron, a pretty white primula and a large ox-eye looking compositæ flower growing upon a long stem. For half an hour after leaving this curious spot, our track lay under a vast precipice of gneiss from which the earthquakes, which are so frequent in these mountains, have hurled down large masses of rock, and in this dangerous spot the Gurungs have ventured to erect their huts even under the most dangerous and incoherent rocks. The whole face of the precipice is split into cuboidal masses, piled one upon the other and which threaten hourly descent. In one of the detached cubes of gneiss I noticed a band of greenstone six inches in width extending for sixty feet along the front of the rock. Under this insecure-looking rock were the remains of a Gurung encampment. This mountain is the Dumdongla of Hooker; a footpath leading from Sikkim towards Nepal, here crosses Singaleelah and is called the Dumdongla pass.

At 2 P. M. we again regained the crest of Singaleelah, where we saw an old springe set for the capture of pheasants; a few minutes afterwards a covey rose close to us, from which I managed to bag a brace; of these welcome birds our Lepchas made us a delicious curry in the evening, the first hot meal we had had for nine days.

Encamped for the night at the southern foot of Kanglanamo mountain at an elevation of 12,317 feet in a dense fog which during the night condensed into heavy rain. At the foot of this mountain the Lepchas collected a quantity of a white lichen which grows in long white filaments; they called it, Búkh; it is used as incense to burn before their gods.

August 11*th*, 1852.—A most lovely clear morning, the perpetual snow is only eight miles ahead of us; the air very cold, Thermometer standing at 41° at sunrise; half an hour's walking brought us at 7.45 A. M. to the base of the conical-shaped Kanglanamo, and three quarters of an hour more and we stood upon the summit at about 13,000 feet elevation towering over every peak to the south. At the base of the mountain there are quantities of a dark and glossy hornblende slate mixed with the gneiss apparently split and fractured by the snow and frost of winter. In Hooker's Map of

Sikkim, Kanglanamo is made to appear covered with perpetual snow; this is a mistake, as I found the following plants on its summit and no snow; yellow and purple aromatic rhododendrons and another kind, rose, pyrus americana, and many small flowers.

The stratification of the gneiss at this elevation is perfectly horizontal, and in no way contorted, as it is at 7,000 feet and lower —associated with the gneiss on Kanglanamo is much hornblende and a black micaceous slate, green felspar, veins of snow-white quartz and masses of black mica.

The view from the summit of Kanglanamo is very extensive, embracing as it does nearly two hundred miles of the Nepal snowy range, and showing the junction of Kunchinjinga with the Nepal range: a sharp peak bearing a little to the north of west, distant 200 miles, that has been visible for two days, but has barely altered its bearing I imagine to be Gosainthan mountain, directly north of Catmandu; so that from Gosainthan mountain on the west round by the Nepal snowy range passing round by Kunchinjinga, Pundeem, the eastern snowy range down southward to Cholah—we had a glorious panorama of three hundred miles of perpetual snow, peak towering above peak, all approach to which appears guarded by steep, precipitous and bare rocky mountains. Looking to the south the plains of Bengal appear but a very few miles distant, although sixty miles removed, and on a very clear day the Rajmuhal Hills south of the Ganges distant 165 miles must be visible, as they are from lower elevations. Chumulari could not be seen, though I searched well for him—probably haze or clouds shut him out from our view. On the north-west we could see the Wallanchun and Kanglachema passes into Tibet, forty miles distant. Over these passes salt is brought from the salt lakes in Tibet. The salt is laden first upon men's backs, who with much difficulty convey it over a dangerous portion of the pass, it is then transferred to the backs of sheep who convey it over the narrow footpaths of the great elevations; from the sheep it is transferred to yaks, from yaks to bullocks and eventually, when nearing the plains, it is transferred to carts.

There is a strange prophecy amongst the Bhotias concerning these salt lakes, it is as follows: In the salt lake region there is one large lake from which no salt has hitherto been obtained by reason

of the great quantity of water in the lake; this lake it is prophesied will in time dry up as the others have done, and that when salt can be procured from the lake, it will be carried away over the passes by a white nation who will come from the south, and who will seize upon the lakes as their own.

The lake is said to have commenced drying up lately, and it is expected that salt will be obtainable from it in a few years.

One European and only one (Dr. Hooker) has visited these passes.

One mountain in the Nepal range is a most remarkable object, both for its curious shape and for its immense height, its name none of my party knew, nor have I yet succeeded in obtaining the name. The peak is a hollow crater-like mountain probably 27,000 feet in height with a long table-mountain attached to it, both covered with glaciers. To the west of this great mountain are five distinct peaks separating the large mountain from a hollow shell-like and perpendicular mountain about 26,000 feet in height. The morning sun shining upon this mass of snow, gave it the appearance of a gigantic pearl-shell set upon its edge, the snow on the surface being of a bright pink colour. From the peculiar hollow curved and perpendicular nature of this mountain, it resembles the crater of a Volcano broken down on one side; beneath this range of snowy mountains there is a range of bare mountains of a deep red colour about 19,000 feet in height, broken into thousands of ravines, and totally destitute of vegetation.

At 9 A. M. we got a glimpse of an inhabited Gurung's hut far away upon a lofty mountain in Nepal, the flocks of white sheep looking like small patches upon the mountain side.

At a small trickle of water where we halted to breakfast, long slender and entirely white worms were abundant in the water; they resembled long pieces of white thread. The Lepchas seemed to hold them in great dread, and would on no account touch them. The crest of Singaleelah at this spot is a precipitous jagged and rocky mountain which necessitated us to descend several hundred feet into the Nepal territory. At 11 A. M. the path led us through a swampy tract of country with several pools of good water, numerous streams flowing to the westward over slaty gneiss. On a patch of luxuriant grass near the pools of water, I turned out from under a

slab of gneiss, one of those curious little animals the Neodon sikkimensis whose habits and proportions resemble that of the Arvicola, but the tail is comparatively short; length from snout to the root of the tail five inches—of the tail 1½ inch. This genus was discovered by Mr. B. H. Hodgson in Upper India. From amongst the rhododendron bushes, we put up a large number of the beautiful scarlet-legged and three-spurred pheasants, of which I only bagged one; in the marshy ground great quantities of a beautiful primrose were in full blossom—also chrysanthemum, a blue dock, dwarf rhododendrons, grass in abundance, many beautiful flowers and potentilla; as we were admiring these beauties, we heard the deep barking of the Gurung's dogs betokening the vicinity to one of their large flocks. A Nepalese of our party was sent on ahead to have the fierce dogs called off, or the better part of our party would have been torn to pieces by these ferocious brutes. We soon came up to the Gurungs seven in number, fine athletic looking Hindus with very scant clothing. They stood in the midst of their flock of three hundred sheep surrounded by their fine-looking dogs which resemble the Newfoundland breed. These shepherds had pitched their one long mat-hut twenty feet in length upon a grassy knoll under the shadow of some rhododendron trees. They called the country Issunghee, and said that they were moving downwards, having consumed all the grass nearer the snows. Their sheep, which are of a very large breed, were in excellent condition, and some of the wethers of a size unknown in England; they asked eight rupees for a large wether, from whose carcass twenty men might have been well fed. In the hut we found the Sirdar or chief, Pahulmun by name, of Chynepoor in Nepal; he told me that he had five brothers each owning a flock of sheep, and that they were all upon the neighbouring mountains. The wool from these sheep is converted into very good blankets, several of which I saw in the tent—the Gurungs appeared to be well fed, their food consisting of mutton and Indian corn, heaps of the latter were being weighed out in the tent prior to being cooked for dinner. The men had an abundance of good brass cooking pots and blankets, and the Sirdar was armed with a handsome silver-mounted kookree or Nepal knife:—snow falls here early in October—elevation about 12,000 feet.

Not being able to come to any terms about the purchase of some sheep, we left the Gurung's hut, and descended a few hundred feet under the guidance of one of the Gurungs to a fir forest, from whence we again ascended and encamped at one P. M. upon a grassy mountain covered with sheep tracks and overhanging the deep valley of the Yung-ya river. We were above the line of firs at 12,109 feet, Thermometer 56°, my breathing was very much affected, and it was with great difficulty I managed the last ascent, and with greater difficulty I managed to bag a beautiful scarlet-legged pheasant. Our Lepchas, who are the most timid of mortals, appeared rather frightened at being in Nepal, especially as the Gurung Sirdar had been questioning them as to the meaning of our party coming into Nepal. He was informed that the rocky nature of the summit of Singaleelah was the reason we were in the Nepal territory, and that had it been possible to have avoided crossing the Sikkim boundary, we would not have done so. The Sirdar said, it was all very well talking, but he knew very well that we had come to examine the boundary, and that he would report our party to the Nepal Durbar. which we suppose he did, as we saw a messenger depart that very afternoon towards the west.

Towards the evening the Gurungs brought some dead sheep for sale that had been killed on account of sickness produced by eating the aconitum. The Gurungs watch the animal that has partaken of this deadly plant, and if they find there is no chance of its living, its throat is cut and the carcass eaten. The wool is first cut off close and the stumps singed until the animal appears dressed in parchment. Strange to say the Lepchas, who will eat snakes, frogs and other extraordinary food, would not partake of these diseased sheep, the two carcasses therefore that I purchased were made over to the Nepalese Hindoo coolies, four in number, who consumed the two sheep in two days.

Across a deep valley immediately opposite or west of our small encampment, was an immense cascade falling by a succession of leaps from upwards of 3,000 feet down into the valley of the Yung-ya river. To our east the ragged and serrated crest of Singaleelah rose some thousand feet above us, the horizontal masses of gneiss being destitute of any vegetation. About 2,000 feet above our camp,

upon the Singaleelah slopes I discerned several white objects like men; I sent off a Lepcha for one, and it turned out to be a mountain rhubarb plant, one of the handsomest botanical objects I ever remember to have seen. It consists of a conical assemblage of buff-coloured leaves of great beauty elegantly crimped, and edged with pink; the whole growing upon a substantial stem, upon which and hidden by the graceful leaves are bundles of flowers and triangular seeds somewhat resembling mignonette—the plant measures forty-five inches in diameter at the base of the cone, and is about the same height. The Lepchas call it "*Chookoor Dong;*" the stem is eaten by the Hill people, it is extremely acid and astringent.

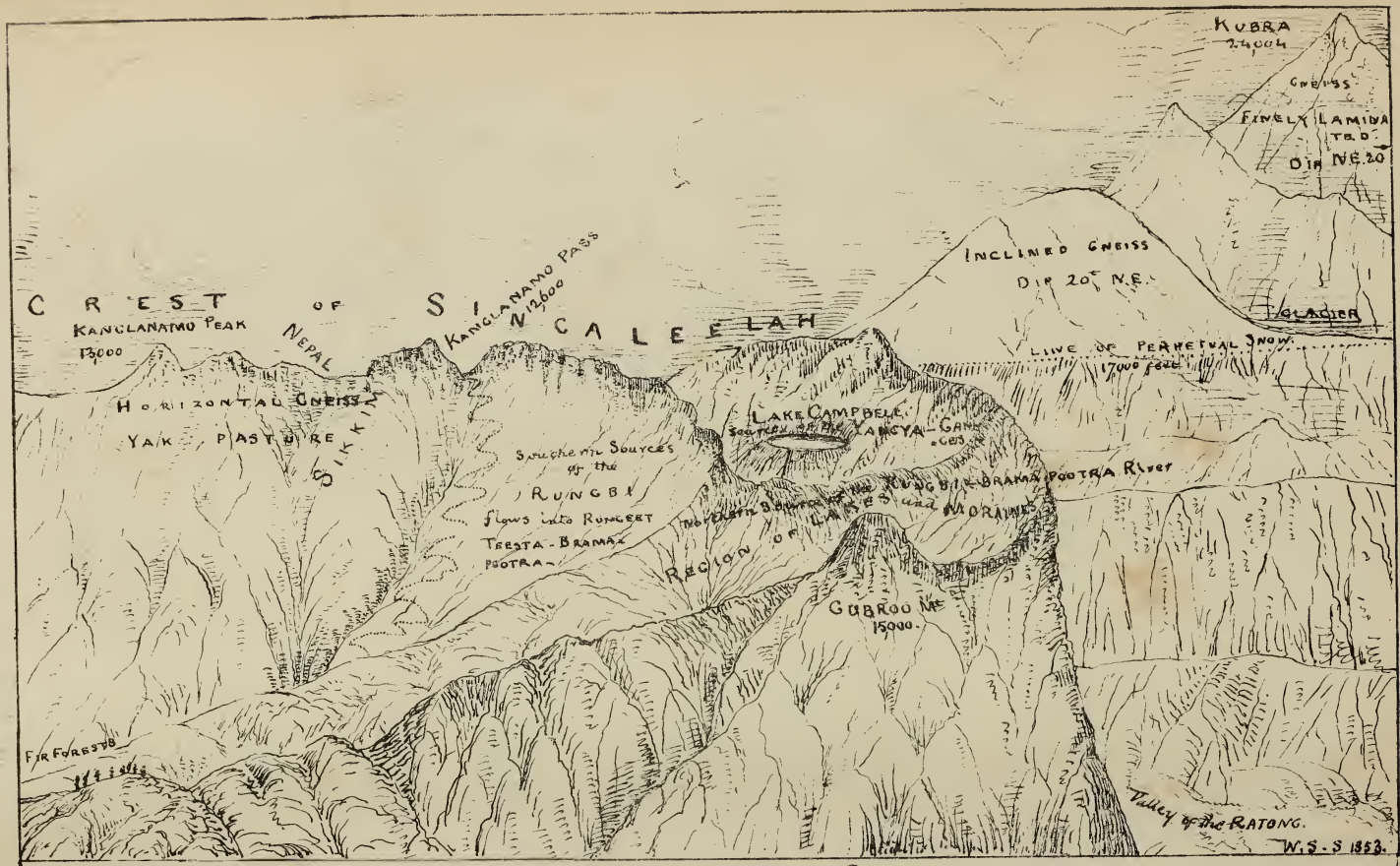
August 12*th*, 1852. Woodcocks were heard overhead at daybreak. Further south upon the summit of Singaleelah there are a considerable number of these birds.

Started at 6 A. M. Thermometer 41°, our road was up a narrow grassy gorge in the mountain; some of the snowy peaks were seen peering over the tail of Kubra on our left, about five miles distant—a few hundred feet rise, brought us to the top of the Kanglanamo pass, a gap in the crest of Singaleelah, affording during the summer months a means of communication between Sikkim and Nepal. This is the pass, so I have been informed, by which Dr. Hooker endeavoured to force his way from Nepal to Sikkim, but was prevented by the deep snow. The pass I calculate to be 12,600 feet, but I did not take the height.

The rocks on the crest of Singaleelah at the pass are of horizontal gneiss, castellated and shattered by the frost, on the right hand side of the pass the rock has been worn into the very image of a man sitting with his hands upon his knees, dressed in a robe and crowned with a Scotch cap with a conspicuous tuft on its top. The whole figure is about fourteen feet in height; the figure by all parties was declared to be the Rajah of Sikkim guarding his boundary.

From the pass, the weather being very fine and the air clear, we had an extensive view of the plains, the Teesta river, the eastern snowy range and of Darjeeling, which latter mountain is a fine object from whatever side it is observed. Darjeeling bore south 22° east, Tendong mountain south-east by east; we were considerably to the north of several of the snowy peaks—we now left the footpath which

The "Chookor Dong" or Mountain Rhubarb, found at 14000 Feet Elevation.



A DISTORTED SKETCH showing the SUDDEN TERMINATION of the GREAT SINGALEELAH SPUR at foot of the PERPETUAL SNOW.

descends in an easterly direction from the pass, crosses the Rungbi to Yangpoong, to scramble in a northerly direction over naked rocks under the eastern crest of Singaleelah; these rocks have been hurled from the castellated crest by the severe frosts of winter; the stratification of the gneiss being perfectly horizontal, and the individual strat exceeding minute; the Lepchas named the blocks "Lama's books" which indeed they resemble—one of these blocks fifteen feet in height and thirty in length, was traversed by a band of white quartz a foot thick, and being of a less perishable nature than the gneiss, it stood out in bold relief at each end of the block. A thousand feet below us, we saw some pools of water standing in the midst of fine grass pasture land, the property of the Sikkim Rajah, and where his herds of yaks graze in the month of September; several stone huts were scattered about the pasture, where the yak herds shelter themselves during the night. At the present the yaks were five miles to the north at Jongri, immediately under the snow, or three days' journey from this. One mile of this rough and slippery scrambling brought us again to the crest of Singaleelah, where, to my amazement I discovered that the Singaleelah range breaks off suddenly, and that I stood upon the edge of a steep descent several thousand feet deep. Singaleelah at this spot sweeps round to the east by a great bend of one mile, and terminates in a spur that points to the south, separating the two main sources of the Rungbi river. From nearly the centre of the great curve, a narrow wall-like ledge much below the crest of Singaleelah runs to the north, and forms the only apparent connection of Singaleelah with the snows. Looking down into the deep valleys to the right and to the left, whose waters are separated by the narrow ledge above-mentioned, the eye rests upon a curious scene; the valleys, destitute of any vegetation and filled with pools of water, have been scoured from end to end by the action of either heavy masses of moving snow or by glaciers, the loose rocks are piled up in confusion, in some places, to the height of several hundred feet. The whole scene is one of ruin and desolation—not a shrub or a plant is seen, nothing but a region of loosely piled up gneiss rocks. From this spot looking to the north-west or across the deep valley at our feet, a fine lake about a mile in length is seen perched up in a strange position upon

a high level plateau in the mountain. The water, partaking of the colour of the naked rocks that rose behind it for several thousand feet, was almost black; its shores were rocky, dark and gloomy.

From this lake the Yungya, a feeder of the Tambur river in Nepal, takes its rise, and is seen leaving the lake by a fine cascade of 3,000 feet fall. As this lake had never been seen by any European, I have named it "*Lake Campbell*," after my esteemed friend Dr. A. Campbell at Darjeeling.

From this strange spot we descended to the east of the narrow ledge and found ourselves in a deep hollow, full of pools of water, and the whole surface of the valley one large moraine, the rocks of which have been driven about and piled up in wild confusion. Temperature of air at 10 A. M. was 58° of water 52°.

I was enabled this day to make some slight additions to Dr. Hooker's valuable Map of Sikkim—especially as this immediate spot was not visited by that intelligent traveller.

Encamped at 1 P. M. upon moss and lichen covered rocks at an elevation of 14,229 feet—we had been scrambling over these loose gneiss rocks for hours, and as we had splitting headaches, we were delighted to halt, although the poor Lepchas had no wood to cook their food. The rarefaction of the air is beginning to tell upon us; bleeding at the nose, a tightness across the back of the head, is what I most suffer from. The exertion of writing, making a false step amongst the rocks, of addressing any one, stooping to tie the shoe, or performing any act requiring but moderate exertion, is productive of the most distressing symptoms of suffocation, sharp sudden pains in the chest, extreme beating of the heart, and violent action of the lungs, which being fed with a thin and rarefied air, have to work hard to keep the blood purified. I have been so prostrated this day as to be fit for nothing, which is the more strange as our elevation is not a very great one; but from all I can gather from travellers in the Himalayah, I suspect that the sufferings of travellers commencing as they do from this elevation, are more acute and more noticed as being something new and at first very alarming. One of our Nepal coolies is in great agony, moaning in a most piteous manner. During the afternoon, rain and fog shut us out from all the world. In the sheltered spots I found dwarf rhododendron, a few primroses

a butter-cup-like plant, the conical rhubarb, two andromeda, one with a pretty white bell the very image of a true heath—and juniper, a few sticks of which latter tree were brought up from a distance by the Lepchas, and with them water was boiled with some difficulty at 189° 50, or 14,229 feet.

A pheasant got up from amongst the rocks, which I fired at and bagged; the concussion of the air was so intolerable and stunning, and so painful, that I was obliged to lie down for some hours before I got over it.

The fog clearing away we were enabled to see that we were in the midst of a scene of desolation and chaos, ragged rocks, black slate, moraines, land slips and steep cliffs were all that met our view *near* us, but to the south the plains and the intermediate ranges of mountains were all spread out before us. To the east of our encampment about one mile distant, we gradually saw the rounded mountain Gubroo, 15,000 feet, emerge from the clouds. To the north we could see nothing, as we were at some distance from the crest of a high ridge, that leaves the foot of Gubroo and sweeping round to the west, joins the high black mountains on which "*Lake Campbell*" is situated.

Somewhat to our astonishment we found our tent was only a few feet removed from a precipice 300 feet deep, had one of the furious blasts of wind that are common at this elevation descended from the snows, our tent would have been hurled over the precipice and received at the bottom in a deep pool of water a few hundred feet across. Thirty feet from the shore and at the depth of twenty feet I could see rocks around, whilst the water from its great depth was quite black.—A bright sun was shining overhead which would have enabled me to see the bottom perhaps at fifty feet, had the pool been so shallow. These pools during the winter are entirely frozen and covered with snow, one hundred feet deep or more, which is drifted from the heights above—when this large body of snow begins to melt in the spring and summer, the rocks lying under it are pushed along with the descending mass and are heaped and piled up as we saw them. These pools form the sources of the Rungbi river which, after a course of thirty-five miles through deep valleys, falls into the great Rungeet under Rinchinpoong.

August 13*th*, 1852. Leaving our tents, baggage and people at the encampment we ascended the loose rocky ridge to the north of us, the summit of which, 14,500 feet, we reached in half an hour; the sight that met our gaze from the top was a scene of grandeur I had never expected to see. The whole of the snowy mountains seen from Darjeeling were close to us, Kubra, 24,004 feet in height, appeared hanging over us although two and a half miles distant, but all progress northward was completely cut off, we were on the edge of a precipice many thousands of feet deep, at the bottom of which was a narrow valley running east and west with a handsome lake to the east, the water from which runs round the foot of Gubroo and falls into the Ratong. Across this valley a small ledge of rocks connects the semi-circular ridge of Gubroo with the foot of Kubra. Three similar chasms all running south-east, north-west, separated us from the perpetual snow on Kubra. The sides of the chasms are composed of a dark slaty rock, containing much hornblende, the sides being too precipitous to allow snow to rest upon them. The first and second ridges had no snow on them, the third had patches only of snow, the fourth was covered with perpetual snow, one and a half mile distant from us. These ridges are buttresses, descending from Kubra and terminate in the Ratong valley.

The Thermometer stood at 34°; the air was quite clear and bracing, allowing us a free view of the plains, Darjeeling, Nepal, the eastern snowy range and of the giant peaks to the north of us. *No aid from a telescope was required to show me that the whole of the large snow-covered mountains, Kunchinjinga, Pundeem, Kubra and Junnoo are composed of a finely stratified rock to their very summits.* By the aid of a telescope, the stratification of Kunchinjinga was very distinct, both in the large naked spot, now only ten and a half miles distant, and mentioned in the first page of my diary as having been caused by the earthquake of May, as well as at the very summit which is not covered with snow, but with a pellicle of ice, snow only resting upon the ledges and peaks. The strata, which are very small and minute, dip to the north-east about 20°, all the large peaks presented the same appearance. The rocks of the Gubroo range are composed of a hard flinty parallel gneiss intermixed with much black or blue hornblende and micaceous slate, the gneiss everywhere splitting into very thin laminæ as thin as roofing slates.

Immediately to the west of Gubroo, the rocks dip to the south-west at an angle of 30°.

The dip of the strata upon the Gubroo ridge being to the south-west, and the northern face of the ridge being nearly precipitous, a great flow of water takes place towards the south, the whole surface of the mountain is divided with numerous steppes, each steppe having pools of water resting upon them averaging from one hundred to four hundred yards broad—and many of them surrounded by steep walls of a fine slaty gneiss composed of hornblende, white quartz and felspar; from these pools there is a constant discharge of icy cold water which flowing away south form the Rungbi river.

From the crest of the Gubroo range, we could see a yak herd's encampment in the direction of Jongri, or north-east of where we stood, many thousand feet below us and separated by several deep valleys.

Kunchinjinga,	28,177*	feet above the sea was	$10\frac{1}{2}$ miles distant.
Pundeem,	.....22,015*	ditto ditto	7 ditto.
Kubra,	.....24,004*	ditto ditto	3 ditto.
Nursing,	.....19,139*	ditto ditto	12 ditto.
Tuchcham,	...14,000 (?)	ditto ditto	27 ditto.

We were six miles north of Nursing; this peak from Darjeeling has the appearance of rather a blunt rounded mountain, but from our position it was an exceedingly sharp pointed peak, run into a very fine point. None of the numerous glaciers that abound at the foot of all the great peaks and in the valleys separating them, could be seen, being completely hidden by the sharp slaty ridges above mentioned.

From the nature of the mountains surrounding Kunchinjinga, I felt convinced that any nearer approach to the great peak would hide him altogether, I therefore determined upon returning. Sitting on the ground with a rock to support my back, I with much difficulty, from the pain I was suffering from the rarefaction of the air, took a sketch of the snowy range from the most northerly attained spot in our journey, and having given one more look round this grand and wintry scene, we turned our backs upon the snow and descended to our tents at which we arrived, very cold, at 7 A. M.

August being the month at which the snow is probably at its

* Heights ascertained by Lt. Colonel Waugh, Surveyor General.

highest elevation, I was enabled by a series of bearings to lay down a correct outline upon Dr. Hooker's Map of the snow line in the height of summer, and which from careful observations I calculated to be about 17,000 feet; but some of the glaciers are far below this elevation, probably not higher than 12,500 feet. The great glacier at the foot of Kunchinjinga, visible from Darjeeling, is elevated about 16,000 feet.

At 8 A. M. we left our encampment and descended in a southerly direction over the loose rocks, crossing many running streams and pools of water. I particularly remarked, and that after repeated examinations, that none of these pools contained any living animal, either fish or animalculæ, nor had they any weeds, grass, nor indeed any organic matter in them. The only living things to be seen were two minute wrens hopping about the rocks. At 9 A. M. we reached a path, or rather a track marked out by the yak herdsmen by erecting large stones within sight of each other; upon a fall of snow occurring, these form their only guides through this wilderness of loose rocks; to us they were invaluable, as no one of our party had ever been where we were now threading our way, in the midst of a thick fog that obscured everything from our view. From the rocks we commenced ascending the ridge of which Gubroo forms the northern culminant point, and which separates the waters of the Ratong and Rungbi rivers. At 9.30 we reached the summit of the ridge, which to the east is precipitous, descending to the Ratong by a steep fall of about 8,000 feet. Looking back into the rocky basin we had left, and from which the fog had blown off, the view was very wild and interesting. Several landslips have taken place upon Singaleelah, uprooting large tracts of fir forest, some of which trees were seen with their roots in the air, their fine stems shivered and torn by the falling rocks.

We were much disappointed in not being able to see the view from the eastern face of the Gubroo range, as from our position, we should have been enabled to comprehend in one view all the glaciers lying at the foot of Kunchinjinga and Pundeem mountains, probably twelve in number, the nearest being five miles distant, as well as Jongri, situated upon one of the swelling buttresses of Kunchinjinga overhanging the right bank of the Ratong. Jongri

is a yak herd's summer-post, consisting of several stone houses at a probable elevation of 14,000 feet, and is the highest spot in this region where yaks are grazed during the summer months. From Darjeeling I was enabled during some very clear weather in October and by the aid of a glass, to fix the true position of Jongri. In Dr. Hooker's Map, Yangpoong is called Jongri. Perhaps the meaning of the name Jongri applies to both places, in which case Dr. Hooker's Map would merely represent an omission of the site Jongri and not a mistake. From these glaciers flow many streams, the united water of which forms the Ratong, a feeder of the great Rungeet. The eastern face of the Gubroo range is a handsome object in the view from Darjeeling, from whence it is seen as a bare, rocky, precipitous mountain. About 10 A. M. we reached a spot upon the almost bare rocks where there stands a yak herd's stone house composed of large slabs of gneiss rocks, some of the slabs being five feet in length. The house which is in a rather dilapidated condition, was supported by wooden posts, and was surrounded by a low stone wall;—we halted for breakfast;—in amongst the rocks, I noticed rhododendrons, blind nettles, rue, primrose, chrysanthemum, rose, dwarf rhododendron, fennel, geranium, polygona, dock and potentilla. This stone-house is a resting-place for the herdsmen and cattle when on their way from the valleys of Sikkim to Singaleelah.

We now commenced a rapid descent, and at 11.20 A. M. we reached Yangpoong, several hundred feet removed from the crest of the Gubroo range or upon the western slope of the mountain on a level with the fir forest or about 12,000 feet. Yangpoong consists of two large stone-houses covered with shingle, and a ruined house, this latter probably a kraal for enclosing cattle, an extensive mendong, covered with carved slabs and two tall flagstaves, bearing cloth flags covered with printed prayers. The inhabitants had gone to the north or to Jongri, so we examined their houses whose doors were merely tied up with a piece of string. We found the houses large, commodious and well filled with the usual Bhotia furniture, amongst which were some fine drums, trumpets and brass vessels. Though my Lepchas and Bhotias wandered about the houses examining and making fun of everything they could lay their hands upon, nothing was taken away, but my guide begged of me to take a large

pair of yak horns that were nailed to a post in the house. I had shown some desire to take back a good pair with me, but I could not consent in the absence of the owner to remove them, especially as they were evidently prized by the herdsmen from their superior size and shape.

Underneath the houses, which were built after the usual Bhotia fashion, there was accommodation for the yak calves.

From Yangpoong the descent was rapid, in the morning we had stood where nothing grew except a minute golden lichen, we were now at noon in a handsome forest, having passed rapidly through the various botanical grades of lichen, small flowers, juniper, rhododendron, fir, oaks, chesnut, to our tormentors the leeches. At noon we passed a small stone-altar called "*Mon Lepcha*" erected by the Lepchas, in honour of the "principle of evil;" we put up in a yak herd's hut on the left bank of the Rungbi, close to where it is joined by a fine stream flowing from the mountains to the east.

August 14*th*, 1852. Started at 6.15 A. M. in a southerly direction crossing the Rungbi over a handsome bridge close to our encampment. These bridges consist of a few saplings, their thicker ends being stepped under heavy stones, their lighter ends are brought together and form the crown of an arch; from this arch, loops of creepers hang down, into which one single sapling is laid, and forms the platform along which the traveller walks—we were now in a deep valley flanked on the west by the lofty Singaleelah, and on the east by the Catsuperri mountains, our path lay through a heavy forest a few feet above the Rungbi, a fine broad river full of rapids and water falls.

At 11 A. M. we arrived at a small patch of cultivation showing that we had descended 9,000 feet since yesterday morning. At this spot I measured one of the large black epirœ bird eating spiders, and found him to be eight inches across the legs; at 11.30 A. M. we reached Rungbi a Limboo clearance with four houses, near which was a small stone altar and some handsome trees of the fir species with very fine leaves.

In the deep valley of the Rungbi we met a party of Limboos, men, women and children all busy poisoning fish in the stream—our sudden appearance in the narrow path running through a thick tropi-

cal underwood seemed to take them by surprise. One old man carried a pot of tobacco and water in his hand, with which he continually anointed the leeches as they crept upon his naked legs, the first application caused the animals to roll off as if in agony.

At 2 P. M. after a very fatiguing march we arrived at two Limboo huts, perched up about 1,000 feet above the river, and commanding a fine view down the stream, which here turns off the east, flowing between the Pemionchi and Catsuperri mountains. The northern flank of Pemionchi is much less steep than its southern or Kullait river-side. Looking up the Rungbi, nothing is visible but a deep dark forest-choked glen, down which the Rungbi could be heard roaring. Near Rungbi we saw a very beautiful waterfall, the fall was only twenty-four feet in height, but the arrangement of the rocks and forests and the numerous streams into which the fall was broken, quite made up for its small height.

We put up for the night at a Limboo clearance where the Soobah of the Rungbi valley resides, and where, upon our arrival, he was, in honour of the harvest, keeping up great festivities. The whole population amounting to about ten men and four or five women besides children, were all more or less intoxicated; it was a long time before we could get a hearing on account of the music and dancing, shouting and screaming that was going on inside the principal house; at last they all tumbled out, and the soobah, a good-natured creature, at the head of the party, led us away to a nice house, which was forthwith swept out and cleaned and a fire lighted for us. Two bamboos of chee, a fowl, milk and rice were sent from the banquet, upon which we regaled ourselves, our sixteen attendants formed a grand addition to the party who were with much cordiality invited to see the dancing and to partake of chee, which they did with a will; for before midnight the whole of them were fast asleep and very drunk.

I sent my compliments across to the soobah to say I should like to see what was going on; he forthwith came himself, conducted us into his fine house, where there were about thirty men and women sitting on the ground, hot chee was being served round to every one and in the middle of the room a young girl highly excited and most fantastically dressed was dancing to the beat of several drums. The

girl was dressed in a pretty coloured petticoat with two cross belts of cloth covered with cowrie-shells thrown across her shoulders, from which depended on the back two skirts almost touching the ground and fringed with the teeth of the wild boar, deer, and bear, the dried heads and beaks of a handsome bird, of the scarlet pheasant, and other birds heads, seeds, pheasants spurs, and bears claws, and her head was ornamented with long cocks' tail feathers. The dance, which was a slow monotonous shuffle at first, increased in spirit as the drums beat louder, the girl moving gracefully to the time faster and faster until she got into a perfect frenzy, wheeling round the room and the fire places at a fearful pace, the men's heads keeping time to her dance; shouts, and beating of drums increased the girl's pace until unable to controul herself, she dashed into the midst of a large fire that was burning in the middle of the room, and with her naked feet sent the fire flying all over the room, nor were her hands idle, for she commenced tearing down a hanging frame-work upon which all the household cooking apparatus and property is generally slung; the women of the house rushed forward to save their property, the men to put out the burning brands; all was uproar and confusion during which moment we slipped out. The next morning I sent for the little dancing maniac, she came in full dress, but was as demure and quiet as any Limboo damsel possibly could be. I examined her dress, and marvelled how so slight a creature could dance, and at such a pace with the enormous weight of cowries and cloth that encumbered her body.

August 15*th*, 1852.—Four hours' quick walking in an easterly direction through forest, brought us to the summit of the Pemionchi mountain.

At 10 A. M. we reached the monastery of Chanachelling, or as the Lepchas call it Sanachelling. It is a remarkable and curious looking stone building three stories high, pierced with doors and windows, ornamented with paint, horse-hair curtains, hanging balconies and flights of stone stairs. The southern side faces a garden which is enclosed by a stone wall, beyond which are several handsome chaitans or stone monuments. The goompa or monastery is thatched, the edges of the thatch are secured by long ratans being tied to it at all points and pegged into the ground; this is to guard against

the high winds that sometimes sweep across these mountains with resistless force. Chanachelling is a monstery for women, but since the Rajah's disgraceful conduct towards Drs. Campbell and Hooker when travelling in his country—which, together with the Rajah's refusal to deliver up his Dewan, the principal instigator in the outrage, and on which account the two Morung Purgunnahs lying at the foot of the hills and yielding a yearly revenue of 23,000 rupees, and that portion of the hills now known as the Darjeeling Territory, and for which the Rajah received 3,000 per annum from the British Government, were confiscated from the Rajah,—the yearly allowance hitherto granted by the Durbar to the Goompa has been stopped, and we found that all the nuns had gone over the snows to Choombi in Tibet, leaving one Lama in charge of the vast house, its library, images and religious furniture. The interior of the house was as curious as its exterior. The portico at the entrance of the Goompa has the walls painted with a series of figures larger than life in the true Chinese style;—bright colours, bad perspective and extravagant action. The drawings represent Chinese officers of various grades bringing in frantic haste presents, such as strings of precious stones and other rare articles to a group of images in an inner room, the figures are so painted that they appear hastening into the room where a grand idol sits, flanked on either side by smaller images. The eyes of one of the mandarins or high officers were so painted that they really looked as if they were about to spring out of their sockets. The tension of the eye-ball was remarkably well-painted. The flowing drapery, the armour, faces and jewels upon the figures were all very well and minutely painted.

In the praying room up stairs, thirty-six feet long by thirty broad, were arranged round the book-cases for the reception of the books of prayers of which I counted 86 volumes bound in silk and each labelled upon three slips of various coloured Chinese satins. The roof of the room is supported upon six handsomely carved and painted wooden pillars, carved in a truly Chinese manner; down the eastern side of the room were ranged eight curiously carved side-tables behind which in recesses were seated twelve gods, five feet in height and painted so as to resemble life. Immediately to the left of the altar which was divested of most of its ornaments, was a

group of painted figures five feet in height, too indecent to make any further mention of. The altar consisting of a raised platform had upon it a few conch shells—brazen cups with water in them—bells—small brazen images and drums, all of Tibetan manufactory and very beautiful, especially the brass work which is chased and carved in a very minute style. Four heads of Indian corn were also hung up in front of the altar. In one corner of the room stood a prayer-drum five feet in height and supported between strong upright wooden posts. Their drums called "Mane" are found with all sects of Buddhists in or near the Himalayah, they contain painted and written prayers and are made to revolve from north, round by east, the revolving Lama repeating the words "Om Mane pemi hom." These prayer-drums vary from a few inches in length to several feet in height. The former are turned by the hand, the latter either by wheels or by water power.

The Lama left in charge of the convent could not appear, as he was undergoing either penance or was under a vow not to mingle with the world on this day; we conversed with him through a door, he speaking in the Bhotia language, our Lepchas interpreting; he sent us out nice soft rugs to sit upon, and a gallon of tea. He was most anxious that we should stay and sleep at the convent, and have a long talk with him on the morrow; he said all the brethren had experienced much pleasure from Dr. Hooker's visit, and assured us that our having come so far to see the convent, was an honour and that we were welcome. The fact is, these monks, perched upon lofty mountains and shut out from all the world, lead a life of monotony; a traveller breaking in upon this monotony and conversing about the world, its politics and people, is warmly welcomed and treated with great kindness.

A hot walk of three miles along the crest of the mountain brought us to Pemionchi, where there is a very handsome Goompa of three stories; it is eighty feet in length by about forty broad. As we approached, we saw one of the Lamas, who was dressed in his long garnet-coloured cloth robes, beating a gong to call all the monks to prayers; we were fortunate in seeing the whole establishment go through a religious performance upon the occasion of the death of a brother monk.

About twenty intelligent looking monks old and young, all dressed in the garnet-coloured flowing robes with under clothes of richly figured Chinese silks and satins, their hair cut short, assembled at the sound of the gong; they received us with great kindness and provided us with seats at the entrance to the Goompa, where the ceremony of chanting prayers for the dead was about to take place. The walls of the vestibule in which we sat were highly ornamented with painted figures as large as life, representing a Tibetan deity on a white horse; a female deity half-woman half-snake; and another deity upon some frightful beast.

Looking through the capacious door or up the body of the temple, the sight reminded me of a Catholic Chapel during the performance of high mass. Three pillars highly ornamented, gilt and painted, stand on either side of the aisle which terminates at the high altar, or rather a deep recess filled with eight or ten strange images as large as life. To the right of the recess there was a square metal tray, containing a hundred lights which shone brightly in the darkened room, the walls of which are painted from floor to ceiling with the likenesses of gods and goddesses, with skulls and tridents, things on earth, and with things that never were on earth, so beautifully confused and confounded that to attempt to analyze or particularize what there was or what there was not, would be a matter of difficulty. The colours were all of the brightest hues and pleasing to the eye.

On both sides of the aisle were ranged felt seats raised a foot from the ground, upon these the twenty Lamas took their seats and opened the ceremony by chanting a hymn, and finer bass voices I never heard; an old Lama sat near the altar on the right hand side and immediately in front of him and standing in the centre of the aisle was a figure dressed in the defunct Lamas clothes, a crash of cymbals, and a loud blowing upon the human thigh-bone trumpets closed each hymn, of which they chanted some twenty; two boys dressed as Lamas, during the whole of the service were very actively engaged in serving out hot chee from Tibetan metal tea-pots to the singers, who each held out his own wooden tea-cup produced from the folds of their capacious robes, and when emptied and *licked* clean, these were put back again into their breasts; near the door and close

to where we stood, incense was burning in a silver dish, a handsome silver flagon containing water also stood close to us, the flagon was of Chinese manufacture highly chased and ornamented, with two hideous Chinese dragons as its handles.

Service being over, we walked round the temple conversing with the Lamas through interpreters, our conversation lasted two hours, during which we were made to drink a quantity of chee and tea, a side of beef was also presented to us, accompanied by plantains, rice and vegetables.

The conversation was principally concerning the Rajah of Sikkim; and of his crippled condition since the British Government had deprived him of his land in the plains, the only land that yielded him any revenue; they deplored the outrage that had been committed upon Doctors Campbell and Hooker at the Cholah pass, and said that it was all the Dewan's doing, but that as the Dewan was intimately connected with the Rajah by marriage, the Rajah could not deliver him up to the British Government, when he was requested to do so. They gave me to understand that the Dewan was now a beggar, that having ruined his master, he was suffering for it. The allowance of 2,000 rupees and various presents that were annually given by the Durbar to the Pemionchi Goompa had been stopped, consequently they would all be obliged to go over the snows into Tibet, or starve. They certainly were very far from the starving point when I saw them, for a more jovial, fat, good-natured set of mortals could not be seen; they were the very pictures of jolly friars.

I particularly asked them if they had any objection to English gentlemen visiting their country and Goompas, their reply was, "None whatever: whoever will honour us with a visit, we will receive them with pleasure, give them food and a house to live in," and begged of us to pay them another visit. They said we were strange people and pointing to our legs that were bleeding from fifty leech-wounds, asked us, why we underwent such trouble, labour and misery when we might sit at home and be comfortable. "Yes" one fine intelligent Lama said, sighing: "we were all happy and at peace amongst ourselves before any English gentleman had penetrated our hills, but since then, all has gone wrong; but strange to say from no fault of yours, but of our own."

The view from Pemionchi, 7,000 feet, commands a fine view of the snowy range and of the greater part of Sikkim. Numerous Goompas perched upon mountains are seen to the east; the Rungeet river is seen 6,000 feet below and Darjeeling to the south—Tassiding Goompa appeared at our feet.

A great portion of the eastern end of the Pemionchi mountain was once encircled with a stone wall, the remains of which are still seen and was the capital of Sikkim. This place was sacked by the Goorkas, and the valuable library burnt in 1787, A. D. when the Goorkas descended the Tumbok pass (Islumbo of Hooker) and ravished the whole of Sikkim.

The summit of Pemionchi mountain is composed of mica schist of great brilliancy, shining in the sun like the nacre of a pearl oyster. The schist is not horizontal, but carved and distorted, presenting in the separation of its strata, huge conchoidal pearl-like surfaces.

Left Pemionchi at 2 P. M. passing several chaitans and descended 2,000 feet on the southern face to the great Gayzing Mendong, which is 615 feet in length, about ten in height, and as many broad; it is highly ornamented with well-carved slabs, the word "Om mane pemi hom" predominating. At the north end there stands a chaitan; and at the south end a tall flat slab of stone nine feet in height and covered with inscriptions, has been erected in a bed of masonry. The slab has had its head snapped off and just below the fracture, the writing commences. I am sorry I did not secure an impression of the inscription, but great fatigue had prostrated my strength, and I was fit for nothing.

Dr. Campbell in his journal of a trip to Sikkim—see Asiatic Society's Journal for May, 1849—mentions that this Mendong is the largest in Sikkim—the labour that has been expended upon this wall is immense, there being no less than 708 stone slabs all elaborately carved with letters five and six inches in length, some of the legends are arranged in circles ornamented with flowers and contain other words than the usual "Om mane pemi hom;" one stone written in the Outza (Tibetan) character had the words "Om, a, húm, túmphí" arranged in a circle. These phrases appear to have some hidden meaning, but unknown to the generality of the Lamas; however, they say that they all apply to God, each syllable bearing its own

peculiar virtue. An intelligent Lepcha with me who read the inscriptions freely, and also copied some for me, rendered the words "Om mane pemi hom" into the following prayer "Oh God receive me into Thine essence when I am going;" (dying); absorption into the divine essence being the Budhist's idea of heaven, I have no doubt that the prayer, meaning whatever it may do in strict reality, is used by the Budhists in that sense.

On our descent, we met a slave girl toiling up the steep ascent laden with a large bamboo full of water for the use of the monks. This girl had been kidnapped from Bengal in her infancy and had forgotten her native language, she was in good condition, fat and plump, but with a melancholy expression of countenance, an expression only seen upon the face of a slave. To prevent people being kidnapped from Bengal and from our own hill territory has long occupied the attention of our government; at every bridge leaving the British territory there is a guard; over these bridges a slave is never taken to Sikkim and no slave who may seek shelter from Sikkim is ever sent back again. Slavery and its attendant miseries have in an indirect manner been the cause of the Rajah's losing his country; mild reforms proposed by our government with regard to the existing slave-trade in Sikkim roused the anger of the Sikkim Durbar which led to direct violence offered to the person of our government representative.

August 16*th*, 1852.—Descended to the Kullait river in two hours, the path the whole way displaying mica schist; saw small red monkeys, doves, and green pigeons (koklah) in the forests.

To our annoyance we found that all the cane-bridges over the Kullait had been cut away to prevent any of the people from Hee, and the neighbouring clearances crossing to Pemionchi, the whole of the inhabitants near the southern bank of the river being more or less affected with dysentery, such is the horror and alarm with which that complaint is viewed by these people. Men were sent up and down the river for miles but without success, all the bridges had disappeared and as the river was at its height, very deep and impetuous, we were at our wits end, as I particularly wished to avoid the hot and miasmatic valley of the Rungeet, which appeared to be our only alternative. Men were again sent off down the stream to

see if there was any possibility of crossing; a spot was at last found half a mile above the junction of the Kullait and Rungeet rivers where some gneiss rocks jutted into the river, diminishing its width considerably. Here our Lepchas, in the space of two hours, threw a strong bridge across the Kullait made of bamboos and saplings retained in position by heavy stones. It was an exciting moment when a man crawling forward upon the supple and bending bamboos overhanging the boiling headlong current below, managed to effect a junction with the opposite bank.

The rocks in the Kullait are a fine gneiss in company with masses of white quartz.

A flock of black cormorants flew up the river, as we were sitting on the rocks, watching the bird-eating spiders letting themselves drop from great heights from the branches of the trees overhanging the water, and seizing insects and flies upon the rocks. The movements of the spiders were exceedingly rapid and precise, seldom missing their prey. From a living specimen I wound off upon a piece of card a good hank of a beautiful golden yellow web, resembling floss silk, which however turned into gum upon getting wet.

At noon we crossed the Kullait and after repeated halts on account of the suffocating heat arrived at a small level clearance near the summit of Rinchinpoong, where there is a Lepcha and Bhotia village of ten houses, at an elevation of about 6,000 feet. The name of the village is Yansúnkúm, the inhabitants of which had an abundance of good cows, pigs and poultry. I was importuned to prescribe for a man suffering from dysentery; having no medicine-chest with me was no excuse, for I was implored to make some sort of medicine to effect a cure; I accordingly had a quantity of wormwood gathered and pounded and stirred up in brandy, to which was added nutmegs, cinnamon, and cloves, all reduced to powder; doses from a bottle full of this strange mixture well diluted with water were recommended to be taken three times a day.

Here, from sheer fatigue and from severe inflammation of my legs and ancles caused by leech-bites, we were obliged to halt a whole day. Let no one who has never ventured into the Himalayah mountains imagine that travelling in these mountains is anything but downright and real hard work; it is seldom a traveller is so fortunate

as to have dry clothes on; his food is of the plainest quality and often very scanty. Dr. Hooker was reduced to coarse boiled rice and Chili vinegar; this is poor fare for a man walking up hill and down dale for ten hours a day.

August 18th, 1852.—Left Yansúnkúm at 6.30 A. M. and ascended to the summit of Rinchinpoong, a few hundred feet above the village—saw several chaitans on the road; all the hills near Darjeeling appear to have been, in some former age, much more densely inhabited than they are now, mendongs and chaitans appearing upon almost every ridge and peak of any note.

The rocks still mica schist. Passed the village Nam-gon-kum and commenced the descent of Rinchingpoong at 9.15 A. M; crossed at 10.40, the torrents; Richi flowing from west to east and falling into the great Rungeet, which river we could see turbid and swollen some thousands of feet below us; commenced the ascent of Singrioong at 11 A. M. and reached the summit at 0.45 P. M; a little to the west of the point of crossing this ridge, stands a conical peak, named Biksadong.

At 2 P. M. commenced the descent of Singrioong and by mistake taking the wrong path, we had to return 2,000 feet up a steep ascent. The heat was so overpowering, the jungle so dense, the air so quiet that a feeling of faintness crept over me, which deprived me of all strength; upon reaching the Ruttoo stream at the foot of Singrioong where it dashes over a high rock, I could not resist a plunge into the river. It was late in the day, any more ascent, worn out as we were, was impossible, and to sleep in this deep miasmatic valley was almost certain death from jungle-fever. Fatigue and the sight of the cool-stream overruled all scruples, we slept here. A fortnight subsequently, I was in bed delirious from jungle-fever, but I feel grateful that no one but myself suffered from my imprudence in sleeping in this deep valley.

On the way down Singrioong passed over one of the travertine lime deposits, common upon this spur, and upon Chakoong to the south.

In the Ruttoo are quantities of rolled and water-worn pieces of blue, pink, and other delicately tinted slates. The rock in situ is gneiss.

August 19*th*, 1852.—Left the banks of the Ruttoo at 7 A. M. and ascended Chakoong by a very steep path, reached the summit at 8 A. M., a rapid descent and ascent over several small spurs, brought us at 11 A. M. to the Rummam river, which we crossed by a very good cane-bridge.

Upon the southern flank of Chakoong I saw several large blocks of sandstone, black clay slate and gneiss. The jungle was too dense to allow of any examination of the ground. In the Rummam, gneiss veined with white quartz is the only rock to be seen.

At 1 P. M. we reached the guard-house at Goke by an excellent government road which commences at the Rummam river; four sets of zig-zags and many easy gradients, render the road accessible to horses. The change from steep and narrow footpaths, to a broad road was most delightful. There is much cultivation upon the spur and many substantial Limboo houses. The most remarkable feature upon the Goke spur is the large bamboo forest through which the road has been cut; bamboos ten inches in diameter and a hundred feet in length may be had in any quantities. These bamboos, called by the natives "Choongas," are used at Darjeeling, instead of the common leather-bag (mussak), for holding water for domestic purposes; they are also used as milk-pails, also for holding chee, ghee and other liquids. Amongst these bamboos, I saw the large black squirrel, measuring about three feet six inches from the nose to the tip of the tail. From Goke half an hour's descent brought us to the little Rungeet where our friends had sent us ponies and some bread; a man having been sent on two days ahead to announce our approach; at 4.30 P. M. we reached Darjeeling by the Tuqvor spur, having been away eighteen days, during which we had travelled 360 miles on foot or at the rate of twenty miles per diem ascending 36,000 feet and descending 31,000 feet, to reach an elevation of 14,500 feet distant in a direct line thirty-seven miles from the point of departure. These figures may in a slight measure convey some idea of the labour that has to be undergone by a traveller in the Himalayahs. The longest march made during the trip *in a direct line* was ten miles; the average distance was only five miles, each march occupying eight hours steady walking.

Here I part with my Lepcha guide and Lepcha companions, testi-

fying at the same time to the good nature and good temper of these interesting people, whom no hardship or discomfort appears to ruffle. After travelling for nearly twenty years amongst the "noli me tangere" Hindus, who, fenced about with a cruel caste, refuse all approach to familiarity, sociality, or even kindness with any one, even with one of their own caste, the change to Lepcha followers for Hindus is most pleasing: on one hand there is the brooding, moody Hindu, exchanging no thought with any one; eating his food in silence and alone; his fear lest any one below him in caste should touch him; his dread lest any of the hundred omens observed between his rising up in the morning and his lying down at night should not have been properly divined and acted up to; the cruel bondage to which his every action in life is subservient, makes the unfortunate Hindu any thing but a pleasant companion: on the other hand we have the free, happy, laughing and playful, no-caste Lepcha, a child of the mountains, modest, social and joyous in disposition.

I have watched the Lepchas after a good day's work playing amongst themselves, either racing on foot, playing at hop-step and a jump, quoits, wrestling and jumping; or walking up to a companion and throwing his arm round his neck, a Lepcha will pretend to be asking some question, in the middle of the pretended conversation, his friend receives a violent kick from behind, he turns round to see who is the culprit, no one is there and his friend has disappeared screaming with laughter at the trick he has played a hundred times before; a chase takes place, they run, they double, the culprit is caught, they wrestle and end by rolling upon the sward locked in each other's arms, they rise in good humour and go off to play the same trick upon some one else. I frequently brought these pastimes to a temporary close by offering the Lepchas a plate full of rice, ham, sausages, or perhaps half a raw flitch of bacon; panting from these healthy exercises, they would take the viands, their very teeth grinning thanks, sit down on the grass and divide the mess amongst each other.

Notices and Descriptions of various Reptiles, new or little known.—*By* E. Blyth.

Testudo Phayrei, nobis. Great Burmese land Tortoise. Carapax smooth, as in T. radiata and T. angulata, but much flatter; oblong, subquadrate, its free marginal plates reverted and moderately serrate. Nuchal plate broader than long. Caudal plate *double*. Gular plates longer than broad, moderately notched: anal broader than long, and deeply notched. Beak unemarginate. Fore-limbs covered with very long and thick imbricated scales, much as in a Pangolin; the claws elongate, strong and thick: similar great elongate scales at the heel; and a group of five principal obtuse spines on either side of the tail, the medial of them remarkably strong and thick. Two or more smaller spines or thick elongate scales above the tail. Colour wholly black, or mingled more or less with buff-yellow. In the young, the scales are probably of the latter hue, with gradually increasing black centres. Limbs deep brown; some of the claws yellow in some specimens: the head and neck paler brown, strongly tinged with yellow. Our largest specimen is 20 in. long in a straight line, or 22½ in. measured over the curve of the carapax, from front of nuchal plate to middle of caudal notch: greatest breadth 14½ in. or 20½ in. following the curve, from one obtuse lateral angle to the other. Height 1¼ in. Head to occiput 4½ in. The shell of this individual is wholly black, with merely a few slight indications of the ochreous-yellow colouring: all the claws deep brown. Another, rather smaller, has the appearance of great age, with most of the plates of its carapax more or less completely united, so that the form of some cannot be traced. Colour irregularly mingled black and dull buff-yellow; the plastron chiefly black; and several of the claws are yellow wholly or in part. Hab. Arakan; Tenasserim Provinces. Specimens presented by Capt. Phayre.

T. elongata, nobis. Small Burmese land Tortoise. Carapax elongate, becoming more so and quite smooth in adults, wherein it approaches to a semi-cylindrical form; flattish, sub-even, the three medial vertebral plates lying almost in a plane, and the free marginals

slightly reverted. Caudal broader than the last vertebral. Nuchal twice or thrice as long as broad, and even with the borders of the anterior marginals. Gulars not notched, or but very slightly so. Caudals divergent from base, and transversely elongate-triangular, broader than long, forming a slight lateral notch with the ventrals. Beak laterally notched or distinctly three-pointed. Scales of the limbs rather small, contrasting much with those of the preceding species. Colour of half grown specimen orange-yellow, each plate having a large black centre, which mostly disappears with age, leaving a few more or less radiating black spots on those of the carapax, and often a black spot on only the large medial plates of the plastron. Head and limbs brown, much tinged with yellow. Length of an adult 13 in. in a straight line, by 8 in. across, or rather more towards the hinder part of the body. Height $5\frac{1}{4}$ in. Head to occiput $2\frac{3}{4}$ in. Hab. Arakan. Specimens presented by Capt. Phayre. According to Dr. Helfer, Tortoises abound in the Tenasserim Provinces, and are much eaten by the Peguers and Karens, who train dogs to search for them.

In India proper and also in Ceylon, only one species of land Tortoise occurs, the T. STELLATA, Schweigger, a figure and interesting notice of which are given by Capt. Hutton in *J. A. S.* VI, 689, under the supposition of its being T. GEOMETRICA. The latter is a S. African species, very similar to T. STELLATA, but having a distinct nuchal plate, which T. STELLATA does not possess, and exhibiting certain other distinctions. Among some Tortoises, however, presented to the Society by Capt. Sherwill from S. Africa, are two small specimens of GEOMETRICA, and one full grown example which can in no way be distinguished from the Indian STELLATA. The latter does not inhabit Lower Bengal, and is rarely brought alive to Calcutta. One much more commonly brought here is the T. RADIATA, Shaw, a larger species remarkable for its very hemispherical form, and which is said to be indigenous to Madagascar, in which case it is probably brought to India from the Mauritius. The very large specimen referred by me to STELLATA (v. *actinodes*) in a note to p. 462 *ante*, I now think, after much consideration, to be distinct, and shall indicate as

T. MEGALOPUS, nobis, *n. s.* Similar to T. STELLATA, but attaining

a much greater size, with proportionally much larger feet and claws. The colours duller and therefore less strongly contrasting, and the lines radiating from each boss of the carapax more numerous. Fore-feet with two large claw-like scales of equal size behind the palm, and no others approaching them in size. Claws of hind-feet fully twice as large as in adult STELLATA. Length of carapax, measured in a straight line, 12 in., by $7\frac{1}{2}$ in. in diameter-breadth. Hab.——— ?

There are several living specimens about Calcutta, of the great Seychelle Tortoise, miscalled T. INDICA by Gmelin, and under which Mr. Gray unites no fewer than seven of the supposed species admitted by M. M. Dumeril and Bibron. According to Dr. Schlegel, "The Indian Tortoise [so-called], probably indigenous to Madagascar and the neighbouring isles, has been acclimated in the Gallapagos Isles, in California, and on several other points on the western coast of South America:" but we have been assured, on good authority, that numerous specimens kept in gardens in the Mauritius, have all been brought from the Scychelle Islands in the first instance, that they are still commonly brought from those islands to the Mauritius, and thence we believe the few in India have been imported. It is most assuredly not an Indian reptile, nor have we heard of its ever propagating in this country.*

* In the Mauritius I am informed that it is eaten. The largest I have seen is in my own possession, alive, and measures 4 ft. 4 in. in length over the curve of the carapax, or 3 ft. 5 in. in a straight line; transversely 4 ft. 2 in. over the high arch of the carapax, or in a diameter line 2 ft. 2 in.: height, when not raised upon the legs, *i. e.* height of shell, $20\frac{1}{2}$ in.; when walking, the shell is lifted fully 6 in. from the ground, if not more: circumference of hind-foot $17\frac{1}{2}$ in. A scientific friend, recently from Jamaica, assures me, that this great Seychelle species is quite distinct from the great Gallapagos Tortoise, which has bred and multiplied in Jamaica and other W. India islands. Curious, that these gigantic land Tortoises (diminutive, however, in comparison with the extinct Indian COLOSSICHEILIS,) should thus be indigenous to small oceanic groups of islands, in each case remarkable for the peculiarities of both their *fauna* and *flora*. We are reminded of the great wingless birds (Dodos and Solitaires) of the Mauritius, Bourbon, and Rodrigues; those also of N. Zealand and of Madagascar; the MEGAPODIUS of the Nicobars, and its congeners of other islands; the singular and quite recently extinct great Parrot of Philip Islet near Norfolk island, with its sole congener in N. Zealand; the Owl-like

From Afghanistan Mr. Gray describes a T. HORSFIELDI, which he suggests may be T. IBERIA, Pallas, *Faun. Casp.*, t. 5. The Society's Museum possesses a land Tortoise from that country, which however belongs to the genus HOMOPUS, having but four claws to each foot. It may be thus described.

HOMOPUS BURNESII, nobis. Carapax squarish, depressed, broadest posteriorly, where the free marginals are a little reverted and distinctly serrate. Anterior border straight, the nuchal plate well developed. Caudal as broad as the last vertebral, and broader than the other vertebral plates. Nucleus of each lateral or discoidal plate near its inner or upper border. Gular plates longer than broad, the two forming a nearly equilateral triangle. Anals oblong, divergent, forming a rather deeply notched border. Scales of forelimbs rather large, and those to the front mostly uniform in size. Claws elongate, or not worn down by attrition. Beak three-pointed. Colour yellow above, with black nuclei to the plates: those of the plastron black with yellow border. The head and limbs appear to have been yellowish. Length of carapax 6 in., by $5\frac{1}{4}$ in., measuring straight. Height $2\frac{7}{8}$ in. Head to occiput $1\frac{1}{2}$ in. This large specimen was procured in Afghanistan by Sir A. Burnes. A very small HOMOPUS in spirit, also from Afghanistan, is doubtless the young, though exhibiting some remarkable differences in the shape of the upper plates. In this the nuchal is roundish, or as broad as long;

nocturnal Cock too of N. Zealand, also close upon extirpation, &c. The majority, if not all, of these islands appearing to be remnants of what may be comparatively termed continents, each with its peculiar centre or centres of creation.

In all these supposed reliques of ancient lands, with the chief exception of Madagascar, mammalia are rare, and are chiefly or wholly *Cheiroptera*, *Rodentia*, and *Marsupialia*; the two former orders comprising the only placental mammalia of Australia; and one species of each of these placental orders being the only known indigenous mammals of N. Zealand, though a large Badger-like animal has lately been reported in the latter country, in all probability a marsupial. Madagascar is very remarkable for the extraordinary development of the quadrumanous group of Lemurs, among the higher placental mammalia; and has even a rodent Lemur in CHEIROMYS, as Australia has a rodent marsupial in PHASCALOMYS. Its other placental mammals are mostly of peculiar genera, unknown even on the neighbouring continent of Africa; and no marsupial has been discovered there.

and all the vertebrals are about equally broad. Colour dull yellow throughout. Presented to the museum by Dr. Allan Webb.

Of the numerous true Terrapins (EMYS) of the Gangetic rivers, only three species are common in the vicinity of Calcutta; and adults of all are rarely met with. These are—E. THURGII, Gray, which attains to a much larger size than has hitherto been described, adults measuring 20 to 22 in. (straight) in length of carapax; E. TECTUM, Gray, the adults of which measure similarly 6 in.; and E. HAMILTONII, Gray, the adults of which measure similarly $5\frac{1}{2}$ in. The only other species we have yet met with from this vicinity is E. TENTORIA, Gray, one young specimen only. This Mr. Gray describes from the Bombay Dukhun, where procured by Col. Sykes; and Sir Alexander Burnes obtained an adult from the Indus, which is now in the Society's museum. These two specimens differ in some respects from each other, also from Mr. Gray's description, and from Buchanan Hamilton's coloured figure, the two latter again presenting certain discrepancies one from the other. The species is nearly affined to E. TECTUM, Bell, but at all ages has the median keels to the first three vertebral plates much less developed, and the form of the whole carapax is conspicuously flatter and broader. A peculiarity of both species consists in the peculiar decanter-shaped form of the fourth vertebral plate. Comparing the adult of E. TENTORIA from the Indus (length of carapax, measured straight, $6\frac{3}{4}$ in.,) with an adult of E. TECTUM from the Hughly (carapax, similarly measured, 6 in.), the first vertebral plate is proportionally much broader in the former, pentagonal, narrower to the front, with a broad straight transverse base posteriorly, and the keel little developed; whereas the first vertebral plate of E. TECTUM is pentagonal, broader to the front, with a rounded posterior base, and much more developed keel. In the former, the first vertebral is considerably larger and somewhat broader than the second, whereas in the latter it is sub-equal or even rather smaller than the second: in adult E. TENTORIA the second vertebral plate is hexagonal but almost square, and rather broader than long, with the keel nearly obsolete; in E. TECTUM somewhat pear-shaped, truncate to the front and narrowing and curving off posteriorly, with the keel strongly marked: the third vertebral plate of adult TENTORIA is quadrangular, longer by

half than broad, with the keel quite obsolete on the anterior half, and flat and but little raised posteriorly; in E. TECTUM it is hexagonal, with the keel strongly developed and prolonged backward. A narrow black line is continued along the spinal ridge of E. TENTORIA; whereas the middle of the ridge is broadly white in E. TECTUM, bordered by a black line on either side. The plastron of E. TENTORIA is blackish-brown, with a pale border to each plate; in E. TECTUM pale with two or three distinct blackish patches on each plate. Comparing the young of the two species, the first vertebral plate forms a much broader pentagon in E. TENTORIA, being equal in breadth to the second; in young E. TECTUM the first vertebral plate is considerably narrower than the second: the second vertebral plate in young TENTORIA forms a heptagon with the base posteriorly; in young TECTUM a pentagon with rounded apex and anterior base: the third in young TENTORIA is subquadrilateral, somewhat longer than broad, with the keel a little produced posteriorly; in young TECTUM a pentagon with its base to the front, and the keel much broader and more prominent. Yet, notwithstanding these great differences of detail, and also of the colouring of the head, neck and limbs, the two species are very liable to be confounded on a superficial glance.

According to M. M. Dumeril and Bibron, the E. TRIJUGA, Schweigger, was obtained by M. Duvaucel from the "salt-water lake" lying east of Calcutta; but of the numbers of Terrapins which we have seen from that locality, we have sought in vain for this species, which belongs to the peninsula of India, and is the only one which has been there observed, with the exception of Col. Sykes's specimen of E. TENTORIA.* In Ceylon it is replaced by the very distinct E. SEBÆ, Gray.

On the Arakan coast, adults of E. DHONGOKA, Gray, approaching to 2 ft. in length of carapax, would appear to be very common; but the only young specimen which we have seen of this species was sent down alive from Asám by Major Jenkins, and is now

* Since the above was printed, we have obtained another EMYS from the vicinity of Chaibasa, which appears to be the young of E. DHONGOKA; and Mr. Jerdon assures me that a large species abounds in the Nerbudda, 2 feet and upwards, which is probably the same: it is not referred to in Mr. Jerdon's paper, p. 463 *ante*.

mounted in our museum. The adults have much the appearance of TETRAONYX LESSONII, D. and B., but are readily distinguished by having five instead of four claws to the fore-feet. T. LESSONII abounds at the mouth of the Hugly, and great numbers are brought to Calcutta, where they are eaten by particular castes of Hindus, and are even kept for sale in tanks. Though the water-Tortoises generally are much used as food, the species chiefly consumed, or at least which are brought in greatest quantity for that purpose, are TETRAONYX LESSONII and EMYDA PUNCTATA. The latter appears to be the most generally diffused species of Tortoise throughout the whole of India and Ceylon, and is very abundant in Lower Bengal, burrowing deep into the beds of tanks when the water dries up. A large one which escaped into the Society's compound was found several months afterwards in a healthy state, buried among the roots of some guinea-grass.

A small and evidently young EMYS from Arakan or Tenasserim would seem to be

E. OCELLATA, Dumeril and Bibron. The colouring agrees with the description: the details of structure less completely. Length of carapax 6 in. (measured straight). It is affined to E. THURGII; and, as compared with a specimen of E. THURGII of the same size, it is at once distinguished by having the whole under surface of the shell spotless yellowish-white, and each lateral or discoidal plate of the carapax is marked in the centre with a large round reddish-brown spot, surrounded by a pale areola; an interrupted black line along the spinal ridge, which is raised into keels on the first four vertebral plates. These are of equal breadth, whereas in E. THURGII the first is much narrower than the others. Nuchal plate twice as long as broad, and throughout equal; whereas in E. THURGII it is triangular with posterior base. Hindmost vertebral plate much narrower than in E. THURGII; and the posterior marginals and especially the caudals are much smaller than in that species. Colour of the upper parts greenish olive-brown, with the ocelli before mentioned, which probably become obscured with age. Head brown above, with yellow superciliary line meeting its opposite over the nostrils, and another proceeding backward from the eye. Limbs and under parts apparently yellowish without markings.

There is a species of Chameleon in the Society's old collection, the origin of which is unknown, but it would appear to be undescribed. It would seem to be most nearly affined to C. CUCULLATUS, Gray, and has the occipital flaps of both that species and CH. DELEPIS, Leach.

CH. VERRUCOSUS, nobis. Body minutely tuberculated, with larger tubercles regularly interspersed throughout. The latter are smaller and contrast less strongly on the limbs and tail, and are more thickly set upon the limbs. Ridges of the back and throat serrated, the tubercles becoming smaller towards and upon the tail. Beneath, the tail is smooth, though tending to exhibit a slight serrature towards its base. Superciliary ridges not uniting together, either before or behind; and a small medial occipital ridge continued to the base of the two lateral flaps or lappets of skin. Colour of the specimen blanched; but there is a strongly marked black streak proceeding backward from the axilla, and surmounted by a white streak, the two occupying the space which may be concealed behind the humerus. Length $11\frac{3}{4}$ in., of which the tail is 6 in. Hab. unknown.

LEIURUS BERDMOREI, nobis (*Geckoidæ*). Agrees with Mr. Gray's definition of LEIURUS, except that there is no appearance of the toes being webbed at base. Colour grey, with 4 longitudinal blackish streaks along the back and sides, 3 or 4 interrupted cross-bands of the same on the upper surface of the tail, a medial black streak on the nape, and others successively diverging on each side of it, and a black streak from before the eye continued to the shoulder. Some mottling also on the limbs. Hab. Mergui, where procured by Capt. Berdmore.

The genus STELLIO is new to the Indian fauna. A species from Upper Hindustan cannot be safely separated from the Arabian ST. CYANOGASTER, Ruppell, unless upon comparison of specimens. The tail, however, appears to be longer; and there is a slight gular *fanon*. Specimens vary much in colour. An adult from Mirzapore, presented by the late Major Wroughton, measures $12\frac{1}{2}$ in. long, of which the tail is 8 in. Throat blue, spotted over with yellowish-white, deepening to purple on the *fanon* which is less spotted. The rest of the lower parts are yellowish-white, marbled on the trans-

verse fold of the neck and immediately behind it with blackish, and spotted with the same on the breast and belly, the spots becoming less numerous on the latter. Upper parts dark olive-green, the back and sides speckled over with whitish. Two smaller specimens were presented to the Society by L. C. Stewart, Esq. now of H. M. 61st Regt., from Wuzeerabad. Length of one $8\frac{3}{4}$ in., of which the tail measures $5\frac{1}{2}$ in. In these the under parts are yellowish-white, suffused or marbled with bluish or pale dusky on the throat, and slightly spotted with the same on the breast. Upper parts paler olive-green than in the large specimen; the back and sides speckled with yellowish-white in one, as in the adult example, with traces of dusky marbling on the back; in the other, the back is much more marbled and blotched with dusky, and has only a few largish dull white spots on the back and sides, while the limbs and tail are banded, and there are three dark transverse lines over each eye. If new, St. INDICUS, nobis.

Genus CALOTES, Kaup. We have now nine well marked species of this genus in the museum. The first three are distinguished by a pit or fold before the shoulder, which is lined with minute scales.

1. C. EMMA, Gray (vide "Proceedings of the Asiatic Society" for May, 1853, p. 413.) Inhabits Mergui, and probably other parts of Burma, ranging northward perhaps to the Khásya hills; but extremely doubtful as an inhabitant of Afghanistan. We have elsewhere expressed our suspicion *(loc. cit.)* that collections made by the late Dr. Griffith in Afghanistan and in the Khásya hills had become mixed and confounded, and hence that Mr. Gray had been led to assign his CALOTES EMMA, C. MARIA, C. MINOR, and SALEA HORSFIELDI to Afghanistan, and two of the four to the Khásyas also; countries so extremely different, that it is most improbable that the same species would be found to inhabit both of them.

2. C. MYSTACEUS, Dumeril and Bibron. (Described *J. A. S.* XXI, 754). Inhabits Burma, and also the mountainous parts of Ceylon. Hind-toe reaching to the ear.

3. C. ROUXI (?), Dumeril and Bibron. Three adult specimens and another half-grown forwarded by Dr. Kelaart from Newera Elia, in Ceylon, accord fully with the description as regards structure;

but the colouring is remarkable, and different again from that of Mr. Jerdon's supposed C. Rouxi of S. India. Pit before the shoulder more developed than in C. mystaceus, and partially black. Hind-toe reaching to the eye. A row of 3 or 4 raised spines above the tympanum; and nuchal crest moderate and gradually diminishing to the tail. The latter is tumid at base, and soon attenuates rather suddenly, the tumid portion exhibiting a median ridge of very broad keeled scales. Caudal scales towards the base of tail much larger than those of the body. Throat scales very broad and flat, with a median row of narrow compressed scales imparting the appearance of a small *fanon* or dewlap. A half-grown specimen (in spirit) is blue, with the tail reddish-brown to near its base, and marked with an irregular double series of *ocelli* which are white, having a black border. A few similar *ocelli* are seen bordering the low spinal crest. There is a black mark between the eye and the ear, and another below the eye; and a tinge of ruddy on the throat, about the tympanum, and on the occipital and tympanic spines. Adults (in spirit) have the body and limbs blue, the tumid base of tail green, and the rest of the tail dull red-brown, with *ocelli* less bright than in the young. Borders of lips black, continued as a broad black band (more or less variegated with ruddy-white) to the shoulder-pit. Throat whitish tinged with ruddy and strongly contrasting, as also a white band from the tympanum continued over and passing the shoulder-pit. In some, the shoulder-pit is also posteriorly margined with a white mark; and raising the fore-leg, two or three additional white stripes are seen, oblique and successively more inclining to the horizontal. The limbs are also banded with white; but these markings are often indistinct or obsolete. Tumid base of tail bright orange underneath in some specimens. C. Rouxi is described from Burma; but as we possess the preceding species both from Burma and the mountains of Ceylon, it is the less improbable that the present may have the same habitat.

4. C. gigas, nobis. (Supposed C. ophiomachus, *J. A. S.* XI, 870). Resembles C. versicolor, except in being much larger, having no trace of gular *fanon*, and a *double* nuchal crest of spine-like scales, ½ in. long in the specimen under examination. Dorsal crest also proportionally more developed than in C. versicolor,

and terminating abruptly over base of tail. Length of head and body 5¾ in. Of tail——? Of hind-limb 3¾ in. Colour apparently uniform without markings, but the specimen is much blanched. Hab.——?

5. C. VERSICOLOR, Daudin. The most common and generally diffused species, inhabiting all India and Ceylon, from the base of the Himalaya southward, and (according to Mr. Gray) also China and Afghanistan (vide, however, remarks on C. EMMA). It is the only species we have in Lower Bengal, where it is excessively abundant, particularly in gardens. Sir A. Burnes sent a specimen from Sindh; and we have also one from Rangoon. In the last, however, the scales are somewhat smaller than in Indian specimens, and the two detached spines on the tympanic ridge are remarkably minute; but there is no other difference. Ceylon specimens, on the other hand, appear commonly to attain a greater size, with somewhat larger scales, the nuchal and dorsal crests and also the gular *fanon* being rather more developed (and they are then the supposed C. ROUXI *apud nos* of *J. A. S.* XXI, 354); but smaller and younger specimens from Ceylon are quite undistinguishable from Bengal examples; and it may even be that the latter sometimes attain the size and general development of the Ceylon reptile.* In S. India, again, the changes of colouring (as described by Mr. Jerdon) differ from those of C. VERSICOLOR of Bengal, and are perhaps the same as in the Ceylon animal. Here the colours are changeable, but no yellow is ever seen; and in the months of May and June, the males chiefly are often observed with the head and anterior third of the body, inclusive also of the fore-limbs, tolerably bright red, a large black patch before the shoulder, and all the rest plain greenish-brown. They are often altogether of the latter hue without markings; or the markings come out more or less strongly. The reptile is then commonly brown, lighter or darker, with a series of transverse dusky bands, broken on either side by a longitudinal whitish band which is evanescent, appearing and disappearing and sometimes shewing very conspicuously. A dusky streak through the eye, and

* Some *living* examples sent to me from Galle by Dr. Kelaart are quite undistinguishable from living Bengal specimens.

three others radiating below and two above it. Three or four oblique streaks on each side of the throat; and others on the limbs. Females are smaller and darker, generally of the hue of the ground on which they lie.

6. C. VIRIDIS, Gray. Nuchal crest extremely slight; and no decided spines above the tympanum, but three raised angular scales placed not on a ridge, but disposed triangularly and separated apart. In some specimens, probably the females, the latter are scarcely noticeable. There is also a row of five flattened scales from below the eye to above the tympanum. Two longest hind-toes of subequal length and reaching only to the ear. Body scales acutely pointed, especially those of the lower parts. Colours green or brown, mottled with whitish and with dark brown; lips black. From S. India.

7. C. OPHIOMACHUS, (Merrem). Tympanic ridge with several short and two longer spines. Longest hind-toe reaching to front of eye. Tail extremely long, its terminal three-fourths commonly whitish. General colour green, paler below; with some irregular white transverse bands on the body in adults. Stripe through the eye red; and nuchal crest and throat the same in the breeding livery of the males. One Ceylon example (in spirit) is remarkable for having a longitudinal white lateral band, continued from the shoulder to the tail upon which it becomes broken and lost. Identical from S. India, Ceylon, and the Nicobar Islands.

8. C. PLATYCEPS, nobis, *J. A. S.* XXI, 354. Hab. Khásia hills.

9. C. TRICARINATUS, nobis. Founded on a young specimen of a well marked species, affined by the flat form of the head to the last, but particularly distinguished by having three low crests or keels along the nape and shoulders. An oblique row of six large triangular scales over each tympanum, but no spines (perhaps on account of youth). Longest hind-toe reaching to tip of muzzle. Colour (in spirit) blue above, white beneath. From near Darjiling, where procured by Capt. Sherwill.

ASPRIS, nobis, *n. g. (Scincidæ)*. Affined to TROPIDOPHORUS, Dumeril and Bibron, but differs much in the arrangement of the shields upon the head, and the face anterior to the eyes is compressed and narrow, with subacute muzzle. Tongue very slightly notched. Teeth extremely minute. Frontal shield elongate-pentan-

gular, attenuating much posteriorly: fronti-parietals triangular and contiguous; parietals large, subovate; interparietal smaller, elongate and obtusely pentangular; superciliaries five in number, broad, the two series separated apart by the narrow hinder part of the elongated frontal shield. Scales of the back and upper part of tail rhombic, strongly carinate, the keels running in parallel ridges; of the belly roundish, smooth. Præ-anal scales 2, large, triangular. Toes 5—5, simple, slender.

A. Berdmorei, nobis, *n. s.* Colour dusky-brown or blackish, the throat and belly ruddy-white, with some cross-bands of the same upon the neck and body, broader and more distinct on the former, and white specks on the lips, chin, and on the under and lateral surface of the tail. Eight distinct rows of keeled scales along the back. Length of specimen $4\frac{5}{8}$ in., of which the tail is $2\frac{3}{8}$ in., and head $\frac{9}{16}$ in.; fore-limbs $\frac{9}{16}$ in.; hind-limbs $\frac{13}{16}$ in. Hab. Mergui, where procured by Capt. Berdmore.

Mocoa formosa, nobis, *n. s.* Length of one 7 in., of which the tail measures half. Scales hexagonal, in six dorsal series. Præ-anal scales similar to the abdominal. Form robust. Frontal shield elongate-pentagonal, broadest to the front, and rounded posteriorly. Inter-nasal and fronti-nasals lozenge-shaped, or somewhat fan-shaped, broader than long. Fronti-parietals distinct, but unsymmetrically divided. Colour olive-green, with black lateral and pale superlateral bands as usual, the former much speckled with greenish-white, and the latter shewing a series of black spots. Between the pale superlateral streaks are five narrow black lines along the nape and body, variegated with angular greenish-white spots. A few such spots appear also on the upper surface of the tail, caused by a scale variegated with black and greenish-white here and there placed. Limbs minutely pencilled with black, and spots or streaks of the same upon the head. Under-parts greenish-plumbeous throughout. This large specimen was procured at Mirzapore by the late Major Wroughton; and others, from Wuzeerabad, presented by L. C. Stewart, Esq. now of H. M. 61st Regt., are smaller and less marked with black, which does not form continuous lines along the back, but variegated scales (black, with pale

medial portion,) are throughout scattered, and there are some black markings on the head.

M. SIKIMMENSIS, nobis, *n. s.* A small species, about 4 in. long, the tail varying in length in different individuals. In one the head and body measure $1\frac{5}{8}$ in., the tail $2\frac{3}{8}$ in.; in another the head and body measure $1\frac{3}{4}$ in., the tail but 2 in. This difference is probably sexual, the former proportions denoting the male, and the latter the female.* Closely affined to the preceding species, but much smaller, flatter, and more lustrous, with proportionally much more slender toes. Colour of the upper parts nacreous olive-green, with three irregular black lines or rows of specks along the back, not always very conspicuous. A broad black lateral band, becoming obsolete along the sides of the tail, is margined with a glistening pale greenish stripe above, and variegated with spots of the same along its lower half and on the outside of the limbs. Under-parts greenish-white, except the tail and below the limbs where the colour is rufous-white. Some have a few dark spots on the throat. HAB. Sikim, where procured by Capt. W. S. Sherwill.

PLESTIODON QUADRILINEATUM, nobis, *n. s.* Proportions of TILIQUA; the head small, but its plates almost exactly as in PL. LATICEPS of N. America. Colour blackish above, pearly white below; two dorsal greenish-white streaks, commencing at the nostrils and gradually disappearing at about the middle of the tail; these streaks being exterior of the two alternating series of medial and hexagonal dorsal scales: also a lateral pale streak from fore to hind limb, which is more or less indicated on the neck and base of tail, close upon the whitish hue of the under-parts. Length $7\frac{1}{2}$ in., of which the tail measures $4\frac{3}{4}$ in.; of hind-limb $\frac{15}{16}$ in. China (Hong Kong?). J. C. Bowring, Esq.

EUPREPES MACULARIUS, nobis, *n. s.* Affined to EU. CYANOGASTER, (Lesson, v. *Eu. sechellensis*, D. & B.) Like TILIQUA RUFESCENS, (Shaw), but the scales of the upper-parts 5-7 carinate, and colour bronzed olive-green above, pale below; the hinder half of back and base of tail above marked with irregular reddish-brown spots, and a broad reddish-brown lateral streak continued from the ear to the middle of the tail, marked throughout with white, which tends to

* The same variation occurs in the species of RIOPA, Gray.

form continuous lines posteriorly. Terminal half of tail whitish. Arms and hind-limbs speckled with white posteriorly. Length of specimen $5\frac{1}{4}$ in., of which the tail measures $3\frac{1}{2}$ in. Hab. Rungpore?

Lissonota, nobis, *n. g.* Form of Euprepes, but more slender, covered with very smooth minute uncarinated scales. Head short, flat, subtriangular as viewed from above, broader than high, with obtusely pointed muzzle. Tympanum distinct, roundish. Lower eyelid scaly. Palatal incision slight, placed far back. Tongue scarcely notched. Teeth very minute. Frontal shield pentagonal, subtriangular, broad to the front, and elongated to an obtuse point posteriorly; the supra-orbitals nearly meeting across. Inter-nasal hexangular, somewhat fan-shaped. Fronti-nasals small. Fronti-parietals two, contiguous. Inter-parietal squarish or diamond-shaped. Limbs well developed. Toes 5-5, the palms and the heels (or exterior portion of soles) granular. Infra-caudal scales larger than those of the body; and two large triangular præ-anal scales.

L. maculata,* nobis, *n. s.* Colour (in spirit) greyish olive-green, with a double row of irregular dark spots along the nape and back, and a median line of the same along the tail. On each side a dark band is continued throughout, commencing at the nostrils; and beneath this is a narrow pale streak, then a narrow dark one, and finally a few dark spots on the sides of the throat and belly. Upper surface of the limbs variegated throughout. Lower-parts albescent-greenish. Length of specimen,—head and body $1\frac{7}{8}$ in., and tail probably about the same, but the tip is wanting. Fore-limbs $\frac{5}{8}$ in.; hind limbs $\frac{15}{16}$ in.: distance apart of fore and hind limbs 1 in. From Asám; Col. Jenkins.

Ophiops Jerdoni, nobis, *n. s.* A typical species, dark bronze above, black-spotted, with two obscure broad dorsal streaks; below white throughout. Length of head and body $1\frac{1}{2}$ in.; of tail $2\frac{1}{4}$ in.; of hind-limb, to extremity of longest toe, $\frac{3}{4}$ in. Femoral pores 7 or 8. Shields of head plaited longitudinally. "Procured at Mhow, in pasture land." T. C. Jerdon, Esq.†

* This species would seem affined to Plestiodon sinensis, Gray.

† Since Mr. Jerdon's paper on the reptiles of S. India was ready for publication. With reference to that paper, p. 468 *ante*, he desires me to state that "the only specimen of Homonota fasciata was taken from the mouth of a snake, in grassy land, near Jaulnah."

Sphenocephalus, nobis, *n. g.* A *Sepsoid* form affined to Sphenops, Wagler, but with more slender and elongated shape, and the limbs placed more distantly apart; the anterior minute and fitting into a groove, the posterior as large as in Sphenops, and each having but three toes, of which the innermost and next are subequal and the outer much shorter.* Form slender, $\frac{2}{3}$ cylindrical, quite flat and laterally angulated beneath as far as the vent: the body and tail covered with small, smooth, lustrous, hexagonal scales, with a median row of broader scales along the under surface of the tail. Head much as in Sphenops, but the muzzle more pointed; the upper lip covering the mouth. Tongue broad, triangular, its cleft scarcely perceptible; the incision of the palate small. Teeth very minute. Eyes minute, with semi-transparent lower lid. No external trace of ear. Nostrils terminal, placed in the anterior margin of the nasals, contiguous to the front of each inter-nasal and the rostral; rostral equilaterally triangular; supra-nasal broad, heptangular, with apex to the front; fronti-nasals subtriangular, a little elongated; frontal obtusely subtriangular; parietal inequilaterally pentangular, with obtuse posterior base, single and as large as the frontal. A large subquadrilateral plate under the eye, and three small transversely narrow plates in front of it, and posterior to the nasal plate. A large diamond plate on centre of chin, emarginated anteriorly to admit a small roundish plate which is bordered by the anterior laterals. Tail shorter than the body, and sub-cylindrical, flattened below.

Sph. tridactylus, nobis, *n. s.* Very pale brown, a little deeper on the upper-parts. The largest of six specimens, measures 6 in. in total length, of which the tail is 2 in., and distance apart of the fore and hind limbs $\frac{1}{2}$ in. Length of fore-limb $\frac{1}{8}$ in.; of hind $\frac{9}{16}$ in. From Afghanistan. Presented by Dr. Allan Webb.

The habit of this curious reptile is indicated by its structure. It is evidently a burrower, probably into loose sandy soil, where it would work its way with its wedge-like muzzle, deriving considerable *appuis* from its hind-limbs; the minute fore-legs remaining

* It is still more nearly affined to the Australian form Ronia of Gray, figured in the Appendix to Grey's Journal; but this has still more rudimentary limbs, the anterior merely indicated externally, and the posterior shewing but two digits.

generally close within the grooves into which they fit; the head meanwhile being raised, and the long body arched,—an attitude which most of the specimens assumed when immersed in spirit.

The following is a remarkable limbless lizard from Rangoon, obtained by purchase.

Ophiseps, nobis, *n. g.* Form anguine, of nearly uniform bulk throughout, tapering suddenly at the extremity of the tail; no exterior trace of limbs; and the vent placed in the middle of the entire length; the body above, and tail above and below, covered with parallel ranges of quadrilateral keeled scales, the throat and belly with hexagonal smooth scales, and the tapering extremity of the tail with imbricated and rounded scales. A groove on each side from shoulder to vent. Tongue obtusely forked: no palatal teeth; but a single row of small maxillary teeth: the triangular incision of the palate large. Eyes rather small, lacertine; the lids scaly. Tympanum small. Nostrils small, lateral. Head conical, somewhat compressed in front; the cleft of the mouth extending to beyond the eye. Rostral plate small, broad, triangular; it and the nasals and anterior labials surmounted by numerous small plates and larger representatives respectively of a posterior nasal and united frontinasals. Frontal shield large, heptagonal with posterior base; and the parietal inequilaterally pentangular, with anterior base. Frontiparietals quadrangular. The streaks of the chin are sub-quadrangular and placed obliquely. Along the median ridge of the back the parallel ranges of scales alternate, but not upon the tail.

O. tessellatus, nobis, *n. s.* Length of specimen 12½ in., of which the tail measures 6½ in. Colour pale dingy buff-yellow, paler below, with numerous plumbeous spots on the anterior half of the body above, composed of scales of that colour, some detached, others placed contiguously to form transverse bands more or less imperfect; all the scales being highly lustrous. There are 14 parallel ranges of them above, from lateral groove to groove, and 8 such ranges below. From Rangoon.

(To be continued.)

Notes on the Ruins at Mahábálipuram on the Coromandel Coast.—
By C. Gubbins, *Esq. B. C. S.*

The temples of Mahábálipoor or Mavellipuram are situated in Lat. 12° 36′ 57″ North, and Long. 80° 14′ 1″ East; nearly thirty-five miles south of Madras, and about five north of the little town of Sadras.

They are built and excavated from a low rocky ridge, that rising isolated from the plain, runs slanting towards the shore for about a mile and a half. The highest part, towards the north, is little more than 120 feet in elevation; and perhaps a mile from the sea, into which the southern extremity runs. It appears to have some small spurs, which may be seen cropping out at various points on the beach.

It is chiefly* of a binary granite, that conveys to a casual observer, the idea of having been recently half-wetted by a driving pelt of rain; and although extremely hard, splits readily into masses of various, but considerable size. I saw a block from forty to fifty feet in length, and twenty-five to thirty feet in width, that had been divided with an apparently† plane surface by a single blast of gunpowder. The hewers of the caves, however, do not seem to have enjoyed the assistance of this powerful agent: their method was to trace out on the surface of the rock, the line in which they required a separation, along which small holes were made with the chisel, and wedges introduced with sufficient force to compel cleavage. It would however be difficult at the present day, to determine whether these wedges were of wood, well dried before insertion, and subsequently swelled by the application of water; or of metal driven in by repeated blows, as appears to have been the custom in ancient Egypt.

The rock yields to the weather by conchoidal peelings, which gives to the group the general appearance of a mass of gigantic boulders, or a confused assemblage of ruined domes. Considering its hard-

* As far as I could perceive, it was entirely so: but I had not leisure for an examination sufficiently minute, to authorize my speaking positively.

† I say "*apparently*," because with reference to the known conchoidal fracture of the rock, it is probable that when closely examined, the surface would be found somewhat curved.

ness, it seems to be peculiarly affected by the sea air. This was remarked by Mr. Chambers in 1772 and 1776. "All these figures are doubtless much less distinct, than they were at first; for on comparing these, and the rest of the sculptures that are exposed to the sea air, with others at the same place whose situation has afforded them protection from it, the difference is striking; the former being every where much defaced, while the others are fresh, as if recently finished;" and it is necessary to bear in mind this characteristic, when discussing the antiquity either positive or comparative, of any portion of these edifices.

The greater part of these temples are excavations, after the fashion of Ellora and Elephanta; superior in taste and symmetry, though far inferior in dimensions, to the first named. The most perfect and beautiful is in a narrow ravine, towards the northern part of the range, and facing to the West; whereby it has been well protected from the effects of the sea air. Although small in its dimensions, it is remarkable for its artistic merit: the columns in particular are slender and most graceful; the pedestals couchant tigers facing outwards; the capitals elegant and well proportioned, though fashioned in a style unknown among the orders of Grecian architecture. Mr. Chambers remarks on its sculpture that "the figures of idols in high relief on its walls are very well finished, and perfectly fresh." Another appears to have been dedicated to Siva, who is represented, in the middle compartment, of large stature and with four arms. A small figure of Brahmá is on his right; Siva with his consort Párvatí on the left; and his left foot rests on a bull couchant. At one end of the temple, is a gigantic figure of Vishnoo sleeping on a Cobra-di-capello, with several heads so disposed as to form a canopy above the god. At the opposite end appears Sivání, in the character of Doorga, with eight arms, mounted on a lion; opposed to her is a gigantic figure with a human body and buffalo's head, much resembling that which is elsewhere called the Yum rájá; between them is a human figure suspended head downwards, apparently the object of their dispute: and the monster brandishes a club, while the goddess is armed with various weapons and accompanied by some dwarf attendants.

Mr. Goldingham remarks, "The figure and action of the goddess

are executed in a spirited and masterly style :" and Lieut. Newbold observes that " the best executed figure of the king of the beasts, is that on which the goddess Doorga is seen, mounted in the sculptured cave near the summit of the hill."

Not far off, a large polished slab about ten feet in length, with the figure of a couchant lion at the southern end, is shown as the bed of the Dharma rájá: which may probably be understood as the " Sit de justice," or throne, whence some prince of that name was wont to dispense justice to his people.

Of the other caves some were considerably larger, and had more the appearance of being dedicated to Vishnoo : all facing the East. But the striking point in which the whole series resembles that of Ellora is their unfinished state. Mr. James Fergusson remarks of them in a paper read to the R. A. Society in 1843.

" One of the most singular characteristics of this series of caves is, that they are all of one age, and probably the work of one prince, who has carried on the works simultaneously : but from some cause or other has been unable to complete even one of them. Had one been finished, or had there been any gradation of style or workmanship, some chronological arrangement might easily have been effected : but nothing of the kind exists."

Another still more remarkable point of similarity is the repetition of the sculptured group, representing a skeleton figure in a suppliant attitude before a personage appearing to possess authority. Mr. Goldingham describes the group at Mahábálipoor as follows :

" Near this structure, the surface of the rock about ninety feet in extent, and thirty in height, is covered with figures in bas relief. A gigantic figure of the god Khrishna is the most conspicuous ; with his favourite Arjoon, in the Hindoo attitude of prayer ; but so devoid of flesh, as to present more the appearance of a skeleton than of a living person ; below is a venerable figure said to be the father of Arjoon ; both figures proving the sculptor possessed no inconsiderable skill."

It does not appear whether Mr. Goldingham had any authority for this interpretation, beyond that of the attendant Brahmins, who are always ready to affix the names of some Hindoo god or hero to every ancient sculpture : but I could not perceive in the standing

figure, the usual attributes of Khrishna; neither can I recal any tale or legend, that represents Arjoon and his father Pandu as suppliants to that divinity, in a state of starvation.

When I visited the caves of Ellora in 1841, Lieut. Howarth, then engaged in making drawings of the bas-reliefs, informed me that the group was generally considered to pourtray a miser, holding a bag of money, while his wife and son, reduced to skeletons, are vainly supplicating for food; but on minute inspection, I was not satisfied with this interpretation, and find my notes on the subject as follows.

What is assumed to be a purse tied round the waist of the miser, has not the appearance of a sack containing money; but might rather represent a girdle, drawn tight round the body to ease the sensation of hunger, as is the custom with most semi-civilised nations: neither can it be a bag of coins that he holds in his hand, because the thick part is above the hand, and terminates in a point at top; but it *might* be an instrument for cutting the rock, which he is holding out to the half-starved figures at his feet. The little fat cherub may as well be supposed to be bringing him a bag of treasure, as to be taking it away; and then the entire group may be imagined to pourtray the cause and mode of construction of these caves, as a work undertaken by some prince or wealthy chief, during a time of famine, to relieve the wants of his starving people. Admitting this supposition, we shall have no difficulty in accounting for a continuation of the bas-relief which appears appended, not only to this group, but also to a similar one in less perfect preservation in another cave: and we shall recognize Ganesh, at the head of a row of females, each carrying a child in her arms, as exhibiting the eventual results of the judicious disbursement.

This interpretation is merely a conjecture; but it seems to derive great support from the existence of the same group on the rocks of Mahábálipuram. We can hardly imagine sculptors at such very different parts of India, happening to invent precisely the same story: though it might easily occur that both had to relate to posterity the same events. It is no very great stretch of credulity, to suppose that in both places, the works were undertaken by some prince, to employ his famishing subjects during a time of great scarcity; and to furnish them with food without supporting them

in slothful idleness. This is exactly what was done by Sir Charles Metcalfe, in our Upper Provinces during the famine of 1837-8, and it does not seem impossible that similar events might suggest similar remedies, to beneficent and intelligent minds, even at an interval of many centuries. Nor are we without some indications that such actually *has* been the case: for Mr. Taylor, quoting from the Mackenzie papers, says:

"It is said that in the Kali Yuga, Singhama Nada, a Zemindar of the Vellugotivara race, ruled at Mallapoor (Mavellipuram); in that time, during a famine, many artificers resorted hither, and wrought on the mountain a variety of works during three years."

This theory will explain how in both cases, (Ellora and Mahábálipuram,) a number of works were commenced simultaneously, in order to employ at once a large number of workmen: and how they came to be left unfinished; the people naturally returning to their ordinary occupations, when the pressure of famine was removed.

I must not omit to mention another tradition, which attributes the construction of these works to a body of Northern artificers, who fled from the tyranny of their own or some conquering prince, and were suddenly recalled to their homes, by proffered favours and concessions on his part; nor the conjecture of Mr. James Fergusson, who, discrediting this story, accepts Singhama Nayadu as the prince to whom the excavations are due; and tracing him to his death in battle, while besieging the fort of Jalli Palli in the thirteenth century, conceives this event to be a more probable cause of the sudden interruption of the works, "as they were not part of the religion of the people, nor was it likely that his successor would continue the follies of his parent." Either of these suppositions would certainly account for the non-completion of the works at Mahábálipoor: but we should then have to seek out some analogous cause for the same circumstance at Ellora: and the remarkable repetition of the significant group of sculpture would remain totally unexplained.

There are a variety of other sculptures both of beasts and human beings; and often presenting a mixture of both. The most conspicuous is the king snake, with the head and body of a man, terminating in extensive serpentine convolutions, often winding round other groups. They are nearly all on the eastern face of the rock: and

mostly close to the principal caves, which are in the northern half of the range. In the same vicinity is a somewhat remarkable monolith; a mass of living rock left isolated, and artificially fashioned outside, as well as inside. It appears to be above twenty-five feet in height, the same in length and about half in breadth. It has a long roof curved like a Gothic pointed arch, and gabled at each end.

The walls are of great thickness, so that the interior cell is small: it contains a lingam, and among the sculptures on its walls, appears the figure of Ganesh in small dimensions. Its door faces the West: and close to it the Brahmins are quarrying the rock, to repair and beautify the interior of the brick pagoda; the only one in which the ceremonials of worship are performed, at the present day.

At the extreme south of the ridge, and separated from it by a small level space, along which runs the lower road from Madras to Cuddalore, stand a group of monoliths, seven in number, surrounded by a grove of cocoanut trees.* Five of them are pagodas; of which the most southern (measured by Mr. Goldingham forty feet in height) resembles in general outline a Mussulman mausoleum. Another twenty-five feet in height, and perhaps fifty in length, has a long Gothic roof as previously described, and is ornamented on the outside: the other three are more like modern pagodas. The two remaining rocks are fashioned to imitate an elephant and a lion, in colossal proportions. All these monoliths, though close to the sea beach, and perfectly exposed, are comparatively fresh in their outline, and exhibit very little signs of corrosion. They are composed of this same binary granite, and I think we may thence conclude their comparative antiquity not to be very great.

There still remain two† temples, differing from the former in being *built*, instead of hewn in the solid rock. The first, already alluded to, stands near the village on the level ground not far from the principal caves, and is of brick, plastered and coloured in the modern style. It is of considerable size, and is still used for purposes of worship, and for the accommodation of Hindu travellers. The brahmins enjoy some revenues attached to the building, and are busily engaged ornamenting and improving it: all which circum-

* Or else—palmyras: my recollection on this point is indistinct.

† I have been told of a third farther north, but did not see it.

stances,* combined with its perfectly recent form and appearance, are conclusive in my mind against any claims to great antiquity that may be advanced on its behalf.

The last remaining is that which has attracted most attention from travellers: it is built of large masses of hewn granite, on one of the granite rocks already mentioned, as protruding at intervals along the sea shore. It is nearly opposite the highest part of the ridge, and has apparently been built *en rapport* with some part of the excavated hill, from which it is a mile distant in an easterly direction. Its dimensions are small: speaking from memory, I should say, under thirty feet square: but its curiously ornamented conical roof rises to an elevation of nearly fifty feet: It is surrounded on three sides, by a granite screen of ten or twelve feet high, and about five feet distant from the body of the temple: on the fourth side (the WEST,) stands a miniature of the temple, opening towards the WEST, and bearing every appearance of having originally been its principal† entrance. The walls and roof of a connecting passage still exist, but all access by this route is now barred, by a slab of black basaltic rock, fixed in the eastern wall of the portico, opposite its entrance. A similar, rather larger slab occupies a corresponding place on the inner surface of the western wall of‡ the temple; and on both are images of Siva, Parvatee and their child. I was unable to discover whether the space intervening between these two slabs is vacant, or has been filled up with masonry: but it is my very strong impression, that they and their immediately surrounding blocks of stone are long subsequent in date to the rest of the building, and have been inserted in order to mark the ancient entry. As matters at present stand, it is impossible to assign any reason for the existence of a blind chamber, or

* It will generally be found that religious edifices, still possessing endowments, belong to the later phases of Hinduism: the more ancient having been lost, in the *various political and religious contests.*

† As is constantly seen at present to the EAST of Hindu temples.

‡ The centre is occupied by a large lingum which, from its dark colour, I conclude to be of this basaltic rock, which must have been brought from a considerable distance. The chaityas terminating the roofs of both temples and prophyllum are the same. Every other part is granite.

other mass of building, between two temples of Siva placed *dos á dos:* and there are only two suppositions that will account for the erection of these two buildings, of obviously the same date, with a covered passage of connection. Either the smaller was a sanctuary, to be entered only from the larger; as appears to have been the case in some of the Arian temples still extant in Cashmere: or else it must have been a portico, through which admission was obtained to the larger or real temple. The first hypothesis is contradicted by the existence of the western entry to the smaller edifice, which is certainly contemporaneous with its construction: and also by the fact that the stone screen, that so carefully encircles the larger building, *ceases* on arriving opposite the smaller. We are therefore thrown back upon the second;* which is supported not only by these circumstances, but also by the extreme simplicity of the present door to the larger temple; a mere plain opening in the wall. I may also mention that while the smaller building (and through it, were the passage still open, the larger one only) is approached from the west with ease and on a level; the only access to the simple opening in the eastern screen now serving as an entry is over a low, but steep and rugged rock washed by the breakers below. This rock has certainly the appearance, both here and elsewhere, of having been partly cut into rude steps, and partly perforated as if to receive some superstructure that has since disappeared. One solitary column still raises its head above the waves, and is commonly considered to have been a Stambha, to support lamps: it should however be remarked that there is no vestige of any mode of ascent, to place them; neither of niches wherein they might be placed. The top is formed into a kind of peg, as if to receive some capping stone, and I have myself little doubt, that it is the sole relic of some terrace or arcade, once extending in this direction: I also traced out faintly, the platforms of two collateral buildings; one on each side of that now standing: and among the débris of the southernmost, I discovered several images of the kneeling bull generally placed opposite a lingum, so corroded as to be only recognizable on careful

* The idea of the original entrance having been from the West, will appear less strange, if it be remembered, that the entrance and portico of the Kylas at Ellora actually are from that quarter.

examination. A similar image, in a better state of preservation, is to be seen within the granite screen, on one side of the portico; and on the other, in a closet or small chamber of comparatively recent construction, is a large recumbent statue of Vishnoo, with the ordinary Ses-naga below and above him.

On the shore close by, are several rudely sculptured rocks: one representing a monster with human arms and the head of an ox or buffalo, commonly called the Yam rájá. They have suffered greatly from the action of the sea air, as has also every part of the adjacent temple, except its chaityas of basalt. In this respect, there is a great difference between its appearance and that of the caves, or even of the group of monoliths placed in a situation no less exposed: and after close examination of all surrounding circumstances, I am unable to resist the conclusion, that this temple is by many degrees the most ancient of the remains at Mahábálipoor: in fact that it is one of the most ancient in India. I am aware that Mr. James Fergusson considers, "that its age does not differ materially from the rest;" and it is with the greatest diffidence that I venture to express an opinion differing from that entertained by so competent an authority: but Mr. Fergusson was specially engaged in the examination of the rock-cut temples; remarking the similarities and the differences existing between them and similar works in other parts of India; so that probably he had little leisure for this structure; to which I, on the contrary, devoted much attention. Besides, if I remember right, he decided these caves to be more modern than those of Ellora: at the same time he considered the celebrated Kylas of that place to have been copied from some earlier edifice of Southern India: and looking to the very great general similarity of style, I am certainly inclined to refer this shore temple of Mahábálipoor, to the *age* of those earlier structures, although the precise model of the Kylas may not be found here, but at Shellumbrum or Tanjore. This would give a considerable difference of date; and the supposition is borne out by the assurances of the Brahmins who attended Mr. Goldingham, that their ancient books "contained no account of any of the structures here described, except *the stone pagoda near the sea*, and the pagodas of brick near the village." The obvious error of the last statement certainly detracts from the value

to be assigned to the former; but it should not be forgotten, that these brick pagodas were in their own possession, and in present use; so that they had a motive for assigning to *them* a fabulous degree of antiquity: while they had no such inducement for making an untrue distinction between the caves and the other remains, all equally abandoned and valueless to themselves.

But whatever the age either actual or relative of the various temples of Mahábálipoor, it seems certain, that at some distant period, the place was one of no small importance. The ground immediately inland from the shore temple has obviously been built over, to a considerable extent. The extremely well cemented foundations of ancient walls are now dug out, as required for building materials, by the inhabitants of the neighbouring village; or for the improvement of the brick pagoda. I examined a large mass of concrete, with bricks on the lower surface, and found it extremely solid, and in excellent preservation. It consisted of sharp broken fragments of the granite of the place, mixed with unburned shells: the excellent mortar in which they were embedded being probably these same sea shells burned. The bricks were of the large size usual in all old Hindu structures: but not uniform in their shape. Those I measured varied from eleven to thirteen inches in length, from seven to seven and half in breadth and were pretty regularly two inches* thick; so well laid in the finest mortar, that five of them *in situ* barely measured eleven inches. Most of the houses in the village are built of these old bricks; but the ruins are so completely covered with a deposit of soil, and drift sand, that numerous excavations would be necessary, to afford even the vaguest idea of their extent. It is

* I append a memorandum of the dimensions of old bricks I have collected within the limits of the Mahabharut, and an average of a much larger number of specimens from the neighbourhood, gives 15¼ by 8¾ by 2½.

Paneeput fort,	15 inch long	9 inch wide	2½ thick,	
Burnawa ditto,	17 ,,	9 ,,	2½ ,,	
Hustinapoor do.	14 ,,	9 ,,	2½ ,,	
Average,	15⅓ ,,	9 ,,	2½ ,,	

It will be observed that here again the most variable dimension is the length: and the average of these north country bricks will be found to be exactly of the same *proportions* as the average of those at Mahabalipoor, the length 15¼ and breadth 9, being pretty nearly to the length 12 and breadth 7¾ inches as the thickness 2½ is to the thickness 2.

however certain, that there must have been a wealthy, and therefore in all probability a numerous, population, where dwelling-houses were built of burned bricks, cemented with lime mortar; and where masons were sufficiently acquainted with the mysteries of their art, to use foundations of concrete, formed of the most durable materials, and on the most approved principles. It must be remembered that in classical days, the extremity of the peninsula was the entrepôt of commerce, between the east and the west. Gibbon says, "Every year about the summer solstice, a fleet of a hundred and twenty vessels sailed from Myas Hormas, a port of Egypt on the Red Sea. The coast of Malabar or the island of Ceylon was the usual term of their navigation, and it was in those markets, that the merchants from the more remote parts of Asia expected their arrival. This fleet traversed the ocean in about forty days, by the periodical assistance of the monsoons." Whence we gather that the European fleets proceeded to India, with the commencement of the S. W. monsoon; and remained there until the beginning of the N. Easterly; which is consonant with all we know of the habits of the seamen of antiquity. But, at that time of year, the ports of the Malabar coast would have been extremely unsafe; besides that no large city is known to have flourished at that epoch, any where near Ceylon, with access from that quarter. It is therefore far more probable, that the laden ships, favoured by the strong southerly current along the shore, passed *by* the Malabar coast, and *by* the island of Ceylon, to find harbour on the Coromandel coast, and await the change that would take them on their return voyage. I have the authority of a commander of approved skill, and well acquainted with these seas, for saying that there are no physical features to prohibit the idea, that Mavellipoor may have been one of these ports. He answers my enquiries: "There are no reefs off the Seven Pagodas; and the only danger in the vicinity, is a small reef nearly abreast of the collector's house at Tripalore, hence called the Tripalore reef, upon which one of the Company's vessels was wrecked some fifty years ago: but so near shore (half mile) as not to create any alarm at the present day," when its situation is perfectly ascertained. He adds, that even now ships passing along this coast generally make Sadras hills, to get into a good position for reaching more northern parts:

and that "there is no reason why the anchorage at the Seven Pagodas should not be as safe as Madras roads." Nor are there wanting indications of the place having formerly possessed far better anchorage than either Madras or Pondicherry could ever boast. Behind and south of the sculptured ridge for some distance inland, runs a salt-marsh, bearing every appearance of having once formed part of the estuary, which debouches about half-way between Sadras and the shore Pagoda. The soil is not at all like once firm ground, overflowed by the ocean, but rather the light pulpy character of silt, deposited by contending currents and streams in some nook, where their forces neutralised one another: an operation well known to be proceeding down to the present day in every quarter of the globe. A corresponding action, minor in degree because only due to rain and atmosphere, has most certainly taken place on the other side of the sculptured ridge: as is shown by the five or six feet of alluvial soil under which the ruins of the city are now buried: and we can with equal confidence assert, that foreigners were in the habit of visiting the place, as among the coins found in the vicinity, have been some of Rome, of China and other distant lands. No very great increase of depth in the estuary would (I *believe*, but I could not obtain accurate soundings) be necessary to admit vessels of the burthen then usual, and to afford them shelter equal to any on the coast. We have, therefore, I think, good reason to conclude, that in the olden days of which so few records have reached us, when the Chinese, the Phœnicians and the men of Tarsis united, as in the present day, the extreme east and west in bonds of amity by the mutual interchange of commodities, Mavellipoor or Mahábalipuram was a place of considerable commercial resort; and perhaps one of the chief ports of Southern India: very probably the Malearpha of Ptolemy. I am far from considering it equally certain that this was the capital city of the mythological hero Bali. We all know the tendency of the Brahmins to appropriate to their own sect every relic of antiquity they found in the countries over which they extended their influence: and beyond their own assertions, I do not know that we have the least evidence to the fact. "The name still surviving" will seem, to many, a strong argument: only it will not prove a sound one. The name of Mahábalipuram, "the city of the

great Bali," is only known at the present day to the Brahmins, and to Europeans who derived all their information either directly or indirectly from the Brahmins: and as there is no reason to believe that Sanscrit or Hindee was at any epoch the vernacular of that part of the country, we can hardly suppose that such a purely Sanscrit name ever was in common use thereabouts. Had the current name among the people been one that might possibly be considered a Tamul version of this significant epithet, we might certainly give some weight to the fact of such a name lingering about these remarkable antiquities: but on the contrary the common names of Mallapoor or Mavellipooram are* said to have no such meaning; and the similarity of sound would rather favour the idea that the Brahmins finding these remains with a name firmly annexed, adapted both to their own purposes; by fixing upon that one of their fabulous heroes, to whose title the foreign word could most easily be converted. Their own books do not afford much support to their present claims. The Mahábhárata describes the city as being

गङ्गायाः दक्षिणे भागे योजनानां शतद्वयं
पञ्चयोजनमात्रेण पूर्वाब्धेश्चैव पश्चिमे ।

"South of the Ganges 200 Yojanas, 5 Yojanas westward from the eastern sea." It must be admitted that we do not know the exact equivalent of the Indian Yojana:† but it has generally been considered between nine and twelve miles, either of which would carry us far south of Ceylon! If therefore this quotation refers to any city on the present continent of India we must greatly reduce the length of the Yojana: say to five or even four miles which would about bring us to the latitude of Mavellipuram. But we must suppose that the proportion of two hundred to five was somewhat near the truth: and this would oblige us to look for Bali's capital not on the seashore but twenty miles inland, where to the best of my information no vestige of a city remains. If we assume the Yojana five miles

* I cannot speak positively nor of my own knowledge, not being sufficient of a Tamul scholar.

† A Pundit in this neighbourhood (Rohilcund) called it "four kos:" which would be from five to six English miles; as the local kos is seldom as much as one-half miles: and from a note to Chap. 22, of Fa Hian's pilgrimage it would seem that farther south the Yojana was only four miles.

instead of four, we shall certainly be able to satisfy both conditions pretty well in Combacorum, the Benares of the south, or in the ancient capital of the Pandyan kingdom, but either explanation is equally fatal to the claims of Mavellipuram.

It is true that it has been generally believed that the sea had encroached on this shore, and that many pagodas and buildings of this ancient city had been submerged even since the English settlements took place; and it may therefore be said that in all probability the site of this city was actually twenty miles from the sea in the days when the Mahábhárata was written. This idea is founded partly on the mariner's name of the Seven Pagodas, said to indicate the existence (in the early days of English intercourse with India) of seven Pagodas on the shore where now only one remains. But personal inspection at once shows the fallacy of this derivation of the name: the shore temples being far too low to be perceived at the distance that ships usually pass; more especially as they are backed by the cave-hewn ridge; and it is infinitely more probable that Mr. Chambers was correct in referring the appellation to the peculiar appearance presented by the rounded peaks of this ridge itself, especially as temples were vaguely known to exist in that neighbourhood without their situation being very accurately settled. He says, "The rock or rather hill of stone on which great part of these works are executed, is one of the principal marks for mariners as they approach the coast, and to them the place is known by the name of the Seven Pagodas: possibly because the summits of the rocks have presented them with that idea as they passed."

A far stronger evidence, however in the general opinion, was the tradition imparted by the Brahmins, and perhaps other inhabitants, to the earlier European visitors of the place. Mr. Chambers relates: "The natives of the place declared to the writer of this account, that the more aged people among them remembered to have seen the tops of several pagodas far out at sea; which being covered with copper (probably gilt) were particularly visible at sun rise, as their shining surface used *then* to reflect the sun's rays: but that now that effect was no longer produced, as the copper had become encrusted with mould and verdigris." Passing over as a minor objection that "at sun rise" the dark sides of the pagoda tops would

alone be visible from the shore, and that they would be best seen when illuminated by the *setting sun*, I would enquire, how is it possible that these slender ornaments should shine "far out" in the surf of the Coromandel coast, where not years or months, but a few hours of the stiff gales, with which it is so constantly visited, would be all-sufficient, not only to destroy the lustre of gilt copper, but to dislodge every stone between high and low water mark? It cannot be supposed that any sudden convulsion lowered the whole coast, so that all at once the waves should roll within a few feet of the top, instead of below the foundations of the Pagodas: for such a convulsion must infallibly have shaken them to pieces, as well as levelled the existing temple, whose still uninjured pinnacles clearly disprove the hypothesis: therefore the subsidence, if ever it took place, must have been extremely gradual, like those of the Swedish and parts of the Italian coast: and recollecting the numerous years, (not to say centuries) that would be required to sink the forty or fifty feet which may reasonably be assumed to have been the height of the vanished structures, I only ask, is it credible that the waves should have spared them until only their tops (still bright and glittering notwithstanding the dashing spray!!!) remained above the surface.

I am sorry to be obliged thus to demolish the beautiful romance of the "Wave-covered metropolis of Bali;" but it is not the first of the aerial castles of Indian tradition, that has faded before the fuller light of modern European investigation. Like Bishop Heber, I find it difficult to understand how this particular spot should have sunk so much, if (as other writers aver) the rest of the Coromandel coast, both north and south, has rather risen within historical times. I have already mentioned the local features leading me to conclude, that this immediate vicinity has not suffered any encroachment from the ocean, but has rather gained from, and increased in elevation above it by, alluvial deposits from the higher* lands: and if a Brah-

* The brick foundations I have mentioned as being five or six feet *below* the present surface of the land, are very considerably more than that amount *above* high-water mark. I have not noticed Capt. Newbolt's argument in favour of the submersion of the city: viz. that Chinese and other coins are often washed ashore in storms; because the fact is equally explicable, by the supposition that this was a port frequented by foreign ships, of which some must necessarily, in the course of years, have been wrecked and sunk in the vicinity.

min legend is required, there happens to exist one in the Mackenzie papers (v. Mr. Taylor's 3rd report, section 9, page 65,) that comes as near to my view of the formation of the salt-marsh, as these tales generally do to the natural truths they often dimly chronicle.

"In early times one Mallesudu ruled here prosperously, but having refused charity to a Brahmin, he was changed into an alligator. A Rishi named Pundarica, going to pluck a lotus flower in the tank where the alligator lay, was seized by it, but had power to drag it out. The king thus obtained release and went to Swerga. The Rishi wished to present the lotus flower to Vishnoo, but the sea barred his way, and would not retreat; so he sat down to bale the sea out! While thus occupied, an ancient Brahmin came and asked for boiled rice, offering to do the Rishi's work, while the latter should go and cook it. By taking up a single handful of water the sea retreated a whole coss, and when the Rishi returned he found the Brahmin reposing in the manner in which statues of Vishnoo are sometimes represented. He now recognised the god, and a fane was built by him over the spot." If this tale have any real foundation, it probably indicates, that after a period of abandonment this site was re-occupied, and great increase of land discovered to have taken place, about the time when the worship of Vishnoo was introduced into the southern peninsula; which being a date tolerably ascertained, may possibly guide some future visitor in fixing the age of the various structures; especially if assisted by some translation of the inscriptions which were unfortunately quite unintelligible to me.

It will be observed that I have made the freest use of the accounts of other travellers: partly, in order to present in a general view the remarks now scattered in half a dozen volumes, and partly in order to support by the authority of others, the conclusions drawn in my own confessedly hasty visit. Had I only been as well acquainted at that time as I am now, with the writings of my predecessors, I should have investigated far more closely several points that I now perceive with regret I almost overlooked. The shore temple alone can be said, to have been thoroughly examined: and I suppose it must have been deemed less worthy of notice by former travellers: else I do

not understand how it could escape* remark that the original entry of the building, must have been through the portico which is in rear at present. I trust what I have said may draw the attention of men better versed in Indian antiquities to the subject of the direction in which the entrance is placed in Hindu temples: as it may possibly prove characteristic of some particular sect or epoch. At the present day, all temples in these Upper Provinces (and as far as my observation goes, in the other Presidencies also) are turned towards the east: and a Brahmin at Huridwar gave me as a reason, the rising of the sun in that quarter. I remember† to have seen one exception (besides the Kylas at Ellora already mentioned;) which is on the grand trunk-road on the banks of the Burachur near Taldanga. In a group of four temples, not differing essentially in style or architecture, and all apparently quite modern, one is turned to the west, while all the others are to the east, I could not discover that they belonged to different divinities, but there was no person near from whom I could positively ascertain that such was not the case.

Another point that strikes me as deserving attention, more particularly from Engineers and persons engaged on public works, is the very great durability of the basaltic rock as compared with the granite of the Coromandel coast. We have no reason to believe that the umbrella-shaped summits of the temples, which for want of a better term I have called *chaityas*, are otherwise than contemporaneous with the rest of the temple; and they are of course equally exposed to the spray and saline atmosphere: yet they appear perfectly fresh and uninjured, while the granite has lost the whole of its outer surface by gradual disintegration and exfoliation.

I append two sketch plans to elucidate the above descriptions of locality: but they have no pretensions to strict accuracy, being done entirely from memory, months after I visited the place.

* I have not been able to procure the papers of Mr. Babington or of Mr. Walter Elliot on the subject: but of the four or five I have perused no one *touches this point.*

† And I *think* that among the Aryan temples of Cashmere, is said to be a group of four facing to all four cardinal points.

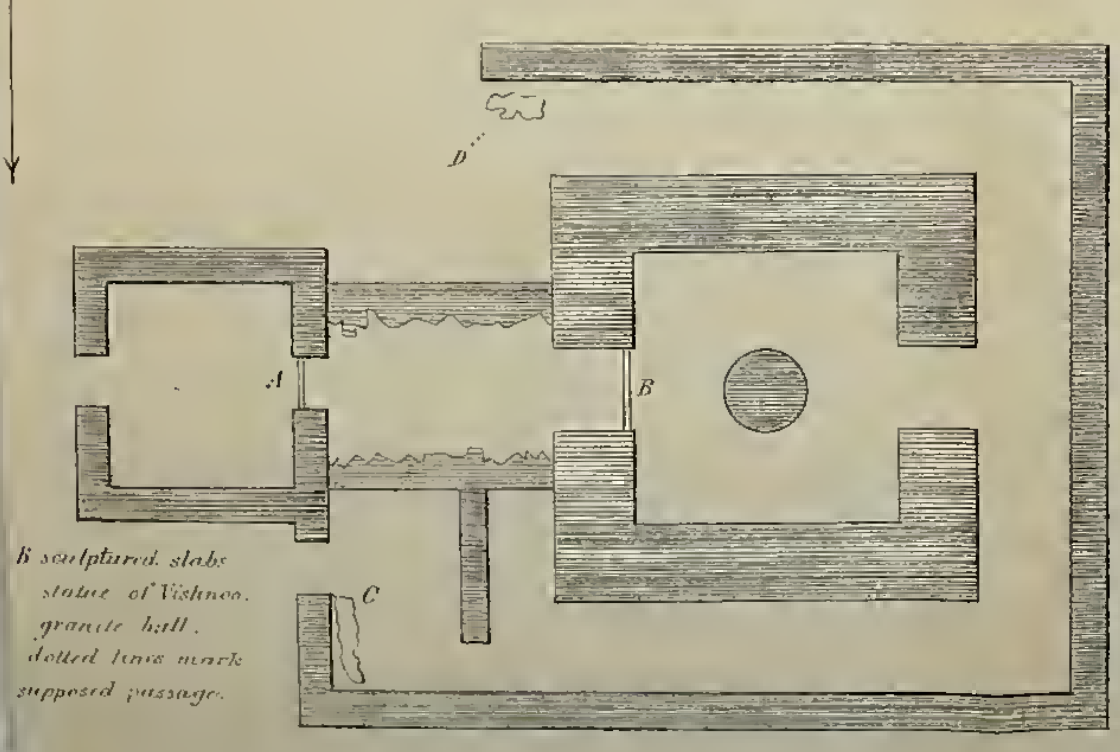
Sketch Plan

of the country around

MAVELLIPOOR.

Sketch Plan of the Temple

on the Shore.



Pillar

ASIATIC LITH. PRESS T. BLACH, MADRAS H.

MAHÁ VALI PURAM SHORE TEMPLE.

Note on an ancient Inscription from Thâneswar. *By* Bábu Rájendralál Mittra, *Librarian, Asiatic Society.*

Subjoined is the legend of a Sanscrita inscription lately found in the Thâneswar district. Mr. Bowring, to whom the Society is indebted for facsimiles of this interesting record, states "that it is engraved on a tablet of red sandstone in the temple of a follower of the Goraknâth persuasion, in the town of Pehewá, which is about fifteen miles west of Thâneswar." Regarding the circumstance under which it was discovered, Mr. B. adds, "I was marching from Patiala towards Thâneswar, and halted at Pehewá which is on the banks of the Saraswati river, and is a place of pilgrimage of some note, having been formerly known under the name of Prithudak. It is included in the limit of the sacred territory, known as the forty coss, that is, the distance between certain places, or the four points of the compass, within which the skirmishes of the Pándavas were carried on. The inscription was copied after my departure by the Thánádár of Pehewá, and is, as you will observe, reversed. I am not sure whether it will prove to be legible, as a part of the inscription is effaced. It is possible, however, that there may be interesting matter in it."

The document is divided into two portions, the first of which is in verse and comprises twenty-one lines, and the second is in prose and includes eight lines. They are both very imperfect, being full of lacunæ, and several letters from the beginning and end of every line effaced; the inscription, however, is of importance as throwing some light on an interesting but little known period of Indian history.

The researches of Wilford, Colebrooke and Tod have proved that three different sovereigns of central India have assumed the title of Bhoja Rájá. The first of these, according to Tod apud Prinsep, flourished about the end of the 5th century (483 A. C.) the other two in the middle of the 7th and the 10th centuries (665 and 1035 A. C.) respectively. These dates however, excepting the last, have not been proved by any authentic testimony, and the history of the three princes has been very much confounded by Orientalists. Prinsep makes the first Bhoja the nephew of Munja, while the astronomical and astrological works quoted by Colebrooke concur in

styling the latter as the uncle and predecessor of the third Bhoja, a statement fully borne out by the Jain MSS. of Col. Tod and the authorities cited by Wilford and Bentley. Colebrooke places the celebrated "nine jewels" of Vicramáditya in the court of the third Bhoja, while Prinsep, following Bentley, would have Kalidása flourish in the 5th century as a contemporary of the first king of that name.

If this imperfect inscription has been correctly read, these discrepancies are completely set at rest. It shows that the first Bhoja lived about three and a half centuries before the time assigned him by the learned historian of the Rajputs, and entirely overthrows the deductions of Bentley, regarding the age of Brahma Gupta, Vararuchi, and of some of the leading astronomical works of the Hindus, as far as they are based upon the era of the renowned sovereign of Dhára. The Bhoja of Prinsep and that of the inscription are both descended from Mahendrapála, but the former is the fourth, and the latter the tenth (if not more—for the last six lines being defaced it is impossible to be positive) in descent from that sovereign; the intervening names too are different; they stand thus:—

Prinsep (Tables p. 106.)	Inscription.
A. C.	
402. Mahendrapála.	Mahendrapála.
409. Karmchandra.	Jatula.
410. Vijyananda.	———— ?
470. Munja.	Vajrata.
483. Bhoja.	Yajnika.
	Sogga.
	Purna.
	Devarája.
	Rámachandra.
	Bhoja. S. 179—A. C. 122.

Of Prithudaka, the pool, near which the inscription was engraved, nothing seems to be known, and the temple which bears its name and on which the inscription is recorded, although according to Mr. Bowring a place of pilgrimage, is not reckoned as such in the Puráṇas. But Kurukshetra itself, the battle-field of the Pándus, on which the empire of India has been more than once contested and lost, is a perfect *terra incognita* to the antiquarian, and would

prove a rich field to the tourist who with the *Mahábhárata* or the *Kurukshetra Mahatmya* by his side, could devote a fortnight to the wastes between Delhi and the Sutledge.

Inscription.

—शेषेषु सर्वात्मना, ध्वस्ते ध्वान्तरिपौ जने विघटिते खस्थे च तारागणे, भग्ने भूबलये गतेषु च तथा रत्नाकरेष्वेकतामङ्के यस्खपिति प्र—(१)—तदखिलं शार्ङ्गिणः कान्तमूर्त्तेः कान्तासङ्गस्फुरितसुभगस्निग्धता-राभिरामाः। उद्यत्तीव्रस्मरजलनिधौ मज्जतः स्त्रीमुखेन्दुस्फारज्योत्स्नां-शव * *—(२)—बलाति दत्तं क्रियादुदयमस्तसमस्ततापम्। अध्या-सितं मुनिगणैरुदितात्मबोधप्रध्वस्तगाढतिमिरप्रकटप्रमोदैः * *—(३)—वातबद्धैः प्रलयजलधरैस्सम्यतत्सान्द्रधारः। नानाव्याधिप्रवरप्रचुर-तरतमःपङ्कविध्वंसभानुर्नीरक्तैस्तत्समन्ताद्यनुदुरित—(४)—मद्या नि-न्दातः परबलनान्तसं समन्तात्। स श्रीमाञ्जयति महेन्द्रपालदेवः शा-न्तारिः शशधरसुन्दरः शरण्यः॥ * सीत्ता * * * *—(५)—वृत्तशै-लाशनिः। नाम्ना जातुल इत्यपूर्व्वचरितः ख्यातो दयालङ्कृतिस्तत्त्वा-लोकिविलोकितः क्षितिपतिव्यापारलब्धोदयः। ये तज्जातिकुलं क—(६)—सकले कृत्वोपहारं भुवः। कीर्त्या यस्य च नाकराजनिकरव्या-सङ्गतः सङ्गमाद्योम्नश्च स्फुरदिन्दुसुन्दरतया खस्मिंश्च लीलायितम्। प्रतिविश्व—(७)—स्फारमारोपितानि। जगति वितनभासा येन दूरं विभान्ति खयश इव निरोढुं शङ्खवो दिङ्मुखाताः॥ तत्सन्तानमहोदधेः प्रमुदितप्रोद्यद्भुज * *—(८)—दः। प्रख्यातादजनि खवंशतिलकः श्रीवज्रटाख्यः प्रभुः प्राप्ताशेषमनोरथप्रशुभतरव्यापारतुङ्गोन्नतिः॥ तस्य स्फुरदिन्दुरुचिः सौरेरिव जय—(९)—व गिरिशस्य॥ तस्मात्तस्यां यज्ञकः प्रादुरासोदुचैश्शान्तस्तत्सु निर्मत्सरेषु। क्रीडत्क्रेतुर्दुर्द्धरारातिचक्रे क्रुद्यत्सेनाकुञ्जरध्वान्तशोभे॥ तस्य—(१०)—रोद्धरणोरुकीर्त्तेः। सदृत्तरक्तवनितातिलकाङ्कलक्ष्मे कान्ते बभूवतुरुदारशशाङ्ककान्ते॥ एका चन्द्रेति विख्याता द्वितीया शङ्कटेति च। * *—(११)—जति सोमनामधेयो वीराणां धुरि विनिवेशितो विधात्रा। भूनाथो द्विषदि-

भकुम्भभेदनिर्यन्मुक्ताभिः खचितमही * * * तासिः॥ प्रतरति—(१२)—लसैनिकाम्भोरुहम्। अधर्म्मपरिपन्थिनं तदनु पूर्णराजं सुतं खर्व-प्रगगनोदरे तुहिन * * चिन्तां * *। कुरुत नखरिताधरप—(१३)—लैर्यदरिस्त्रियस्सरलितप्रचुरालककज्जलकाः॥ तस्य भ्राता गुणनिधिरभूत्प्रोदरो देवराजः स्फूर्ज्जत्तेजःप्रविहतपरस्कारसेनान्धकारः। * (१४)—क्षायस्तरुरिव ततस्तत्कालानन्यमूर्त्तिः॥ नामापि प्रकटतरं निगृह्य यस्य क्रुद्धस्य भ्रुकुटितरङ्गिताननस्य। दृप्तानां युधि विकसद्दिगाद भासा—(१५)—भीरुहंसरसमयितां यस्य तान्नितान्तमगमत्तृणत्वमुप * * मा * *। व्यापूर्णं त्ववसम्भ्र*त्पतिभटतद्दन्तिनां घटाविघटनोन्मुखी—(१६)—रम्याब्भमेण प्राप्तश्रीकास्तुभतरधियस्साधुरक्षास्त्रयोपि। विप्रैस्तोधात्यतुलमहसं मारयामासुरुच्चस्तात्तीर्त्वाभवजलनिधे * * *—(१७)—पुरतो देवराजेन धनानुतमगच्छिदे*चतुस्समुद्रसीमाङ्कं यावदेतन्महीतले। इदमया ततं तावद्विभातुसदनं श्रियः। * *—(१८)—नः। काम्बोजजः प्रभुमनद्रमलद्दि*र्यो रामस्य सूनुरिह कारयिताय * * *॥ यत् क्षपोपक्षतामेको द्वितीयो गेज्यमानिव। पाटलाख्यस्ततो * *—(१९)—सारं दृष्टोचैः कर्त्तव्या सद्बुद्धिः॥ स्वकुलगगन————कार प्रसक्तः——खल्विदञ्च विदित्वा भट्टरामलक्ष्मीधरेण कृतमधुरधु * * * * * * *—(२०)—बभूव तन्त्रधारोत्र दुर्लभादित्यसंज्ञितः।————लादित्येनधीमता————

परमभट्टारकमहाराजाधिराजपरमेश्वरश्रीरामचन्द्रदेवपादानुध्यातपरमभट्टारकमहाराजाधिराजपरमेश्वरश्रीभोजदेवपादानामभिप्रवर्द्धमानक(१)ल्याणविजयराजधर्म्मपरमवृद्धये महाषष्ट्यधिकवैशाखमासशुक्लपक्षसप्तम्यां संवत् २७९ वैशाखशुदि ७ अस्यां संवत्सरदिवसमासपूर्व्वा(२)यां तिथावित्र श्रीएथूदकाधिपा येपि स्वाधीनवर्त्तस्यां घोटकयाचायां समायातनटधार्म्मिकजहट्टवीरकसुत चन्द्र तथा राज्य बल तथा वल्लकपाण्डुकसुत सत्यसिंह उद्यति (३) कृत्यभट्टकमतमाज्ञाय विलासवरेण सह तथा धिक्कारिमल्ल रणपरिवर्द्धक तल्लक

सुत जयनाकविल्वसुत आदित्यनाकरत्नकरवरेण सह तथा रङ्क-
कर्णक (४) सुत रामकबलदेवप्रवीरश्च तत्सुत श्वेतमृगाङ्क शरीरकर्षक-
सुत वर्णकवचङ्कर्षकसुत शुकमणीज्यसुत उपभारसार ऊडिकत्यसार-
सुत लाभट (५) तथा शङ्करवल्लकसुत उद्धवादित्य श्रीगुरुदत्तक्षत्यवल्ल-
कसुत रत्नक जयवर्द्धकसुत रतिवर्द्ध * * * * क सूरसुत भ्रमदुःख-
घाटकीय धारट्टसुत चन्द्रपङ्क शौनकसुत सर्व्व (६) देव धर्म्मसुत कप-
वल्लक पूर्व्वकरुठवीर्य्या * * * लक्षिकसुत स्वामिशर्कासंहकसुत———
———श्रीधरसुत पौगुड्र दत्तकसुत दत्त———————क*ल्लकसुत
————(७) व*त्य उसूभसुत रत्नप*सुत सुसुभवि*सुत भयचै-
तन्यधरहर————हरकसुत श्रीश्रीकृष्णभक्तसुताय प्रयच्छति यथा
भवद्भिः

Translation.

Line 1. * * * * May he who sleepeth in the embrace of [Sesha], when even the soul of the enemy of darkness ceaseth to be, when the career of mankind knoweth no change, when the stars vanish and the horizon of the earth is destroyed, when the [different] oceans [which surround the globe] all merge into one [may he vouchsafe prosperity to thee.]

Line 2. * * * * It is the most beneficent aspect of the god of the horny-bow. Delighted in the company of his beloved, pleasing as the sweet soothing stars, merged in the ocean of ardent love * * * radiant beams from the moonlike face of women * * * *

Line 3. * * * * May he grant such vigour as knoweth no failing! Seated in the heart of sages, whose knowledge of themselves has dispelled deep darkness from their mind, who are ever contented * * * *

Line 4. * * * * The cloud at the time of the destruction of the earth pouring without intermission. Abounding in many a dire disease; like a sun for the destruction of the soft clay * * * *

Line 5. * * * * Envied another's might. May he prosper, the illustrious Mahendrapála Deva, the victorious over his enemies, the beautiful as the moon, the asylum of all * * *

Line 6. * * * * By name Játula, of excellent character, renowned and adorned with (the modest ornament of) mercy, radiant with the light of true knowledge, and glorious in kingly career * * * *

Line 7. * * * * The glory of his deeds made his very body brilliant as the sky, bright with the radiant moon * * * *

Line 8. * * * His columns of victory in the different quarters of the earth were planted by him, as if to prevent his fame spreading wide * * * *

Line 9. * * * * The noblest of his race Lord Sri Bajrata, who had obtained all he wished, whose greatness was extreme in all auspicious actions, whose beauty was bright as the radiant moon, was born of that celebrated * * * *

Line 10. * * * * Of her was born Yajnika, the gentlest among the unenvious; his banner moves triumphant among the mighty legions of his enemies, dismal with numberless elephants * * * *

Line 11. * * * * [He] the renowned in battle had two wives, both great as if they were the crowning jewels of all well-behaved women, and beautiful as the full moon. Of them, one was called Chandrá, and the other Sankatá * * * *

Line 12. * * * * His name was Sogga; the creator of the world had placed him foremost among heroes, he was the Lord of the earth. Through the vigour of his scymetar pearls from the forehead of the elephants of his enemies had adorned this earth * * * *

Line 13. * * * * Afterwards he got a son named Purṇa rájá who was an enemy to vice and * * * *

Line 14. * * * * * * * * * * His brother Deva rája by name was the receptacle of all [noble] qualities. His vigour dispelled the clouds of his enemies * * * *

Line 15. * * * Of form like a verdant tree bent down by the weight of the delicious fruit [of goodness]. The mere mention of his majestic name overcast with a frown * * * *

[Lines 16 to 21 undecipherable.]

For the promotion of the prosperity, success and the good government of the most venerable, the king of kings, Lord Srí Bhoja Deva, successor of the most venerable, the king of kings, the deceased Sri Ráma Chandra Deva, the proprietors of Sri Prithudaka, on

the 7th day of the white half of the moon, in the month of Vaisákha of the Samvat era 179, by the advice of those who had, as independent men, assembled here at the horse festival, [such as] Chandra son of Natadhármika son of Hatta Vira, Rájyabala, Ballaka, Satya Siñha son of Pánduka, and Uddyati Kritya Bhattaka, to Vilásavara, Dhikkári Malla son of the valiant Takshaka, the noble Adityanáka Ratnákara son of Jaya Náka Bilva, also Rámaka son of Rahuka Karanaka, Baladeva, and his son Právira, Sweta Mrigánka, Varana Kavachankarsaka son of Sarirakarsaka, Sukamanijya and his son Upabhárasára, and son of Lábhata Sava Hurikatyasára, and also Uddhavádityа son of Sunkara Ballaka, Rakshaka son of Sri Gurudaksha Kritya Ballaka, son of Ratibardhaka, Yaya Bardhaka, Bhramadukshaghátakiya ——— son of Sura Chandrapanka, Sarva Deva, Dharatta son of Saunaka, Kafabalhaka Dharmya's son, (after several other undecipherable names) and Sri Krishna son of Bhacta, presented * * * * *

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL,

FOR NOVEMBER, 1853.

The Society met on the 2nd instant at the usual hour.

SIR JAMES COLVILE, Kt., President, in the Chair.

The proceedings of the last month were read and confirmed, and the accounts and vouchers for the month of September laid on the table.

Presentations were received—

1st. From the Bengal Government, through W. G. Young, Esq., Under-Secretary, for the Museum of Economic Geology. Specimens of Rocks collected by Lieut. Furlong of the 1st Madras Native Infantry, at Kaizawalajong, during a march with a detachment on the route between Padong and the Tongoop pass.

2nd. From J. A. Cockburn, Esq., Superintendent of the Barrackpore Park. A dead *Janghil Bird. Tantalus leucocephalus*, GM.

3rd. From J. Avdall, Esq., a new Dictionary in Italian, French, Armenian and Turkish.

4th. From R. Houstoun, Esq., a Mug MS. of medicine entitled Maha-thanada-yea.

Rájá Is'riprasád of Benares was named for ballot at the next meeting; proposed by Mr. Hall and seconded by the President.

The Council submitted a report, recommending that a grant of Co.'s Rs. 1000 (one half that amount from the Oriental Fund) be sanctioned for the purpose of four more glazed book-cases; two for the preservation of the Sanskrita MSS. transferred to the Society from the College of Fort William, and the other two for the Society's Library.

Ordered that the grant asked for by the Council, be placed at their disposal for the purpose in question.

Communications were received—

1st. From Major A. Cunningham, forwarding a plate of Kangra coins, and promising to send a descriptive account of the coins so soon as the plate shall have been engraved.

The following is an extract from Major C.'s letter.

"I have made out this plate after examining all Bayley's coins, which have given me about five specimens in addition to those which I had before; I have also collated all the genealogies, and I am happy to say that their general agreement with one another and, more particularly, with numerous synchronous Princes in other states, is very satisfactory. The data for establishing the Chronology are sound and good, and as they extend over a considerable period, we have the means of fixing the approximate dates of the earlier Kings.

"The earliest ascertained date is A. D. 804, and the average length of reign from that time to the present is 1,326 years."

2nd. From Rev. N. Brown of Sibsagur, Assam, enclosing a list of Assamese works published at the American Mission Press at Sibsagur.

3rd. From A. Campbell, Esq., Darjeeling, enclosing an abstract of the Register of rain-fall kept by Dr. Withecombe at Darjeeling, from 1st January to the 1st October, 1853.

"The maximum fall for a whole year," says Mr. C. "was 135 inches in 1850, and the minimum 114 inches in 1852. I believe after a residence of many years that 125 inches may be taken as the average annual fall at Darjeeling.

"I am not able to supply any detail of the annual rain-fall at Cheera Punjee, but from Lieut. Yule's observation (see Journal Asiatic Society) and from Dr. Hooker's letter to me from that place in 1850, I believe that the annual fall of rain there varies from 360 to 500 inches per annum."

4th. From Capt. Thuillier, communicating a paper entitled "Notes upon some atmospherical phenomena observed at Darjeeling, in the Himalayah Mountains, during the summer of 1852," by Capt. W. S. Sherwill.

The Librarian and the Curator in the Zoological Department having submitted their usual monthly reports the meeting adjourned.

Read and confirmed, 7th Dec. 1853.

(Signed) J. W. Colvile.

Library.

The following additions have been made to the Library since the last meeting.

Presented.

Archæologia: or Miscellaneous Tracts relating to antiquity. Vol. XXXV.—By the Society of Antiquaries of London.

Catalogue of the Kerrich Collection of Roman Coins 1852.—By the same.

Proceedings of the Society of Antiquaries of London. Nos. 33 to 36.—By the same.

Bombay Magnetical and Meteorological Observations for 1850.—By the Government of Bombay.

A Map of the District of Purneah surveyed by J. Fitzpatrick and J. J. Pemberton.—By the Government of Bengal.

Revenue Meteorological Statements of the North West Provinces for the several official years from 1844-45 to 49-50. Agra 1850, 4to.—By the Government of the North Western Provinces.

Report of the Inspector General of Prisons for 1852.—By the same.

The Satyarnab, No. 1, of Vol. IV.—By the Rev. J. Long.

The Oriental Baptist, No. 82.—By the Editor.

The Calcutta Christian Observer, for October 1853.—By the Editors.

The Upadeshak, No. 82.—By the Editor.

The Oriental Christian Spectator for August 1853.—By the Editors.

A Plan for the future Government of India. By J. S. Buckingham, Esq. Pamphlet.—By the Author.

On the Cyclone Wave in the Sunderbunds. A letter to the Most Noble the Governor-General of India, by H. Piddington, Esq. Calcutta, 1853. Pamphlet.—By the Author.

The Citizen for September, 1853.—By the Editor.

Journal of the Indian Archipelago. Nos. for February and March.—By the Editor.

Exchanged.

The Calcutta Review. No. 41.

Purchased.

Shore on Indian Affairs, 2 vols. 8vo.

Gleig's Memoirs of Warren Hastings, 3 vols. 8vo.

Malcolm's Life of Clive, 3 vols. 8vo.

Sutherland's Dattakamimánsá.

Masson's Journey to Khelat, 1 vol. 8vo.

Siely's Wonders of Ellora, 1 vol. 8vo.

Scott's History of Dekkan, 2 vols. 4to.

Pogson's History of the Boondelas, 4to.

Burnes's Visit to Scinde, 12mo.

Wynch's Dáya Krama Saṅgraha, 4to.

Ra'jendrala'l Mittra.

FOR DECEMBER, 1853.

At a meeting of the Society held in the Society's Rooms, Park Street, on the 7th instant, at the usual hour,

Sir JAMES COLVILE, Kt. President, in the chair.

The minutes of the last month were read and confirmed, and the accounts and vouchers for the month of October laid on the table.

Presentations were received—

1st. From Mons. Stanislas Julian, the first volume of his Life and Travels of Hiuean Thsang.

2nd. From J. J. Gray, Esq. a MS. copy of the Ryas-us Saláteen, a History of Bengal in Persian, by Gholam Hossein.

3rd. From the Government of Bengal, for the Museum of Economic Geology, through W. G. Young, Esq. Under-Secretary, a map of the district of Tirhoot.

4th. From F. L. Beaufort, Esq. an image of Vishnu found in the bed of a Nallá in the Pubnah district.

5th. From Mons. E. Mulsant, Secretary to the Societè Royale des Agriculture, &c. de Lyon. Memoirs of the Academy for 1851.

6th. From Shah Kabeer Uddeen. The following Persian works:

Dele Sard,

Nálá Dard.

7th. From Captain Hayes. A collection of ancient coins from Lucknow.

8th. From H. Piddington, Esq. Clay Figures of Káluráya and Dakhinráya, forest gods of the Hindus, found on Saugor Island.

9th. From J. Ritchie, Esq. of Bombay, through Mr. Piddington, a lithographed copy of the Map of Bengal and the Sunderbund, published in De Barros's History.

Rájá Isriprasád of Benares, duly proposed and seconded at the last meeting, was balloted for and elected an ordinary member.

The following gentlemen were named for ballot at the next February meeting.

Bábu Nagendranáth Tagore,—proposed by Sir James Colvile, and seconded by Dr. Sprenger.

G. H. Freeling, Esq.—proposed by Mr. E. Thomas, and seconded by Mr. Grote.

The Council gave notice that at the next anniversary meeting of the Society, they will propose that Section 6 of the Code of Bye-Laws be modified by omitting the words "is anxious to promote the progress of science and literature, and."

Dr. Falconer gave notice of his intention to propose that rule 6 be altered into the form originally proposed in the Draft Code.

Mr. Piddington sent, for exhibition at the meeting, a copy of the Admiralty Chart of the N. W. Passage, just published.

Communications were received—

1st. From W. G. Young, Esq. Under-Secretary to the Government of Bengal, stating that the Most Noble the Governor of Bengal would be glad to have any opinion or suggestion which the Society may desire to offer relative to the best way of preserving any of the ruins at Gour from further destruction.

Copy of the reply which the Council proposed to dispatch, was read and approved of.

2nd. From the same, enclosing a paper, by Capt. J. C. Haughton, on the Geological Structure and mineral resources of the country comprised within the Singbhoom division of the South-West Frontier Agency, together with a map to illustrate the same.

3rd. From Bábu Rádhánáth Sickdár, Meteorological Register kept at the Surveyor General's Office, Calcutta, for the month of October.

4th. From the Secretary, Geological Society of London, acknowledging receipt of the Journal, Nos. 230-31.

5th. From J. Barlow, Esq. Secretary, Royal Institution, London, acknowledging receipt of the Journal, Nos. 233-34.

The Librarian having submitted his usual monthly report, the meeting adjourned.

Read and confirmed, 4th January, 1854.

(Signed) J. W. Colvile.

Library.

The following additions have been made to the Library since the November meeting.

Presented.

Literaturgeschichte der Araber. Von ihrem Beginne bis zu Ende des zwölften Jahrhunderts der Hidschret. von Hammer-Purgstall. Vierter Band.—By the Author.

Memoires de la Société Royale d'Agriculture, Histoire Naturelle et Arts Utiles de Lyon, 1825-1836, 5 volumes.—By the Society.

Compte Rendu des Travaux de la Société Royale d'Agriculture, Histoire Naturelle et Arts Utiles de Lyon, pour l'années 1813-15-17-19-21 et 24, 6 volumes.—By the same.

Annales des Sciences Physiques et Naturelles d'Agriculture et d'Industrie, publiée par la Société nationale d'Agriculture, etc., de Lyon. Tome III.—By the same.

Memoires de l'Academie Nationale des Sciences Belles-lettres et Arts de Lyon. Classe des Sciences, Tome 1er.—By the Academy.

Ditto ditto, Classe des lettres, Tome 1er.—By the same.

Collection Orientale. Burnouf's Bhágavat, vol. III.—By the Imperial Government of France.

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Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June, 1853.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Date.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer.			Mean Dry Bulb Thermometer.	Range of the Temperature.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.645	29.707	29.574	0.133	87.5	96.3	77.7	18.6
2	.600	.651	.534	.117	85.6	97.0	79.7	17.3
3	.517	.586	.436	.150	84.5	92.0	76.7	15.3
4	.457	.524	.381	.143	87.8	95.9	77.8	18.1
5	*Sunday.*							
6	.468	.545	.413	.132	86.2	94.0	79.4	14.6
7	.504	.552	.457	.095	84.0	88.0	69.0	19.0
8	.529	.597	.440	.157	84.4	93.5	75.1	18.4
9	.495	.538	.429	.109	87.0	92.0	74.9	17.1
10	.454	.536	.391	.145	89.1	93.8	81.6	12.2
11	.534	.607	.463	.144	89.0	94.1	81.7	12.4
12	*Sunday.*							
13	.637	.688	.568	.120	88.2	94.9	80.3	14.6
14	.641	.710	.562	.148	89.7	98.8	80.5	18.3
15	.682	.732	.621	.111	87.6	93.6	80.8	12.8
16	.682	.757	.596	.161	88.8	95.2	80.0	15.2
17	.601	.684	.511	.173	89.0	97.0	79.2	17.8
18	.505	.571	.425	.146	86.2	91.0	79.5	11.5
19	*Sunday.*							
20	.459	.525	.399	.126	81.8	86.3	74.9	11.4
21	.483	.528	.420	.108	82.7	87.3	78.0	9.3
22	.494	.541	.440	.101	85.6	91.5	76.8	14.7
23	.522	.579	.469	.110	86.6	92.4	79.0	13.4
24	.494	.541	.424	.117	87.1	93.0	77.0	16.0
25	.449	.511	.389	.122	85.3	93.6	79.8	13.8
26	*Sunday.*							
27	.505	.574	.438	.136	84.1	88.6	77.1	11.5
28	.481	.533	.411	.122	85.9	91.8	77.4	14.4
29	.464	.501	.413	.088	83.6	86.7	78.0	8.7
30	.480	.517	.411	.106	84.7	91.6	77.0	14.6

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June, 1853—*(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	7.7	77.0	10.5	0.909	9.67	3.82	0.717
2	80.5	5.1	78.7	6.9	0.960	10.26	2.50	.804
3	81.0	3.5	79.8	4.7	0.995	10.64	1.71	.862
4	82.3	5.5	80.5	7.3	1.016	10.83	2 77	.796
5	*Sunday.*							
6	82.1	4.1	80.7	5.5	1.023	10.91	2.08	.840
7	81.2	2.8	80.2	3.8	1.009	10.79	1.38	.887
8	80.5	3.9	79.1	5.3	0.973	10.42	1.89	.846
9	83.2	3.8	82.0	5 0	1.066	11.36	1.93	.855
10	83 7	5.4	82.0	7.1	1.065	11.31	2.81	.801
11	83.4	5.6	81.5	7.5	1.051	11·13	2.95	.790
12	*Sunday.*							
13	81.6	6.6	79.3	8.9	0.979	10.40	3.36	.756
14	82.4	7.3	79.9	9.8	0.998	10 56	3.81	.735
15	82 0	5.6	80.1	7.5	1.004	10.67	2.85	.789
16	81.5	7.3	78.9	9.9	0.968	10.26	3.74	.733
17	81.1	7.9	78.3	10.7	0·948	10 05	4.03	.714
18	80.5	5.7	78.4	7.8	0.953	10.15	2.84	.781
19	*Sunday.*							
20	80.2	1.6	79.6	2.2	0.990	10.65	0.75	.934
21	79.8	2.9	78.8	3.9	0.963	10.36	1.36	.884
22	81.4	4 2	80.0	5.6	1.000	10.68	2.08	·837
23	81.2	5.4	79.3	7.3	0.980	10.44	2.70	.795
24	81.1	6.0	79.0	8.1	0.970	10.33	3.00	.775
25	81.8	3.5	80.6	4.7	1.021	10.90	1.74	.862
26	*Sunday.*							
27	81.1	3.0	80.1	4.0	1.003	10.75	1.46	.880
28	81.1	4.8	79.4	6.5	0.983	10.47	2.40	.814
29	81.0	2.6	80.1	3.5	1.005	10.75	1.28	.894
30	81.7	3.0	80.7	4.0	1.023	10.95	1.47	.882

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June, 1853—(Continued.)

Date.	Max. Solar radiation.	Rain.	Prevailing direction of the Wind.	General aspect of the Sky.
	o	Inc.		
1	112.8	..	Calm or S. E.	Cloudless till 2 A. M. \i or \ i till 7 A. M scattered ∩ i till 8 P. M. nearly cloudless afterwards.
2	117.5	0.55	S. E.	Cloudless till 4 A. M. \i or \— i till 7 A. M. scattered ∩ i with little rain till 7 P. M. cloudless afterwards.
3	116.0	0.15	E. or S. E. [or S. E	Cloudless till 4 A. M. ∩ i or cloudy with thunder and rain till 7 P. M cloudless afterwards. [scattered ∩ i afterwards.
4	124.0	..	S. or E. or N. N. E	Cloudless till 5 A. M. cloudy till 8 A. M.
5	*Sunday.*			
6	118.7	..	S. or S. E. or calm.	Cloudless till 3 A. M. cloudy with rain and thunder afterwards.
7	.....	0.18	S. or S. E. or N. E.	Overcast with occasional drizzling.
8	98.0	..	S. E. [or N. [ly the whole day.	Cloudy or overcast with occasional rain and thunder. [scattered ∩i.
9	103.0	0.75	S. blowing high near-	Overcast with little rain and lightning or
10	109.0	..	S. E. or S. blowing high the whole day.	Overcast or scattered clouds.
11	105.0	..	S. or S. E. ditto.	Overcast or cloudy.
12	*Sunday.*			
13	115.5	..	S. or S. E.	Overcast with slight drizzlihg, or cloudy or scattered ∩ i.
14	120.0	..	S. E. or S.	Cloudy or scattered \i or ∩ i. [wards.
15	113.0	..	Calm or S.S.E. or N.	Scattered ∩i or \i till 11 A.M. cloudy after-
16	121.5	..	S. E. or E.	Cloudy or scattered \i or \—i. Little driz-
17	123.0	..	Calm or E. or S. E.	Cloudy or scattered ∩i. [zling at 11 A.M.
18	109.0	..	E.	Overcast or scattered ∩i till 7 P. M. \i afterwards.
19	*Sunday.*	1.32		
20	....	3.12	S. E.	Cloudy, raining, or drizzling constantly.
21	....	0.48	S. or S. S. W. [ly the whole day.	Cloudy the whole day, and drizzling till 2 A M. [between 4 and 5 A. M.
22	103 8	0.14	S. blowing high near-	Cloudy the whole day and a shower of rain
23	114.3	0.08	Ditto.	All kinds of clouds. [afterwards.
24	111.8	..	S or S. W.	Cloudy or \— i or \ i till 8 P. M. cloudless
25	108.0	0.72	S. E.	Cloudy with occasional drizzling, or scattered ∩ i or \— i.
26	*Sunday.*			
27	104 0	0.46	S. E.	Scattered \i or \—i till 5 A. M. scattered ∩i or cloudy with occasional rain afterwards.
28	109.0	0.16	Ditto.	Cloudy. [occasional drizzling afterwards.
29	99.6	..	S. or E. or S. E.	Scattered \i or \—i till 8 A. M. cloudy with
30	109.4	0.16	Calm or E. or S. or S. E.	Overcast till 4 P. M. scattered \— i or \ i or cloudy afterwards since rain at 2 P. M.

\ i ..... Cirri.
∩ i ..... Cumuli.
— i ..... Strati.
\ i ..... Cirro-cumuli.
\— i ..... Cirro-strati.
∩ i ..... Cumulo-strati.
\— i ..... Nímbí.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of July, 1853.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Date.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer.			Mean Dry Bulb Thermometer.	Range of the Temperature.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.468	29.508	29.398	0.110	84.5	89.9	77.4	12.5
2	.467	.536	.425	.111	83.6	89.2	76.4	12.8
3	*Sunday.*							
4	.523	.576	.444	.132	84.8	89.5	77.0	12.5
5	.496	.537	.426	.111	85.7	91.2	77.8	13.4
6	.500	.540	.441	.099	85.2	91.8	78.0	13.8
7	.510	.554	.463	.091	82.8	91.7	77.5	14.2
8	.487	.542	.426	.116	84.5	89.2	78.2	11.0
9	.429	.482	.358	.124	83.7	87.6	75.5	12.1
10	*Sunday.*							
11	.304	.345	.236	.109	83.9	89.4	75.0	14.4
12	.318	.412	.258	.154	82,8	86.9	77.0	9.9
13	.425	.493	.383	.110	80.7	84.0	76.1	7.9
14	.452	.510	.395	.115	83.6	91.2	75.9	15.3
15	.407	.473	.335	.138	83.5	91.0	73.2	17.8
16	.376	.463	.327	.136	82.4	86.7	..	..
17	*Sunday.*							
18	.513	.555	.448	.107	84.2	89.8	75.0	14.8
19	.459	.528	.371	.157	84.4	91.0	76.0	15.0
20	.411	.456	.359	.097	85.7	91.5	78.3	13.2
21	.416	.460	.360	.100	85.5	90.1	79.2	10.9
22	.411	.491	.343	.148	84.5	89.8	78.0	11.8
23	.531	.604	.468	.136	84.9	90.0	77.7	12.3
24	*Sunday.*							
25	.495	.536	.434	.102	86.6	90.6	80.2	10.4
26	.557	.639	.474	.165	82.3	85.5	79.0	6.5
27	.575	.624	.517	.107	83.6	88.9	75.7	13.2
28	.557	.615	.483	.132	85.6	91.2	78.6	12.6
29	.575	.640	.521	.119	85.2	90.5	77.8	12.7
30	.562	.606	.513	.093	82.6	85.0	77.7	7.3
31	*Sunday.*							

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of July, 1853—*(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	81.1	3.4	79.9	4.6	0.999	10.67	1.68	0.864
2	80.9	2.7	80.0	3.6	1.000	10.72	1.31	.891
3	*Sunday.*							
4	81.6	3.2	80.5	4.3	1.017	10.89	1.57	.874
5	81.5	4.2	80.1	5.6	1.003	10.71	2.09	.837
6	81.8	3.4	80.6	4.6	1.022	10.90	1.71	.864
7	81.0	1.8	80.4	2.4	1.014	10.90	0.85	.928
8	81.4	3.1	80.3	4.2	1.012	10.82	1.53	.876
9	81.0	2.7	80.1	3.6	1.004	10.75	1.32	.891
10	*Sunday.*							
11	81.0	2.9	80.0	3.9	1.002	10.72	1.41	.884
12	80.0	2.8	79.0	3.8	0.970	10.42	1.33	.887
13	79.4	1.3	79.0	1.7	0.969	10.46	0.58	.947
14	80.1	3.5	78.9	4.7	0.966	10.37	1.66	.862
15	79.8	3.7	78.5	5.0	0.954	10.25	1.75	.854
16	80.3	2.1	79.6	2.8	0.988	10.63	0.98	.916
17	*Sunday.*							
18	79.6	4.6	77.9	6.3	0.938	10.04	2.20	.820
19	80.5	3.9	79.1	5.3	0.973	10.42	1.89	.846
20	81.9	3.8	80.6	5.1	1.021	10.90	1.90	.852
21	81.8	3.7	80.6	4.9	1.019	10.90	1.82	.857
22	81.5	3.0	80.5	4.0	1.017	10.89	1.46	.882
23	81.6	3.3	80.5	4.4	1.016	10.89	1.60	.872
24	*Sunday.*							
25	82.6	4.0	81.3	5.3	1.042	11.13	2.01	.847
26	80.3	2.0	79.6	2.7	0.989	10.63	0.95	.918
27	80.4	3.2	79.3	4.3	0.978	10.51	1.52	.874
28	81.5	4.1	80.1	5.5	1.004	10.71	2.05	.839
29	81.0	4.2	79.5	5.7	0.987	10.53	2.08	.835
30	79.6	3.0	78.5	4.1	0.955	10.27	1.41	.879
31	*Sunday.*							

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of July, 1853—(Continued.)

Date.	Max. Solar radiation.	Rain.	Prevailing direction of the Wind.	General aspect of the Sky.
	o	Inc.		
1	104.0	..	S. E. or E. S. E.	Cloudy with occasional drizzling. Cloudless from 9 P. M. to 11 P. M.
2	102.2	0.75	S. E. or S.	Cloudless till 1 A. M. Cloudy and occasionally raining.
3	*Sunday.*			
4	106.0	0.52	S. or S. E.	Cloudy with occasional drizzling. Cloudless from 8 P. M. to 11 P. M.
5	115.0	..	Ditto.	Cloudy with little thundering and drizzling at 1 P. M.
6	112.0	..	N. E. or S. E.	Nearly cloudy the whole day.
7	....	0.88	S.	Overcast or cloudy and constantly drizzling.
8	....	..	Ditto.	Overcast or cloudy.
9	....	0.44	S. or calm.	Overcast with constant drizzling before sunrise.
10	*Sunday.*	2.92		
11	....	0.24	Calm or N. E.	Overcast with occasional drizzling.
12	....	0.19	S. E.	Cloudy and also raining between 12 & 2 P. M.
13	....	1.34	N. E.	Cloudy and constantly drizzling.
14	....	..	S. E. or S. W.	Scattered \ i or _ i or ∩ i till 6 P. M. overcast with rain and drizzling afterwards.
15	....	1.09	Calm or N. N. E. or N.	Cloudy and raining between 5 & 6 P. M.
16	....	0.46	E.	Cloudy with occasional drizzling also overcast and raining at 5 & 10 A. M.
17	*Sunday.*			
18	....	0.36	E. or S.	Cloudy.
19	....	0.08	E. or S. S. E.	Cloudy with occasional drizzling.
20	....	..	E. or N. E. or S. E.	Cloudy or scattered \ i or \ i or ∩ i.
21	....	..	E. or N. E.	Scattered \ i till 5 A. M. Cloudy afterwards, also drizzling at 1 P. M.
22	....	..	N. N. E. or N. E.	Cloudy and also rain between 8 & 10 P. M.
23	....	0.42	S. S. E. or S.	Cloudy and constantly raining.
24	*Sunday.*			
25	....	..	S. or S. W. or S. E.	Scattered _ i till 7 A. M. Cloudy afterwards.
26	....	1.47	S. E. or S. W.	Cloudy and constantly raining or drizzling.
27	....	1.49	S. E. or S. W. or N. W. or calm.	Scattered _ i or cloudy with occasional drizzling before sunrise also rain at 2 P. M.
28	....	..	Calm or S. W. or S.	Cloudy and also drizzling at midnight and 3 P. M. and raining at 11 P. M.
29	....	..	Calm or S. W.	Cloudy and drizzling at 4 & 8 P. M.
30	....	0.11	S. W. or S.	Scattered \ i or _ i or ∩ i till 5 A. M. Cloudy with occasional drizzling afterwards.
31	*Sunday.*			

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August, 1853.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Date.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer.			Mean Dry Bulb Thermometer.	Range of the Temperature.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.571	29.618	29.514	0.104	83.5	88.7	75.9	12.8
2	.591	.644	.528	.116	83.4	92.1	75.9	16.2
3	.611	.659	.557	.102	86.3	92.7	75.8	16.9
4	.611	.663	.559	.104	85.4	92.0	78.2	13.8
5	.610	.660	.546	.114	83.8	90.0	78.0	12.0
6	.574	.626	.514	.112	83.5	87.8	74.5	13.3
7	*Sunday.*							
8	.583	.640	.527	.113	81.5	83.1	77.3	5.8
9	.616	.668	.561	.107	82.9	90.0	75.9	14.1
10	.645	.698	.597	.101	83.8	90.0	77.0	13.0
11	.706	.779	.659	.120	81.7	83.6	76.9	6.7
12	.763	.817	.703	.114	83.2	88.0	75.5	12.5
13	.720	.793	.647	.146	85.1	90.5	76.9	13.6
14	*Sunday.*							
15	.632	.682	.558	.124	80.5	86.0	74.0	12.0
16	.659	.734	.608	.126	81.8	86.0	75.5	10.5
17	.740	.791	.692	.099	81.3	85.3	75.0	10.3
18	.761	.839	.683	.156	83.5	89.5	73.3	16.2
19	.669	.741	.574	.167	85.5	92.2	77.5	14.7
20	.578	.641	.506	.135	84.9	90.7	79.0	11.7
21	*Sunday.*							
22	.570	.611	.510	.101	83.5	90.0	76.7	13.3
23	.586	.650	.541	.109	82.4	88.5	76.4	12.1
24	.642	.697	.595	.102	84.4	90.4	76.3	14.1
25	.659	.710	.599	.111	83.3	87.0	77.9	9.1
26	.605	.653	.540	.113	83.0	87.0	77.2	9.8
27	.575	.632	.514	.118	80.6	82.8	75.0	7.8
28	*Sunday.*							
29	.613	.669	.559	.110	83.9	89.7	75.2	14.5
30	.623	.693	.541	.152	84.4	89.5	77.0	12.5
31	.620	.673	.547	.126	84.7	89.2	77.2	12.0

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August, 1853—*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	79.9	3.6	78.6	4.9	0.958	10.28	1.72	0.857
2	80.1	3.3	78.9	4.5	0.968	10.37	1.59	.867
3	81.5	4.8	79.8	6.5	0.996	10.60	2.42	.814
4	81.4	4.0	80.0	5.4	1.002	10.70	1.98	.844
5	80.7	3.1	79.6	4.2	0.989	10.60	1.50	.876
6	80.7	2.8	79.7	3.8	0.993	10.63	1.37	.886
7	*Sunday.*							
8	79.2	2.3	78.3	3.2	0.950	10.22	1.09	.904
9	80.2	2.7	79.3	3.6	0.978	10.51	1.28	.891
10	80.6	3.2	79.5	4.3	0.985	10.57	1.53	.874
11	79.4	2.3	78.6	3.1	0.957	10.32	1.05	.908
12	80.5	2.7	79.5	3.7	0.987	10.57	1.32	.889
13	81.1	4.0	79.7	5.4	0.992	10.61	1.96	.844
14	*Sunday.*							
15	78.4	2.1	77.6	2.9	0.928	10.01	0.97	.912
16	79.5	2.3	78.7	3.1	0.960	10.35	1.05	.908
17	79.4	1.9	78.7	2.6	0.962	10.35	0.89	.921
18	80.3	3.2	79.2	4.3	0.975	10.48	1.52	.873
19	81.7	3.8	80.4	5.1	1.014	10.83	1.89	.851
20	81.8	3.1	80.7	4.2	1.025	10.95	1.54	.877
21	*Sunday.*							
22	80.3	3.2	79.2	4.3	0.975	10.48	1.52	.873
23	80.3	2.1	79.5	2.9	0.987	10.60	1.01	.913
24	80.8	3.6	79.5	4.9	0.987	10.55	1.76	.857
25	81.0	2.3	80.2	3.1	1.008	10.81	1.12	.906
26	80.5	2.5	79.6	3.4	0.989	10.63	1.19	.899
27	79.3	1.3	78.8	1.8	0.964	10.40	0.61	.945
28	*Sunday.*							
29	80.9	3.0	79.8	4.1	0.996	10.66	1.47	.879
30	80.8	3.6	79.5	4.9	0.987	10.55	1.76	.857
31	80.9	3.8	79.5	5.2	0.987	10.55	1.87	.849

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August, 1853—*(Continued.)*

Date.	Max. Solar radiation.	Rain.	Prevailing direction of the Wind.	General aspect of the Sky.
	o	Inc.		
1	....	..	S. E. or S. W. or W. or calm.	Cloudy.
2	....	..	Calm or N. E. or W. S. W. or S. or N.	Overcast with rain. [or ∩ i till 7 P. M. Cloudless afterwards.
3	....	0.30	Calm or W. or S.	Cloudy till 8 A. M. Scattered _ i or \ i
4	....	..	N. or W.	Cloudless till 2 A. M. Cloudy or scattered ∩ i afterwards also raining at 7 P. M.
5	....	..	Calm or S. W.	Cloudy and also drizzling from 4 P. M. to 6 P. M. [4 A. M.
6	....	0.75	Calm or S. or S. E.	Cloudy and also drizzling or raining till
7	*Sunday.*			[till whole day.
8	....	0.46	S. E. or calm or N. W.	Cloudy or overcast also raining or drizzling
9	....	0.23	Calm or S. W. or W. or S. E.	Cloudy and also drizzling till 6 A. M. [zling occasionally.
10	....	0.68	S. E.	Cloudy or scattered _ i or ∩ i also driz-
11	....	0.29	S. E. or S.	Cloudy and constantly drizzling, also smart shower of rain between 8 & 9 A. M. and 8 & 9 P. M.
12	....	0.25	S.	Cloudy and occasionally drizzling.
13	....	..	Calm or S.	Cloudless till 7 A. M. Scattered ∩ i or _ i
14	*Sunday.*	5.50		afterwards. [zling.
15	....	..	S. or S. E. or N. W.	Overcast or cloudy with constantly driz-
16	....	0.41	S. or calm. [high at 1 P. M.	Overcast or cloudy with constantly drizzling, also a shower of rain from 6 to 8 A. M.
17	....	0.23	S. or S. E. blowing	Overcast or cloudy with constant drizzling.
18	....	0.34	S. E. or S.	Scattered _ i or ∩ i or cloudy with constant
19	....	..	S.	Scattered \ i or \ i or ∩ i. [drizzling.
20	110.0	..	S. or S. W.	Scattered _ i till 3 P. M. Cloudy with drizzling afterwards and a shower of rain
21	*Sunday.*	0.35		between 4 & 5 P. M. [7½ P. M.
22	95.5	0.60	S. E.	Cloudy and also raining at 10 A. M. and
23	109.0	0.75	S. E. or E.	Scattered \ i or _ i or \ i till noon, cloudy and raining and thundering afterwards.
24	106.2	0.32	E. or S. E.	Scattered \ i or \ i.
25	105.0	..	S. or E. or S. S. E.	Scattered \ i or _ i or \ i till 10 A. M. Cloudy with occasional drizzling afterwards, a shower of rain between 9 & 10 A. M.
26	....	..	S. E.	Cloudy and drizzling occasionally.
27	....	1.75	S. E. or Calm.	Cloudy and constantly drizzling.
28	*Sunday.*			
29	102.5	0.14	S. E. or E.	Cloudless till 4 A. M. overcast or scattered ∩ i till 7 P. M. Cloudless afterwards, also little rain at 3 P. M.
30	104.0	..	E. or S. E.	Scattered _ i or \ i or ∩ i or cloudy till 7 A. M. Cloudless afterwards. Also little rain at 1 & 4 P. M.
31	105.2	0.09	Ditto.	Cloudless till 2 A. M. Cloudy with little thunder, till 7 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 September, 1853.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Date.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer.			Mean Dry Bulb Thermometer.	Range of the Temperature.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.645	29.714	29.567	0.147	84.6	89.0	77.9	11.1
2	29.610	.667	.530	.137	84.3	91.0	77.3	13.7
3	29.608	.661	.555	.106	83.8	87.5	77.6	9.9
4	*Sunday.*							
5	29.660	.720	.596	.124	84.6	88.5	78.4	10.1
6	29.596	.645	.533	.112	84.5	88.0	79.4	8.6
7	29.574	.632	.511	.121	84.8	88.4	79.5	8.9
8	29.585	.649	.523	.126	80.0	82.0	75.8	6.2
9	29.636	.694	.570	.124	81.0	84.6	75.6	9.0
10	29.614	.672	.535	.137	83.8	89.4	75.0	14.4
11	*Sunday.*							
12	29.606	.666	.544	.122	84.3	89.2	77.0	12.2
13	29.637	.698	.588	.110	85.8	92.0	77.5	14.5
14	29.695	.748	.646	.102	86.1	91.7	77.9	13.8
15	29.721	.783	.654	.129	86.6	92 0	83 0	9.0
16	29.721	.789	.638	.151	86.7	92.6	79.4	13.2
17	29.734	.798	.646	.152	85.1	93.4	..	..
18	*Sunday.*							
19	29.758	.804	.674	.130	82.4	86.3	73.6	12.7
20	29.750	.817	.665	.152	84.5	91.0	76 2	14.8
21	29.718	.788	.642	.146	86.1	92.9	77.5	15.4
22	29.697	.760	.628	.132	87.4	93.5	79.6	13.9
23	29.691	.762	.615	.147	87.1	93.0	79.8	13.2
24	29.671	.726	.606	.120	86.0	91.3	79.9	11.4
25	*Sunday.*							
26	29.605	.668	.534	.134	80.1	86.0	74.9	11.1
27	29.564	.608	.517	.091	78.8	79.9	73.8	6.1
28	29.600	.662	.536	.126	79.8	84.0	74.3	9.7
29	29.661	.730	.610	.120	82.5	88.0	74.0	14.0
30	29.693	.762	.630	.132	84.3	90.0	75.9	14.1

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of September, 1853—*(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	81.1	3.5	79.9	4.7	0.998	10.67	1.72	0.861
2	80.9	3.4	79.7	4.6	0.992	10.61	1.67	.864
3	81.1	2.7	80.2	3.6	1.007	10.79	1.31	.892
4	*Sunday.*							
5	81.9	2.7	81.0	3.6	1.033	11.05	1.34	.892
6	82.1	2.4	81.3	3.2	1.042	11.17	1.18	.904
7	81.8	3.0	80.8	4.0	1.026	10 98	1.48	.881
8	78.5	1.5	77.9	2.1	0.938	10.12	0.69	.936
9	79.1	1.9	78.4	2.6	0.952	10.25	0.89	.920
10	79.8	4.0	78.3	5.5	0.950	10.16	1.94	.840
11	*Sunday.*							
12	80.1	4.2	78.6	5.7	0.958	10.26	2.02	.836
13	80.3	5.5	78.3	7.5	0.949	10.12	2.71	.789
14	81.8	4.3	80.3	5.8	1.012	10.78	2.17	.832
15	82.6	4.0	81.3	5.3	1.042	11.13	2.01	.847
16	82.4	4.3	81.0	5.7	1.032	11.01	2.17	.835
17	80.8	4.3	79.3	5.8	0.979	10.46	2.11	.832
18	*Sunday.*							
19	79.7	2.7	78.7	3.7	0.962	10.33	1.28	.890
20	80.4	4.1	78.9	5.6	0.968	10.34	2.01	.837
21	81.4	4.7	79.8	6.3	0.994	10.62	2.33	.820
22	82.1	5.3	80.2	7.2	1.009	10.73	2.72	.798
23	81.6	5.5	79.7	7.4	0.991	10.57	2.76	.793
24	81.0	5.0	79.3	6.7	0.978	10.44	2.47	.809
25	*Sunday.*							
26	78.5	1.6	77.9	2.2	0.937	10.12	0.72	.934
27	78.0	0.8	77.7	1.1	0.931	10.09	0.35	.966
28	78 2	1.6	77.6	2.2	0.928	10.03	0.72	.933
29	79.2	3.3	78.0	4.5	0.939	10.09	1.55	.867
30	80.2	4.1	78.7	5.6	0.962	10.29	1.99	.838

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of September, 1853—*(Continued.)*

Date.	Max. Solar radiation	Rain.	Prevailing direction of the Wind.	General aspect of the Sky.
	o	Inc.		
1	107.0	..	S. E. or E. or N. E.	Cloudless till 3 A. M. scattered ∩ i and ⌣ i till 9 P. M. Cloudless afterwards.
2	111.0	..	E. or N. E. or S. E.	Cloudless till 2 A. M. scattered \ i or ⌒ i or ∩ i till 2 P. M. cloudy and rainy till 8 P. M. Cloudless afterwards.
3	101.0	0.41	E. or S. E.	Cloudy, raining occasionally till 7. P. M. Cloudless afterwards.
4	*Sunday.*			
5	105.8	0.36	Calm or S.	Cloudy.
6	..	..	Calm or S.	Ditto [6 P. M. and raining at 11 P. M.
7	..	..	S. sharp at 3 A. M.	Overcast or cloudy, also drizzling at 5 and
8	..	1.92	S. or S. W.	Overcast, raining or drizzling, nearly the whole day.
9	..	..	S. or calm.	Overcast and also drizzling till 8 A. M. also a shower of rain between 5 and 6 P. M.
10	98.0	0.47	S. or S. W. or W.	Cloudy.
11	*Sunday.*			
12	..	..	W. or S.	Cloudy.
13	105.0	..	S. or W. or calm.	Cloudy.
14	104.3	..	S. W. or calm.	Cloudy.
15	111.8	..	S. or S. S. W.	Cloudy or scattered ∩ i and ⌣ i.
16	107.0	..	S.	Scattered ⌣ i or \ i or ⌒ i or overcast.
17	108.0	..	S. or S. W.	Overcast or cloudy; also raining or drizzling after 8 P. M.
18	*Sunday.*	0.70		
19	104.4	0.95	Calm or S.	Overcast or cloudy also raining between 2
20	101.0	..	S. or W. or calm.	Cloudy or scattered ∩ i or ⌣ i. [and 3 P. M.
21	117.5	..	S. W. or N. W. or W. or calm.	Cloudless or scattered ∩ i.
22	102.0	..	Calm or N. W.	Cloudless till 3 A. M. afterwards scattered ⌣ i or ∩ i or \ i or cloudy.
23	102.2	..	Calm or N. E. or N. W.	Scattered \ i till 7 A. M. cloudy or scattered ∩ i, afterwards also drizzling at 5 P. M.
24	113.5	..	Calm or S. or N. E. or E. or S. E.	Scattered \ i or ⌣ i or ⌒ i or ∩ i.
25	*Sunday.*			
26	..	1.42	N. E. or E. N. E.	Overcast and drizzling or raining.
27	..	1.85	E.	Overcast and drizzling or raining.
28	..	0.70	E.	Overcast and raining or drizzling.
29	96.0	0.37	E. or S. E. or S.	Cloudy or scattered ∩ i also raining at 1 A. M. afterwards occasionally drizzling.
30	107.4	..	S. E. or E.	Cloudless, or scattered \ i or ⌣ i or ∩ i.

\ i Cirri, ∩ i Cumuli, — i Strati, ⌒ i Cirro cumulo, ⌣ i Cirro strati, ∩ i Cumulo strati, ⌒ i Nimbi.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October, 1853.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Date.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer.			Mean Dry Bulb Thermometer.	Range of the Temperature.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.682	29.751	29.619	0.132	83.8	87.3	77.5	9.8
2	*Sunday.*							
3	.672	.737	.604	.133	84.3	90.0	73.9	16.1
4	.665	.717	.594	.123	83.3	87.5	77.2	10.3
5	.711	.777	.634	.143	78.4	79.8	73.2	6.6
6	.771	.831	.716	.115	80.0	86.5	73.0	13.5
7	.850	.913	.795	.118	79.6	83.0	74.0	9.0
8	.909	.979	.853	.126	82.8	88.1	74.6	13.5
9	*Sunday.*							
10	.872	.934	.816	.118	85.1	90.7	77.4	13.3
11	.857	.916	.805	.111	82.8	88.0	75.0	13.0
12	.851	.923	.800	.123	81.4	87.4	71.9	15.5
13	.849	.915	.788	.127	82.1	88.9	73.6	15.3
14	.873	.942	.829	.113	82.6	88.6	73.3	15.3
15	.901	.977	.855	.122	82.1	88.4	73.4	15.0
16	*Sunday.*							
17	.914	.979	.868	.111	81.3	85.0	73.5	11.5
18	.879	.930	.836	.094	81.2	84.6	76.0	8.6
19	.853	.914	.794	.120	81.7	87.4	73.2	14.2
20	.867	.933	.818	.115	81.6	86.3	73.9	12.4
21	.873	.947	.820	.127	79.2	83.3	70.0	13.3
22	.846	.904	.801	.103	79.2	84.4	72.0	12.4
23	*Sunday.*							
24	.935	30.005	.880	.125	80.1	87.0	70.2	16.8
25	.926	29.998	.863	.135	79.4	85.5	70.0	15.5
26	.940	30.011	.884	.127	79.1	84.8	70.0	14.8
27	30.015	.103	.967	.136	79.8	86.6	70.0	16.6
28	.026	.100	.969	.131	80.4	86.5	71.7	14.8
29	29.999	.082	.936	.146	79.9	86.6	70.0	16.6
30	*Sunday.*							
31	.983	.057	.929	.128	78.2	86.2	67.5	18.7

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October, 1853—*(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	80.2	3.6	78.9	4.9	0.967	10.37	1.73	0.857
2	*Sunday.*							
3	80.2	4.1	78.7	5.6	0.962	10.29	1.99	.838
4	79.4	3.9	78.0	5.3	0.939	10.09	1.84	.846
5	76.4	2.0	75.6	2.8	0.870	9.42	0.89	.914
6	77.5	2.5	76.5	3.5	0.897	9.67	1.14	.895
7	78.3	1.3	77.8	1.8	0.934	10.09	0.60	.944
8	80.0	2.8	79.0	3.8	0.969	10.42	1.33	.887
9	*Sunday.*							
10	80.8	4.3	79.3	5.8	0.978	10.46	2.11	.832
11	76.8	6.0	74.4	8.4	0.837	9.00	2.75	.766
12	75.5	5.9	73.0	8.4	0.801	8.62	2.65	.765
13	76.6	5.5	74.4	7.7	0.837	9.00	2.51	.782
14	76.2	6.4	73.5	9.1	0.815	8.74	2.94	.748
15	75.7	6.4	73.0	9.1	0.801	8.60	2.91	.747
16	*Sunday.*							
17	75.9	5.4	73.7	7.6	0.818	8.82	2.42	.785
18	77.8	3.4	76.5	4.7	0.895	9.65	1.56	.861
19	77.7	4.0	76.2	5.5	0.886	9.54	1.83	.839
20	76.1	5.5	73.9	7.7	0.823	8.87	2.47	.782
21	73.1	6.1	70.3	8.9	0.734	7.93	2.63	.751
22	73.2	6.0	70.5	8.7	0.738	7.98	2.58	.756
23	*Sunday.*							
24	73.4	6.7	70.4	9.7	0.735	7.94	2.90	.732
25	73.1	6.3	70.2	9.2	0.732	7.91	2.71	.745
26	72.3	6.8	69.1	10.0	0.706	7.62	2.91	.724
27	73.2	6.6	70.2	9.6	0.731	7.89	2.86	.734
28	73.8	6.6	70.9	9.5	0.747	8.07	2.87	.738
29	71.8	8.1	67.9	12.0	0.679	7.33	3.45	.680
30	*Sunday.*							
31	71.5	6.7	68.3	9.9	0.687	7.45	2.80	.727

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October, 1853—*(Continued.)*

Date.	Max. Solar radiation.	Rain.	Prevailing direction of the Wind.	General aspect of the Sky.
	o	Inc.		
1	91.0	..	Calm or S. W.	Cloudy also drizzling between 7 and 11 P. M.
2	*Sunday.*	0.90		
3	112.0	..	E. or N. E.	Cloudless till 6 A. M. scattered ⌒i or cloudy afterwards and also much lightning on S. W. side between 6 and 9 P. M.
4	97.8	0.08	E.	Scattered \i or \—i or ⌒i also overcast and raining at 11 P. M.
5	....	0.76	E. or N. E. or S.	Cloudy and occasionally raining.
6	....	0.12	E. or S.	Cloudy or overcast, raining occasionally.
7	....	0.66	E. or N. E. or S. E.	Ditto.
8	101.8	..	Calm or E. or S. W.	Cloudy or scattered ⌒i or \i or \—i.
9	*Sunday.*			
10	110.5	..	Calm or S. S. W.	Cloudless till 7 A. M. scattered ⌒i till 5 P. M. and cloudless afterwards.
11	106.0	..	Calm or N. W.	Cloudless.
12	108.5	..	Calm or W.	Cloudless till 11 A. M. scattered ⌒i till 6 P. M. and cloudless afterwards.
13	101.8	..	Calm or N. W.	Cloudless till 8 A. M. scattered ⌒i till 5 P. M. and cloudless afterwards.
14	109.7	..	Ditto.	Cloudless.
15	105.0	..	Ditto.	Cloudless till 7 A. M. scattered \i afterwards
16	*Sunday*			
17	....	..	N. W. or N.	Scattered \—i or cloudy.
18	94.0	2.42	Calm or N. or S. E.	Cloudy, also raining at 7 P. M.
19	106.0	..	N. W.	Scattered \i or \—i or ⌒i.
20	102.0	..	Ditto.	Cloudless till 6 A. M. scattered \i or \—i till 6 P. M. cloudless afterwards.
21	98.0	..	N. or N. W.	Scattered \—i till 8 A. M. cloudy afterwards.
22	97.0	..	N. W.	Cloudy.
23	*Sunday.*			
24	101.0	..	Calm or N. W. or W.	Scattered ⌒i or \—i or cloudless.
25	100.0	..	Calm or W.	Scattered ⌒ i or \— i till 4 P. M. cloudless afterwards.
26	105.9	..	W.	Scattered \—i or cloudless.
27	113.0	..	Calm or E. or S. W.	Cloudless till 6 A. M. scattered ⌒ i afterwards.
28	111.5	..	Calm or E. or N. E.	Scattered \—i or ⌒ i.
29	103.0	..	W. or N. W. [or N.	Scattered \i or ⌒ i.
30	*Sunday.*			
31	109.0	..	Calm or N. W.	Cloudless.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of November, 1853.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Date.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer.			Mean Dry Bulb Thermometer.	Range of the Temperature.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.958	30.032	29.892	0.140	78.1	86.2	68.0	18.2
2	.900	29.980	.830	.150	78.6	86.2	68.3	17.9
3	.867	.947	.820	.127	78.7	86.0	68.4	17.6
4	.848	.919	.782	.137	78.7	86.9	70.5	16.4
5	.849	.913	.800	.113	79.3	86.7	69.4	17.3
6	*Sunday.*							
7	.885	.957	.818	.139	79.2	86.2	68.6	17.6
8	.846	.928	.790	.138	79.0	86.6	69.4	17.2
9	.853	.912	.800	.112	79.8	87.6	72.7	14.9
10	.910	.988	.847	.141	80.1	86.9	72.6	14.3
11	.935	30.018	.852	.166	77.3	85.5	66.7	18.8
12	.865	29.949	.796	.153	76.6	85.6	64.9	20.7
13	*Sunday.*							
14	.941	30.012	.886	.126	78.0	86.0	67.5	18.5
15	.939	.030	.877	.153	77.5	86.5	67.3	19.2
16	.868	29.946	.801	.145	77.1	86.5	66.0	20.5
17	.903	.990	.852	.138	78.4	86.7	72.8	13.9
18	.919	30.000	.861	.139	77.9	85.4	67.8	17.6
19	.933	.017	.882	.135	74.9	83.0	65.5	17.5
20	*Sunday.*							
21	.963	.037	.908	.129	69.1	78.0	58.0	20.0
22	.969	.050	.902	.148	69.6	79.2	57.6	21.6
23	.938	.026	.868	.158	70.3	80.0	58.4	21.6
24	.934	29.997	.887	.110	71.2	80.0	60.0	20.0
25	.935	30.015	.858	.157	71.5	80.9	59.7	21.2
26	.918	29.991	.852	.139	71.6	80.0	60.4	19.6
27	*Sunday.*							
28	.922	.991	.868	.123	69.3	79.3	58.3	21.0
29	.933	30.007	.868	.139	69.3	80.7	56.4	24.3
30	.976	.065	.931	.134	70.4	81.0	57.7	23.3

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of November, 1853—*(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	71.3	6.8	68.0	10.1	0.681	7.38	2.84	0.722
2	72.3	6.3	69.4	9.2	0.712	7.72	2.66	.744
3	73.0	5.7	70.4	8.3	0.736	7.97	2.44	.766
4	73.4	5.3	71.0	7.7	0.751	8.12	2.29	.780
5	73.1	6.2	70.3	9.0	0.733	7.93	2.66	.749
6	*Sunday.*							
7	73.6	5.6	71.1	8.1	0.754	8.15	2.41	.772
8	73.7	5.3	71.3	7.7	0.759	8.20	2.30	.781
9	74.5	5.3	72.2	7.6	0.780	8.41	2.34	.782
10	74.3	5.8	71.7	8.4	0.769	8.30	2.54	.766
11	68.8	8.5	64.3	13.0	0.603	6.55	3.43	.656
12	70.4	6.2	67.3	9.3	0.666	7.24	2.53	.741
13	*Sunday.*							
14	72.0	6.0	69.2	8.8	0.708	7.67	2.52	.753
15	71.6	5.9	68.8	8.7	0.699	7.57	2.47	.754
16	70.9	6.2	67.9	9.2	0.678	7.37	2.55	.743
17	71.7	6.7	68.5	9.9	0.692	7.50	2.81	.727
18	72.0	5.9	69.2	8.7	0.709	7.67	2.49	.755
19	67.4	7.5	63.3	11.6	0.583	6.35	2.93	.685
20	*Sunday.*							
21	62.3	6.8	57.9	11.2	0.488	5.37	2.41	.690
22	63.5	6.1	59.8	9.8	0.519	5.71	2.19	.723
23	64.4	5.9	60.9	9.4	0.538	5.93	2.15	.734
24	65.8	5.4	62.8	8.4	0.573	6.31	1.99	.760
25	66.1	5.4	63.1	8.4	0.579	6.37	2.01	.760
26	66.0	5.6	62.9	8.7	0.575	6.31	2.09	.751
27	*Sunday.*							
28	63.0	6.3	59.1	10.2	0.507	5.60	2.23	.715
29	63.7	5.6	60.3	9.0	0.528	5.82	2.01	.743
30	64.3	6.1	60.6	9.8	0.534	5.86	2.24	.723

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of November, 1853—(Continued.)

Date.	Max. Solar radiation.	Rain.	Prevailing direction of the Wind.	General aspect of the Sky.
	o	Inc.		
1	108.0	..	Calm or N. W.	Cloudless till noon scattered \ i till 4 P. M. cloudless afterwards.
2	108.0	..	Ditto.	Cloudless till 11 A. M. scattered ∩ i or \ i till 8 P. M. cloudless afterwards.
3	102.0	..	N. or N. W.	Cloudless till 5 A. M. scattered \ i till 7 P. M. cloudless afterwards.
4	103.0	..	Calm or N. W.	Cloudless till noon scattered ∩ i till 7 P. M. cloudless afterwards.
5	108.0	..	Calm or W.	Cloudless till 10 A. M. \ i and ∩ i till 4 P. M. cloudless afterwards.
6	*Sunday.*			
7	102.0	..	Calm or S. W.	Cloudless till 11 A. M. scattered ∩ i till 4 P. M. cloudless afterwards.
8	102.0	..	S. W.	Cloudless.
9	105.0	..	Ditto.	Ditto.
10	104.0	..	S. W. or W.	Ditto.
11	100.0	..	N. E.	Ditto.
12	100.8	..	N. or E. or S.	Nearly cloudless.
13	*Sunday.*			
14	104.0	..	S. W.	Cloudless.
15	100.5	..	S.	Ditto.
16	101.5	..	S. W. or S.	Cloudless and occasionally scattered ∩ i or _ i.
17	103.6	..	S.	Cloudy till 8 A. M. cloudless till 1 P. M. scattered ∩ i till 4 P. M. cloudless afterwards.
18	100.5	..	Calm or N. E. or W.	Cloudy nearly throughout the day.
19	103.0	..	N. W.	Nearly cloudless.
20	*Sunday.*			
21	88.5	..	Variable.	Cloudless.
22	95.0	..	N. W. or S. W. or W.	Ditto.
23	93.8	..	Calm or W.	Ditto.
24	92.0	..	W.	Ditto.
25	100.5	..	N. W.	Ditto.
26	93.4	..	Calm or N. W. or W.	Scattered \ i or _ i or \ i till 6 P. M. cloudless afterwards.
27	*Sunday.*			
28	92.0	..	Calm or N. W.	Cloudless.
29	98.0	..	W. or N. W.	Ditto.
30	105.0	..	Calm or N. N. W.	Ditto.

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of May, 1853.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.275	87.0	97.5	80.5	..	..	N.	Clear.
2	29.293	89.4	94.5	72 5	..	..	N.	Ditto.
3	29.273	89.0	94.1	73.0	..	..	W.	Ditto.
4	29.273	88.5	92.2	68.9	..	..	W.	Ditto.
5	29.235	87.6	93.0	71.0	..	..	W.	Ditto.
6	29.309	86.9	93.2	71.6	..	..	W.	Ditto.
7	29.365	88.0	94.0	75.0	..	..	S.	Ditto.
8	29.307	86.8	93.5	72.0	..	..	N.	Ditto.
9	29.203	87.3	94.0	72.0	..	..	W.	∩ in zenith.
10	29.189	91.0	97.5	75.5	..	..	S. E.	Clear.
11	29.297	89.5	89.5	79.4	..	..	N.	⌣ all over.
12	29.223	88.0	88.0	79.0	..	..	E.	Hazy.
13	29.235	89.5	91.5	71.5	..	..	S.	Clear.
14	29.279	89.0	91.8	73.4	..	..	S.	Ditto.
15	29.285	86.0	90.0	72.0	..	..	W.	Ditto.
16	29.429	86.6	87.6	71.9	..	..	N.W.	Ditto.
17	29.409	86.6	88.9	71.0	..	..	W.	Ditto.
18	29.325	86.7	90.2	74.5	..	..	W.	Hazy.
19	29.357	87.8	91.0	75.5	..	..	W.	Ditto.
20	29.335	90.5	93.8	79.5	..	..	W.	∩ scattered.
21	29.397	88.0	94.9	76.0	..	..	W.	Clear.
22	29.401	89.0	95.6	78.5	..	..	S.W.	Ditto.
23	29.389	90.5	96.5	80.4	..	..	W.	∩ few in zenith.
24	29.403	90.9	97.7	81.0	..	..	W.	Clear.
25	29.307	92.0	98.9	81.0	..	..	N.W.	Hazy.
26	29.193	90.8	100.7	80.5	..	..	W.	Clear.
27	29.173	87.9	102.5	84.5	..	..	W.	Ditto.
28	29.205	90.0	100.0	81.0	..	..	W.	Ditto.
29	29.301	90.8	93.5	77.0	..	..	N.	Hazy to N.
30	29.235	90.0	98.2	79.0	..	..	W.	Clear.
31	29.305	90.8	93.0	77.0	..	..	W.	Ditto.
Mean.	29.297	88.8	94.1	75.7	..	..	..	....

Barometer Observations corrected for capillarity only.

Symbols, ... { \ Cirrus. ⌣ Cirro-strati. ∩ Cumuli. ∩~ Cumulo-strati. ⌣~ Nimbi or Nimbus.

W. MUIR, *Secy. to Govt. N. W. P.*

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of May, 1853. LATITUDE.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.267	88.5	99.4	82.0	..	..	N.	Clear.
2	29.269	87.9	96.8	69.5	..	..	N.	Ditto.
3	29.245	88.5	96.0	69.0	..	..	W.	Ditto.
4	29.251	88.0	95.5	74.0	..	..	W.	Ditto.
5	29.229	87.8	95.4	73.9	..	..	W.	Ditto.
6	29.301	87.5	98.0	71.5	..	..	W.	_ scattered.
7	29.335	86.5	99.9	78.0	..	..	W.	Clear.
8	29.279	88.0	96.0	73.8	..	..	N.	∩ in zenith.
9	29.183	87.0	98.1	78.0	..	..	W.	Clear.
10	29.153	91.9	101.0	79.5	..	..	S. E.	Ditto.
11	29.279	91.0	95.0	77.3	..	..	N.	\ in horizon to N. and E.
12	29.205	90.0	91.4	77.5	..	..	S.	Hazy.
13	29.229	90.4	94.8	71.5	..	..	S.W.	∩ scattered.
14	29.255	84.9	94.5	73.8	..	..	S.	Clear.
15	29.239	88.0	92.0	71.5	..	..	W.	Ditto.
16	29.405	87.9	91.9	73.9	..	..	N.W.	Ditto.
17	29.387	88.0	93.5	70.0	..	..	W.	Ditto.
18	29.319	86.9	92.8	75.4	..	..	W.	_ all over.
19	29.341	87.9	92.1	76.4	..	..	W.	Hazy.
20	29.305	90.7	97.8	81.0	..	..	W.	∩ scattered.
21	29.335	88.8	95.5	77.5	..	..	N.W.	Clear.
22	29.375	89.5	98.2	80.0	..	..	S.W.	Ditto.
23	29.335	90.7	100.9	78.5	..	..	N.	∩ scattered.
24	29.345	90.5	100.9	82.4	..	..	W.	Clear.
25	29.279	89.0	104.2	84.6	..	..	N.W.	Hazy.
26	29.137	88.9	102.5	81.8	..	..	W.	Clear.
27	29.149	89.0	105.0	86.4	..	..	W.	Ditto.
28	29.177	91.0	102.9	83.4	..	..	W.	Ditto.
29	29.277	91.1	97.5	78.6	..	..	N.	Hazy in horizon.
30	29.205	91.0	99 5	79.8	..	..	W.	Clear.
31	29.205	92.0	97.5	79.0	..	..	W.	Ditto.
Mean.	29.268	89.0	97.3	77.1	..	..	..	....

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of May, 1853.

Minimum pressure observed at 4 P. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.	Rain Gauges.	
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.		3 Ft. 2 In. from the ground.	Direction of the Wind.
1	29 185	90.0	101.5	80.0	100.0	85.0	92.5	Clear	..	N.
2	29.165	90.0	99.5	70.5	99.1	82.5	90.8	Ditto	..	N.
3	29.165	90.0	99.5	70.5	99.1	84.5	91.8	Ditto	..	W.
4	29.155	88.0	99.3	75.0	98.0	82.0	90.0	Ditto	..	W.
5	29.159	86.6	101.0	76 2	99.0	82.6	90.8	Ditto	..	W.
6	29.217	89.1	102.1	77.0	101.0	82.0	91.5	Ditto	..	N.W.
7	29.255	84.0	103.9	79.9	102.0	82.0	92.0	Ditto	..	N.
8	29.169	89.0	102.6	79.0	102.0	81.8	91.9	⌒ in zenith	..	N.
9	29.071	88.1	100.6	78.1	99.1	82.0	90.55	⌒ to W.	..	W.
10	29.079	91.2	100.0	80.0	101 0	88.5	94.75	⌒ to N. [S.	..	S. E.
11	29 181	91.2	96.0	79.5	95.5	81.0	88.25	Hazy a few ⌒ to	0.12	N. E.
12	29 063	90.5	95.6	79.0	95.5	82 0	88.75	⌒ $\frac{2}{3}$ of sky	..	S.
13	29.173	86.5	97.0	74.0	96.6	82.0	89.3	∩ scattered	..	W.
14	29.179	83.4	96.6	75.5	96.0	81.5	88.75	Clear	..	S. W.
15	29 173	88.5	93.6	73.0	94.0	77.5	85.75	Ditto	..	W.
16	29 315	83.0	94.8	75.5	94.2	77.0	85.6	Ditto	..	N.W.
17	29 287	87.9	97.0	76.6	96.0	77.0	86.5	Ditto [of S.	..	N.W.
18	29.245	87.0	95.2	77.0	94.2	80.6	87.4	— scattered $\frac{1}{3}$	..	S.
19	29.265	88.5	93.0	77.5	94.0	81.6	87.8	....	..	W.
20	29.257	91.4	99.0	82.0	98.8	84.5	91.65	⌒ scattered	..	W.
21	29.303	90.0	100.4	82.9	99.8	85.0	92.4	Clear	..	N.
22	29.293	90.0	100.3	81.9	99.9	84.8	92.35	∩ few to N.	..	W.
23	29.225	91.2	102.5	78.0	101.0	84.7	92.85	∩ scattered	..	N.
24	29.245	91.8	103 5	83.7	103.0	85.0	94.0	Clear	..	W.
25	29.155	89.9	106.0	85.0	104.8	86.7	95.75	Hazy	..	W.
26	29.085	89.6	99.6	81 5	100.9	88.0	94.45	Clear	..	W.
27	29.057	90.9	107.5	86.0	102.0	89.0	95.5	Ditto	..	W.
28	29.145	90.2	90.5	77.0	107.0	90 5	98.75	Drizzling	..	S. W.
29	29.193	91.8	98.3	79.0	98.0	83.9	90 95	Clear	..	N.
30	29.059	91.8	101.0	79 9	100.0	86.9	93.45	Ditto	..	N.W.
31	29.105	91.0	106.0	87.0	106.0	87.0	96.5	Ditto	..	E.
Mean.	29.178	89.1	99.5	78.6	99.3	83.5	91.40	....	0.12	..

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of June, 1853.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.241	94.0	99.5	78.0	..	..	N.	Clear
2	29.151	90.0	101.0	79.5	..	..	N.	Ditto
3	29.143	92.8	105.8	82.0	..	..	W.	Ditto
4	29.037	91.5	105.2	72.5	..	..	W.	Ditto
5	29.067	92.0	105.0	73.0	..	..	W.	Ditto
6	29.053	91.0	106.3	69.5	..	..	W.	Ditto
7	29.077	92.0	106.0	71.0	..	..	N.	Ditto
8	29.151	93.0	101.5	71.0	..	..	N.	Ditto
9	29.057	90.8	106.2	73.0	..	..	N.W.	Hazy
10	28.977	91.0	104.8	81.0	..	..	N.	∿ scattered
11	29.051	91.0	105.0	78.0	..	..	N.W.	∩ in zenith
12	29.067	92.0	106.0	79.5	..	..	N.	Hazy
13	29.137	94.0	105.0	79.0	..	..	N.	Clear
14	29.149	91.0	106.2	77.0	..	..	N.W.	Ditto
15	29.231	94.0	102.0	80.0	..	..	N.	Hazy
16	29.279	94.0	93.8	80.6	..	..	N.W.	Ditto
17	29.245	96.5	86.0	80.0	..	..	N.	∿ to N.
18	29.113	93.0	95.0	79.6	..	..	N. E.	∩ scattered all over
19	29.149	93.0	87.5	81.5	..	..	N. E.	∿ to N.
20	29.109	91.5	89.4	83.6	..	..	E.	∿ all over
21	29.021	89.9	89.0	81.6	..	..	N.	∼ scattered
22	28.983	91.5	91.5	82.0	..	..	E.	∿ scattered all over
23	29.049	92.1	92.7	81.6	..	..	E.	∿ scattered
24	29.071	92.5	94.8	82.0	..	..	N.	∼ scattered
25	29.033	92.0	95.0	83.9	..	..	W.	Clear
26	29.045	92.0	98.2	81.5	..	..	N.W.	Hazy
27	29.133	94.0	95.5	82.5	..	..	E.	∩ scattered all over
28	29.055	95.0	97.5	81.0	..	..	E.	∩ scattered
29	29.053	92.4	92.4	82.0	..	..	N.W.	∿ scattered
30	29.109	85.0	84.3	80.4	..	..	N.	∿ all over
Mean.	29.101	92.15	98.27	78.92	..	..	..	....

Note.—The Dry Bulb and Maximum Register do not agree, the former always reads more than the latter the average difference is 1° 6′ but at times it is far greater.

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of June, 1853. LATITUDE.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.219	91.5	105.3	82.9	..	..	N.	Clear
2	29.113	91.5	103.5	80.5	..	..	N.	Ditto
3	29.103	92.0	108.7	84.4	..	..	W.	Ditto
4	29.005	90.4	108.7	73.4	..	..	W.	Ditto
5	29.009	92.6	108.2	73.1	..	..	W.	Ditto
6	29.029	91.0	110.7	70.5	..	..	W.	Ditto
7	29.061	91.8	109.2	71.9	..	..	N.	Ditto
8	29.113	92.9	107.7	71.0	..	..	N.	Ditto
9	29.031	92.0	110.5	74.0	..	..	N.W.	Hazy
10	28.905	91.0	104.0	81.0	..	..	N.	∿ scattered
11	29.025	91.0	108.0	79.2	..	..	N.W.	Hazy
12	29.025	92.0	106.9	80.5	..	..	N.	Ditto
13	29.115	93.2	107.6	79.0	..	..	N.	Clear
14	29.115	94.0	110.0	79.0	..	..	N.	Ditto
15	29.181	94.5	105.0	81.6	..	..	N.	Hazy
16	29.277	91.0	86.0	77.5	..	..	W.	Stormy
17	29.229	89.4	89.3	80.5	..	..	N.	∿– to N.
18	29.083	93.9	96.6	80.5	..	..	N. E.	∩ scattered all over
19	29.105	93.4	92.4	82.4	..	..	N. E.	∩– to N.
20	29.089	92.8	90.0	84.0	..	..	E.	∿– all over
21	28.995	90.8	90.3	82.4	..	..	N.	– scattered
22	28.957	93.0	93.5	81.5	..	..	N. E.	∩– scattered all over
23	29.039	94.0	94.6	80.9	..	..	E.	∿ scattered
24	29.039	92.5	95.6	83.9	..	..	N.	Ditto
25	29.005	91.5	96.9	83.4	..	..	W.	Clear
26	29.019	95.0	100.8	81.5	..	..	N.W.	Hazy
27	29.101	95.5	97.8	82.7	..	..	E.	∩– scattered all over
28	28.995	95.0	98.7	82.5	..	..	E.	∩– scattered
29	29.035	93.6	94.0	81.1	..	..	N.W.	∿– all over
30	29.089	87.0	87.2	82.0	..	..	N. E.	Ditto
Mean.	29.104	92.3	100.6	79.6	..	..	..	....

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of June, 1853. LONGITUDE.

Minimum pressure observed at 4 P. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.	Rain Gauges.	
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.		3 Ft. 2 In. from the ground.	Direction of the Wind.
1	29.123	96.0	108.0	85.5	108.0	90.0	99.0	Clear	..	N.
2	29.061	93.0	109.0	84.0	109.0	91.5	100.25	Ditto	..	N.
3	29.005	96.0	109.0	82.5	109.0	92.3	100.65	Ditto	..	W.
4	28.929	92.0	109.9	80.5	109.2	93.5	101.35	Ditto	..	W.
5	28.959	94.0	110.0	74.5	109.4	91.4	100.4	Ditto	..	W.
6	28.965	93.3	111.6	80.0	111.0	91.3	101.15	Ditto	..	W.
7	28.995	94.0	112.0	73.0	111.3	91.7	101.5	Ditto	..	N.
8	29.005	92.0	110.4	75.6	110.0	90.5	100.25	Ditto	..	W.
9	28.901	92.5	113.0	75.0	113.0	96.5	104.75	Hazy	..	N.W.
10	28.887	90.5	110.0	80.0	109.6	98.0	103.8	⌇ all over	..	N.
11	28.999	92.0	105.0	79.0	109.0	98.4	103.7	Hazy	..	N.W.
12	28.891	93.0	104.0	81.0	107.5	99.0	103.25	⌇ all over	..	N.
13	29.031	94.0	111.0	79.5	109.8	95.0	102.4	Clear	..	N.
14	29.035	94.6	111.0	80.0	111.0	95.5	103 25	Hazy	..	W.
15	29.077	96.0	106.0	82.0	106.0	97.0	101.5	Ditto	..	N.
16	29.171	90.2	93.5	78.9	98.5	93.3	95.9	⌇ to N.	..	N,W.
17	29.125	92.0	93.4	79.6	83.9	93.0	88.45	Ditto [over	0.18	N.
18	29 013	95.5	98.0	85.0	87.5	97.0	92.25	∩ scattered all	..	E.
19	29.005	95.0	92.0	82.3	93.0	85.9	89.45	⌇ all over	1.02	N. E.
20	28.995	91.0	89.6	82.0	91.0	84.5	87.75	Ditto [over	..	N.
21	28.915	93.0	93.0	82.0	92.8	84.4	88.6	∩ scattered all	..	N.
22	28.903	93.0	94.0	82.0	93.6	86.6	90.1	⌇ ditto	..	N. E.
23	28.973	93.0	95.5	81.5	95.0	86.7	90.85	∩ scattered	..	N.
24	28.955	92.0	98.0	84.3	98.0	90.3	94.15	⌇ scattered	..	W.
25	28.909	92.0	99.4	85.9	99.2	90.6	94 9	Hazy	..	W.
26	28.975	97.0	104.0	83.0	103.4	93.6	98 5	Ditto [over	..	N.W.
27	29.037	95.6	93 9	84.0	94.0	92.4	93.2	∩ scattered all	..	N.W.
28	28.945	95.5	94.2	88.0	95.5	89 0	92.25	⌇ all over	..	E.
29	28.985	92.7	91.0	79.0	95.5	85.0	90.25	⌇ to S. & W.	..	N.W.
30	29.019	88.5	87.9	82.0	92.4	82.9	87.65	⌇ all over	1.05	N. E.
Mean.	28 993	93.3	101.9	81.05	102.5	90.9	96.7	....	2.25	..

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of July, 1853.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.077	89.0	88.1	84.0	..	..	N.	⌒ to W. ⌒ to E.
2	29.069	87.7	85.9	82.9	..	..	S. E.	⌒ all over
3	29.135	89.9	88.0	84.0	..	..	E.	⌒ scattered
4	29.133	89.5	88.3	83.6	..	..	S. E.	⌒ all over
5	29.029	89.9	88.6	82.7	..	..	S. E.	⌒ all over
6	29.025	86.1	85.5	82.6	..	..	S.W.	Ditto
7	29.101	85.4	83.5	81.5	..	..	S. E.	Ditto
8	29.069	87.0	85.2	82.8	..	..	Lull.	Ditto
9	29.033	84.0	83.1	79.9	..	..	Do.	Ditto
10	28.943	86.2	86.5	80.5	..	..	N.W.	Ditto
11	29.011	82.9	79.0	77.9	..	..	N.	Ditto
12	29.015	88.0	88.0	83.8	..	..	N.	Ditto
13	29.057	86.8	86.0	81.7	..	..	E.	⌒ in horizon
14	29.069	87.9	88.3	81.8	..	..	E.	⌒ scattered
15	29.123	87.0	86.6	82.5	..	..	N. E.	∩ scattered
16	29.129	89.5	91.1	83.6	..	..	W.	Ditto
17	29.159	89.0	84.6	82.0	..	..	N.W.	⌒ all over
18	29.165	87.0	85.6	80.0	..	..	N.	Ditto
19	29.135	84.7	83.6	79.4	..	..	N.W.	Ditto
20	29.043	86.2	87.4	81.8	..	..	W.	∩ scattered
21	29.067	87.0	87.8	81.7	..	..	W.	Ditto
22	29.135	86.0	86.0	82.9	..	..	W.	Ditto
23	29.157	88.3	85.4	81.5	..	..	S. E.	Raining.
24	29.167	86.5	83.1	80.9	..	..	N.	⌒ all over
25	29.083	82.0	82.0	80.4	..	..	W.	Raining.
26	29.105	84.0	83.7	77.5	..	..	S.W	∩ scattered
27	29.151	83.1	82.9	77.5	..	..	W.	Hazy
28	29.117	84.5	85.0	78.0	..	..	N.W.	Ditto
29	29.185	85.0	85.5	78.4	..	..	W.	∩ in zenith
30	29.145	85.0	86 3	78.5	..	..	W.	Clear
31	29.105	87.0	87.5	78.4	..	..	N.W.	Ditto
Mean.	29.095	86.5	85.7	81.1	..	..	..	....

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of July, 1853.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.059	85.5	84.2	81.4	..	..	S. E.	⌇ all over
2	29.051	89.0	88.0	83.2	..	..	S. E.	⌇ to N.
3	29.105	90.0	88.5	84.0	..	..	E.	⌇ all over
4	29.085	90.5	90.3	84.0	..	..	S. E.	⌇ scattered
5	29.005	88.4	88.6	84.0	..	..	S. E.	⌇ all over
6	29.023	86.5	86.0	82.6	..	..	W.	Ditto
7	29.091	86.0	84.4	81.5	..	..	S. E.	Ditto
8	29.023	86.6	85.0	82.7	..	..	E.	Ditto
9	28.997	86.0	86.3	80.9	..	..	N.	Ditto
10	28.931	86.5	86.8	80.9	..	..	N.W.	Ditto
11	28.993	83.5	79.5	77.8	..	..	N.	Ditto
12	29.007	87.0	86.7	82.8	..	..	N.	Ditto
13	29.039	87.5	87.5	81.0	..	..	E.	⌇ in horizon
14	29.055	89.0	89.8	81.9	..	..	E.	⌇ all over
15	29.113	88.0	88.4	82.7	..	..	N. E.	∩ scattered
16	29.113	91.0	94.5	83.4	..	..	W.	Ditto
17	29.147	89.9	85.4	82.0	..	..	N.W.	⌇ all over
18	29.141	87.2	87.5	81.0	..	..	N.	Ditto
19	29.115	85.6	85.3	81.5	..	..	W.	Ditto
20	29.019	88.0	88.4	81.5	..	..	W.	∩ scattered
21	29.053	88.0	88.5	81.5	..	..	N.W.	⌇ all over
22	29.117	88.0	88.9	83.2	..	..	N. E.	Ditto
23	29.125	87.8	85.6	82.0	..	..	N. E.	Raining
24	29.135	87.0	85.4	82.0	..	..	N.	⌇ all over
25	29.073	83.1	82.2	81.0	..	..	N.W.	Raining
26	29.097	85.0	84.4	78.8	..	..	W.	∩ scattered
27	29.143	85.0	84.8	78.8	..	..	W.	Hazy
28	29.117	86.0	86.5	78.5	..	..	N W.	Ditto
29	29.165	87.0	87.4	79.2	..	..	W.	∩ in zenith
30	29.133	88.0	89.0	79.1	..	..	W.	Clear
31	29.089	87.0	89.4	79.1	..	..	N.W.	Ditto
Mean.	29.076	87.3	86.9	80.8	..	..	..	....

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of July, 1853.

Minimum pressure observed at 4 P. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.	Rain Gauges.	
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.		3 Ft. 2 In. from the ground.	Direction of the Wind.
1	29.013	86.0	83.0	80.5	87.9	84.0	85.95	∿ all over	1.07	E.
2	28.982	90.6	90.4	85.0	89.5	81.3	85.4	∿ to N.	0.22	E.
3	29.029	90.0	93.9	82.9	92.9	81.4	87.15	∩ in horizon	..	E.
4	29.005	90.1	89.0	83.5	90.5	82.9	86.7	∿ all over	0.37	S. E.
5	28.969	89.0	84.2	81.0	89.0	84.2	86.6	Ditto	..	N.
6	28.995	87.0	86.5	82.7	86 0	82.9	84.45	Ditto	..	S. W.
7	29.031	86.5	85.0	81.7	86.0	80.0	83.0	Ditto	3.27	E.
8	28.985	87.8	85.0	78.5	84.5	80.4	82.45	Ditto	0.09	E.
9	28.891	87.0	86.6	80.5	85.9	78.9	82.4	Ditto	0.49	N.
10	28.905	87.0	87.5	81.0	87.0	78.8	82 9	Ditto	..	N.W.
11	28 949	86.5	85.6	81.9	85.5	76.8	81.15	Ditto	0.24	N.
12	28.943	88.8	88.2	83.9	87.5	80.8	84.15	Ditto	..	N.
13	28.977	88.9	89.0	81.7	88.6	82 0	85.3	∩ scattered	0.19	E.
14	29.011	89.6	90.5	82.0	89.3	82.0	85.65	∿ all over	..	E.
15	29 053	90.7	90.5	83.5	89.8	81.8	85.8	∩ scattered	0.17	E.
16	29.063	84.0	94.6	84.3	94.0	84.5	89.25	∿ to S.	..	N.W.
17	29.105	89.5	84.9	80.7	85.5	82.7	84.1	∿ all over	..	N.W.
18	29.081	88.0	86.0	81.6	88.4	81.9	85.15	Raining	..	N.W.
19	29.033	87.0	86.0	81.9	85.6	81.3	83.35	∿ all over	0.15	N.W.
20	28.957	89.9	90.3	82.0	89.6	81.0	85.3	∿ to S.	..	W.
21	28.995	85.5	84.5	81.7	89.6	82.7	86.15	Raining	1.57	W.
22	29.055	83.0	83.5	81.0	89.0	82.3	85.65	∿ all over	.22	N.
23	29.079	88.0	85.0	82.1	90.0	81.7	85.85	Ditto	0.72	N. E.
24	29.059	87.2	88.0	83.0	87.8	81.5	84.65	∿ all over	0.32	W.
25	29.011	84.5	85.4	78.6	84.5	81.5	83.0	∿ in horizon	0.40	W.
26	29.073	86.7	85.5	79.9	84.5	79.8	82.15	∩ scattered	..	W.
27	29.085	88.0	86.7	79.0	85.5	80.0	82.75	Hazy	..	W.
28	29.059	89.1	88.0	79.8	85 5	79.9	82.7	∿ to N.	..	N.W.
29	29.117	90.0	89.4	79.4	87.0	80 3	83.65	Few ∩ scattered	..	N.W.
30	29.069	91.2	90.6	79.1	88.0	80.4	84.2	Clear	..	W.
31	29.027	88.0	91.0	80.1	88.9	81.9	85.4	Ditto	..	N.W.
Mean.	29.020	88.4	87.7	81.4	87.8	81.3	84.6	....	9.49	..

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of August, 1853.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.135	86.5	87 7	77.9	..	..	N.W.	Clear
2	29.191	87.0	88.6	79.0	..	..	W.	∩ all over
3	29.209	87.0	89.0	78.7	..	..	W.	Clear
4	29.209	87.2	89.0	82.8	..	..	W.	Ditto
5	29.180	87.6	89.4	79.3	..	..	W.	Ditto
6	29.199	87.0	89.4	78.4	..	..	W.	Ditto
7	29.197	88.0	89.0	75.0	..	..	N.W.	Ditto
8	29.191	88.8	89.9	75.6	..	..	..	Ditto
9	29.217	88.0	89.5	76.0	..	..	W.	Ditto
10	29.271	88.8	91.1	78.5	..	.	N.W.	Hazy to E.
11	29.269	88.9	91.2	78.9	..	..	W.	∩ scattered all over
12	29.339	90.0	91.0	79.9	..	..	N.	\ scattered
13	29.309	91.5	94.2	79.9	..	..	W.	∩ ditto
14	29.209	91.5	95.5	78.0	..	..	N.W.	A few \ to N.
15	29.223	89.0	91.2	79.0	..	..	W.	Hazy
16	29 243	88.9	90.9	77.5	..	..	W.	\ in zenith
17	29.297	90.5	93.5	76.4	..	..	N.	∩ scattered
18	29.329	90.0	92.0	76.8	..	..	N.W.	\ all over
19	29.265	90.0	92.2	81.2	..	..	N.W.	Clear
20	29.205	92.4	95.1	79.0	..	..	W.	Ditto
21	29.137	92.5	94.4	78.6	..	..	N.W.	Hazy
22	29.165	90.5	91.7	77.5	..	..	N.W.	\ in zenith
23	29.157	91.1	92.1	80.7	..	..	N.W.	\ to South
24	29.243	90.7	90.2	80.5	..	..	N. E.	∩ scattered
25	29.249	90.6	91.2	81.4	..	..	N. E.	Ditto
26	29.225	95.0	93 5	81.0	..	..	N.W.	\ scattered in zenith
27	29.167	96.0	95.7	78.5	..	..	N.W.	Clear
28	29.200	95.1	94.8	78.6	..	..	N.	Ditto
29	29.239	92 7	89.4	82.9	..	..	N. E.	\ towards S. [all over
30	29.226	90.0	88.8	82.5	..	..	E.	Ditto N. E. and ∩ scattered
31	29.221	93.0	91.7	81.9	..	..	S. E.	∩ scattered all over
Mean.	29.223	90.2	91.4	79.1	..	..	..	....

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of August, 1853.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.119	88.8	89.5	78.1	..	..	N.W.	Clear
2	29.183	88.6	89.7	79.0	..	..	W.	∼ all over
3	29.203	89.4	90.5	79.4	..	..	W.	∼ scattered
4	29.197	89.9	91.3	80.5	..	..	W.	Clear
5	29.165	90.0	91.8	80.0	..	..	W.	Ditto
6	29.141	90.5	91.5	78.2	..	..	W.	Ditto
7	29.079	88.9	91.4	75.0	..	..	N.W.	Ditto
8	29.169	90.2	92.2	76 6	..	..	N.W.	Few _ scattered
9	29.203	90.4	92.6	78.6	..	..	N.W.	Clear
10	29.263	91 4	93.6	78.6	..	..	W.	Hazy to E.
11	29.261	92.0	93.0	77.5	..	..	W.	∼ scattered all over
12	29.319	90.8	92.2	79.5	..	..	N.	\∼ scattered
13	29.279	93.8	96.3	78.8	..	..	N.W.	∼ ditto
14	29.193	92.0	96.4	78.0	..	..	N.W.	A few _ to N.
15	29.205	90.8	92.7	78.0	..	..	..	Hazy
16	29.233	91.2	93.7	77.5	..	..	N.	∩ scattered in zenith
17	29.269	92 0	95.3	77.1	..	..	N.W.	∼ scattered
18	29.305	92.0	93.0	79.0	..	..	W.	\∼ all over
19	29.233	92.0	95.3	81.0	..	..	N.W.	∼ scattered
20	29.167	94.0	98.5	79.4	..	..	W.	Clear
21	29.111	93.0	95.0	79.0	..	..	W.	Hazy
22	29.135	93.0	94.7	81.8	..	..	N.	\ scattered
23	29.131	93.0	95.0	80.2	..	..	N.	∼ ditto
24	29.219	92.5	92 2	79.5	..	..	N.E.	Ditto
25	29.235	95.0	93 8	80.5	..	..	N.E.	Ditto
26	29.181	98.9	100.0	81.0	..	..	N.W.	Ditto
27	29.143	99.8	99.8	78.5	..	..	N.W	Clear
28	29.181	98.0	97.8	78.3	..	..	N.W.	Ditto
29	29.219	93 7	91.9	82.5	..	..	N.	\∼ towards N.
30	29.205	91.8	90.2	81.5	..	..	E.	∼ scattered all over
31	29.197	95 5	95.5	82.1	..	..	..	Ditto
Mean.	29.199	92.4	93.8	79.2	..	..	..	....

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of Aug. 1853. LONGITUDE.

Minimum pressure observed at 4 P. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.	Rain Gauges.	
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.		3 Ft. 2 In. from the ground.	Direction of the Wind.
1	29.085	89 0	89.5	79.2	89.7	81.9	85.8	⌒ all over	..	N.W.
2	29.119	91.6	91.6	79.0	90.5	81.9	86.2	Ditto	..	N.W.
3	29.155	91.0	91.7	79.8	89.4	82.5	85.95	⌒ scattered	..	N,W.
4	29.127	92.5	93.4	80.5	92.1	83.4	87.8	Clear	..	N.W.
5	29.099	93.8	93 6	80.0	92.4	83.7	88.1	Ditto	..	N.W.
6	29.075	91.0	93.6	77.0	91.2	83 0	87.1	Ditto	..	N.W.
7	29.077	89.6	93.0	76.3	91.5	83.2	87.4	Ditto	..	N.W.
8	29.109	92.9	94.0	76.8	92.0	82.3	87.15	Ditto	..	N.W.
9	29.163	94.1	95.1	79 4	92.7	83.0	87.85	Ditto	..	N.W.
10	29.175	94.6	94.6	79.0	92.6	83.4	87.5	⌒ scattered	..	N.W.
11	29.193	93.0	94.6	78.0	92.4	83.6	88.0	⌒ scatd. all o'er	..	W.
12	29.239	92.0	93.0	80.3	91.7	86.6	89.15	⌒ scattered	..	N.
13	29.183	94.0	97.4	79.0	95.0	86.5	90.75	⌒ ditto	..	N.W.
14	29.095	92.2	97.8	78.6	95.2	87.0	91.1	Few ⌒ scattered	..	N.W.
15	29.131	93.0	93.9	78.4	95.0	86.2	90.6	⌒ all over	..	W.
16	29.205	94.0	96.0	77.8	95.0	84.0	89.5	⌒ scatd. in Z.	..	N.
17	29.189	94 0	96.7	77.7	94.5	83.8	89.15	⌒ scattered	..	N.W.
18	29.209	93.9	94.4	80.2	93.1	83.0	88.5	⌒ all over	..	N. E.
19	29.145	93.7	94.9	79.5	94.0	86.5	90.25	⌒ towards E.	..	N.W.
20	29.075	94.0	100.4	79.5	98 2	86.8	92.5	⌒ to west	..	W.
21	29.059	93.0	97.3	79.6	95.1	88.7	91.9	Ditto	..	W.
22	29.079	93.1	95.0	79.3	95.2	86.6	90.9	Few ⌒ scatd.	..	E.
23	29.079	94.0	95.4	79.5	95.5	87 2	91.35	⌒ scattered	..	N.W.
24	29.193	93.0	92.6	79.5	95.2	85.0	85.1	Ditto	..	N. E.
25	29.127	99.5	96.6	78.9	95.0	84.0	89.5	⌒ scattered	..	N.
26	29.079	101.0	101.4	82.0	101.6	83.5	92.55	⌒ ditto	..	N. E.
27	29.029	105.7	103.2	81.0	103.0	87.3	95.15	Clear	..	N.
28	29.085	105.0	102.7	80.6	101.7	86.2	93.95	Ditto	..	W.
29	29.155	87.8	83.5	79.1	101.9	87.2	94.55	⌒ all over	..	W.
30	29.119	98.0	95.2	81.8	101.5	86.2	93.85	⌒ scatd. all o'er	..	E.
31	29.047	101.6	100.0	82.9	101.8	81.2	91.0	Ditto	..	..
Mean.	29.126	94.4	95.2	79.4	94.7	84.7	89.7	....	..	..

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of September, 1853.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.279	96.0	95.4	82.4	..	..	E.	⌒ scattered
2	29.231	95.6	95.0	84.0	..	..	N. E.	Ditto
3	29.213	94.0	93.0	82.0	..	..	S. E.	Ditto
4	29.275	91.5	92.0	81.6	..	..	E.	_ scattered
5	29.271	90.5	91.2	83.4	..	..	E.	⌒ ditto
6	29.171	92 7	93.2	80.4	..	..	N.W.	Clear
7	29.139	91.0	91.4	78.5	..	..	N.W.	Hazy
8	29.173	90.0	90.4	78.0	..	..	N.W.	Clear
9	29.201	88.0	88.6	76.7	..	..	N.W.	Ditto
10	29.235	87.9	88.3	76.4	..	..	N.W.	Ditto
11	29.173	86.8	87.5	76.2	..	..	N.	Ditto
12	29.223	89.0	89.6	76.5	..	..	N.W.	Ditto
13	29.257	91.7	91.9	77.0	..	..	N.W.	_ scattered
14	29.303	92.0	92.7	75.3	..	..	N.W.	Clear
15	29.325	92.5	93.3	75.6	..	..	N.W.	Ditto
16	29.341	92.0	92.2	75.6	..	..	N.W.	⌒ scattered
17	29.369	91.0	91.8	75.3	..	..	N.W.	Ditto
18	29.385	89.4	90.2	74.9	..	..	N.W.	Clear
19	29.367	90.0	90.5	76.5	..	..	N.W.	⌒ scattered
20	29.373	89.0	89.5	76.5	..	..	N.W.	Ditto
21	29.377	88.0	88.6	75.0	..	..	N.W.	Clear
22	29.385	89.5	89.6	75.4	..	..	N.	⌒ scattered
23	29.397	90.0	90.5	76.4	..	..	N.W.	Clear
24	29.341	90.7	91.4	75.0	..	..	N.W.	Ditto
25	29.329	92.0	92.3	76.8	..	..	N. E.	Ditto
26	29.311	91.7	92.8	79.4	..	..	S. E.	Ditto
27	29.257	92.5	93.0	74.2	..	..	S.W.	Ditto
28	29.261	90.8	91.5	72.5	..	..	N. E.	Ditto
29	29.277	88.9	89.5	76.4	..	..	S. E.	\ towards E.
30	29.313	88.6	88.8	78.0	..	..	W.	_ few scattered
Mean.	29.285	90.78	91.19	97.40	..	..	..	....

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of Sept. 1853.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.229	97.5	97.3	83.5	..	..	E.	⌒ scattered
2	29.205	95.9	94.8	84.0	..	..	N. E.	Ditto
3	29.197	95.8	95.8	81.5	..	..	N.W.	Ditto
4	29.253	92.8	94.0	82.0	..	..	E.	⌒ all over
5	29.231	92.5	92.3	83.0	..	..	E.	⌒ all over
6	29.141	95.6	96.7	79.0	..	..	N.W.	⌒ scattered
7	29.123	95.0	95.5	79.5	..	..	N.W.	Hazy
8	29.147	93.9	94.5	78.9	..	..	N.W.	⌒ very few scattered
9	29.201	91.6	92.5	78.0	..	..	N.W.	⌒ scattered
10	29.231	91.4	91.8	74.9	..	..	N.W.	Clear
11	29.151	91.0	91.7	76.4	..	..	W.	Ditto
12	29.215	93.0	93.9	75.6	..	..	N.W.	Ditto
13	29.247	94.8	95.4	76.4	..	..	N.W.	⌒ scattered
14	29.297	96.7	97.3	75.4	..	..	N.W.	Clear
15	29.315	96 0	96.8	74.8	..	..	N.W.	Ditto
16	29 323	95.0	95.9	75 6	..	..	N.W.	Ditto
17	29.359	93.0	93.1	73.8	..	..	N.W.	⌒ scattered
18	29.365	92.3	92.0	75.0	..	..	N.W.	Clear
19	29.325	94.5	94.5	74.3	..	..	N.W.	⌒ scattered
20	29.357	91.2	91.5	75.4	..	..	N.W.	Ditto
21	29.365	91.0	91.8	75.6	..	..	N.W.	Ditto
22	29.355	91.5	92 4	74.5	..	..	N.W.	Ditto
23	29.373	92.5	93.0	76.4	..	..	N.W.	Ditto
24	29.315	91.5	94 0	74.5	..	..	N.W.	⌒ ditto
25	29.305	95.8	96.0	74.5	..	..	N. E.	⌒ in horizon towards E.
26	29.267	94.5	95.2	74.9	..	..	E.	Clear
27	29.235	94.0	94.8	74.6	..	..	..	Ditto
28	29.237	93.9	94.7	72.7	..	..	..	Ditto
29	29 237	92.7	93.0	76.7	..	..	N.W.	Ditto
30	29.303	92.0	92.5	78.6	..	..	W.	⌒ few scattered
Mean.	29.263	93.66	94.16	77.00	..	..	..	....

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of Sept. 1853.

Minimum pressure observed at 4 P. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.	Rain Gauges.	
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.		3 Ft. 2 In. from the ground.	Direction of the Wind.
1	29.111	99.6	98.9	83.5	99.1	81.3	90.2	∿ scattered	..	E.
2	29.111	94.8	90.6	80.2	99.9	85.5	92.65	⌇ all over	..	N. E.
3	29.133	94 2	91.9	81.5	91.0	82.6	86.8	Ditto	..	N. E.
4	29.159	92.3	92.0	81.9	93.2	82.0	87.5	Ditto	..	E.
5	29.153	94.0	93.7	83.0	93.3	83 5	88.4	Ditto	..	E.
6	29.041	100.8	101.5	79.6	99.4	83.0	91.2	Clear	..	W.
7	29.033	100.0	101.0	79.8	100.8	85.5	93.15	Hazy [scatd.	..	N.W.
8	29.125	97.3	98.5	79.6	98.8	82.0	90.4	⌇ very few	..	N.W.
9	29.145	96.0	96.0	78.0	99.0	81.0	90.0	∿ scattered	..	N.W.
10	29.161	96.0	95.8	76.6	94.9	79.0	86.95	Clear	..	W.
11	29.133	96.4	96.2	76.6	95.1	80.0	87 55	Ditto	..	N.W.
12	29.195	97.0	96.6	76.0	97.0	80.0	88.5	Ditto	..	N.W.
13	29.137	97.0	97.2	76.5	96.0	80.0	88.0	⌇ all over	..	W.
14	29 237	99.0	99.0	76.0	97.9	83.9	90.9	Ditto	..	N.W.
15	29.245	99.4	98.6	75.0	98.0	82.8	90.4	Clear	..	N.W.
16	29.237	98.5	98.7	77.5	97.5	82.8	90 15	⌇ towards E.	..	..
17	29.251	97.6	97.9	74.0	98.0	82.3	90.15	⌇ scattered	..	N.W.
18	29.301	96.3	93.7	76.0	95.3	81.0	88.15	∩ all over	..	N.W.
19	29.263	95.0	94.5	75.6	95.3	82.0	88.65	∿ scattered	..	N.W.
20	29.267	94.0	92.5	76.5	92.0	81.0	86.5	Ditto	..	N.W.
21	29.279	94.0	92.4	76.1	92.0	81.5	86.75	Ditto	..	N.
22	29.295	94.1	94.8	75.4	93.8	81.3	87.55	Ditto	..	N.W.
23	29.297	96.7	97.4	76.2	95.8	81.5	88.65	Ditto	..	N.
24	29.237	94.7	98.2	74.5	96.5	82.0	89.25	∩ ditto	..	N.
25	29.235	98.0	98.5	75.0	97.3	82.8	90.55	∩ in horz. to-	..	N.
26	29 175	99.1	98.0	79.0	97.0	83.0	90.0	Clear[wards E.	..	E.
27	29.111	98.6	97.9	75.0	97.6	83.0	90.3	Ditto	..	..
28	29.171	97.6	98.0	72.9	97.9	81.0	89.45	Ditto	..	..
29	29.191	95.5	96.1	78.5	98 4	82.8	90.6	Ditto	..	N.W.
30	29.237	98.5	98.5	78.4	97.2	81.6	89.4	Ditto	..	N.W.
Mean.	29.189	96.63	96.53	77.48	96.50	82.06	89.28	....	..	..

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of October, 1853.

Maximum pressure observed at 9.50 A. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.327	89.0	89.7	72.1	..	..	N. E.	Clear
2	29.265	93.0	93.6	71.0	..	..	W.	Ditto
3	29.325	90.8	91.9	74.4	..	..	N. E.	Ditto
4	29.343	90.5	90.5	74.2	..	..	N. E.	∩ scattered
5	29.311	88.0	88.3	79.5	..	..	N. E.	∿ all over
6	29.299	79.0	78.2	75.0	..	..	E.	Ditto
7	29.191	75.5	75.3	74.3	..	..	E.	Raining
8	29.319	77.0	77.2	74.5	..	..	W.	∿ all over
9	29.411	76.4	76.6	74.0	..	..	N.W.	Ditto
10	29.505	75.5	76.0	72.0	..	..	N.W.	∩ scattered
11	29.573	78.9	79.6	73.0	..	..	N.W.	Clear
12	29.445	82.5	83.3	70.0	..	..	S.W.	Ditto
13	29.447	82.2	82.5	68.1	..	..	W.	Ditto
14	29.497	80.0	80.6	68.2	..	..	N.W.	Ditto
15	29.549	80.0	81.0	66.0	..	..	N.W.	Ditto
16	29.580	81.2	81.7	68.0	..	..	W.	Ditto
17	29.599	82.5	83.0	66.0	..	..	W.	Ditto
18	29.569	81.6	82.6	66.4	..	..	N.	Ditto
19	29.531	78.4	79.3	63.0	..	..	N.W.	Ditto
20	29.507	78.2	79.0	64.0	..	..	W.	Ditto
21	29.527	79.0	80.2	63.3	..	..	W.	Ditto
22	29.499	84.6	85.0	63.4	..	..	W.	Ditto
23	29.517	79.6	80.6	66.6	..	..	W.	Ditto
24	29.559	79.5	81.0	67.4	..	..	W.	Ditto
25	29.529	79.6	80.7	67.0	..	..	S.W.	Ditto
26	29.511	81.0	82.5	64.8	..	..	W.	Ditto
27	29.637	80.5	81.5	67.0	..	..	S.	Ditto
28	29.635	79.8	80.9	66.0	..	..	W.	Ditto
29	29.599	79.0	80.9	66.0	..	..	N.W.	Ditto
30	29.593	82.2	83.0	67.0	..	..	W.	Ditto
31	29.617	81.5	82.8	69.0	..	..	N.W.	Ditto
Mean.	29.482	81.5	82.2	69.1	..	..	..	....

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of Oct. 1853.

Observations at apparent Noon.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Direction of the Wind.	
1	29.289	93.0	93.6	72.4	..	..	N. E.	Few ⌐ scattered
2	29 301	95.2	95.5	71.5	..	..	W.	Clear
3	29.245	93.0	93.3	75.0	..	..	N. E.	Ditto
4	29.307	93.0	93.5	74.8	..	..	N. E.	⌒ scattered
5	29.273	90.0	88.7	79.2	..	..	N. E.	⌐ all over
6	29.259	80.1	79.5	75.8	..	..	E.	Ditto
7	29.173	75.9	75.5	73.5	..	..	E.	Raining
8	29.337	78.9	78.6	75.5	..	..	W.	⌐ all over
9	29.393	78.0	78.5	74.2	..	..	N.W.	Ditto
10	29.489	79.9	80 0	72.9	..	..	N.W.	⌒ scattered
11	29.503	81.0	81.6	73.0	..	..	W.	Clear
12	29.415	85.5	85.5	70.5	..	..	N.W.	Ditto
13	29.421	85.2	85.5	68.1	..	..	W.	Ditto
14	29 479	83.1	83.5	69.0	..	..	N.W.	Ditto
15	29.531	82.5	83.5	66.5	..	..	N W.	Ditto
16	29.567	84.0	85.5	68.3	..	..	W.	Ditto
17	29.559	85.0	85.6	66 8	..	..	W.	Ditto
18	29.551	83.5	84.3	67.9	..	..	N.W.	Ditto
19	29.511	83.0	84.0	63.4	..	..	W.	Ditto
20	29.499	84.1	85.4	64.6	..	..	W.	Ditto
21	29.503	84.8	86.0	64.1	..	..	W.	Ditto
22	29.469	86.0	87.2	64.7	..	..	N.W.	Ditto
23	29.505	85.0	86.1	67.0	..	..	W.	Ditto
24	29.517	83.8	84.5	69.7	..	..	W.	Ditto
25	29.505	84.0	84.7	67.8	..	..	W.	Ditto
26	29.493	84.8	85.5	65.5	..	..	W.	Ditto
27	29.607	84.0	85.0	67.2	..	..	W.	Ditto
28	29.605	86.0	87.2	66.1	..	..	N.W.	Ditto
29	29.557	85.0	86.4	67.0	..	..	N.W.	Ditto
30	29.559	84.0	85.0	67.0	..	..	W.	Ditto
31	29.559	84.0	85.0	67.0	..	..	N.W.	Ditto
Mean.	29.450	84.7	85.3	69.5	..	..	..	....

Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of Oct. 1853.

Minimum pressure observed at 4 P. M.

Date.	Barometer.	Temperature.			Maximum and Minimum.			Aspect of the Sky.	Rain Gauges.	
		Of Mercury.	Of Air.	Wet Bulb.	Maximum.	Minimum.	Mean.		3 Ft. 2 In. from the ground.	Direction of the Wind.
1	29.171	96.0	96.4	72.7	98.2	79.0	88.6	Few ⌒ scattered	..	E.
2	29.237	96.8	97.1	71.8	96.0	79.0	87.5	Clear	..	W.
3	29.251	96.7	96.9	73.4	95 5	86.5	91 0	⌒ scattered	..	N. E.
4	29.247	95.0	95.4	74.4	94.0	86.5	90.25	Ditto	..	N. E.
5	29.263	93.0	93.4	82.7	94.0	89.0	91.5	⌒ all over	..	N. E.
6	29.241	83.5	84 0	76.0	84.0	81.0	82.5	....	..	E.
7	29.101	76.4	75.7	74.5	76.6	74.0	75.3	Raining	..	E.
8	29.339	77.8	77.5	74.9	79.0	73.5	76.25	⌒ all over	..	W.
9	29.371	78.8	79.1	74.8	80.5	73.9	77.2	Ditto	..	W.
10	29.443	83.8	84.0	74.5	82.2	69.0	75.6	⌒ scattered	..	N.W.
11	29.389	87.2	87.6	73 6	85.6	68.8	77.2	Clear	..	W.
12	29.381	89.3	89.6	70.0	87.9	71.2	79.55	Ditto	..	N.W.
13	29 387	90.4	90.0	70.9	88.9	71.5	80.2	Ditto	..	W.
14	29.459	88.0	87.2	67.0	88.2	68.9	78.55	Ditto	..	..
15	29 503	87 0	86.7	66.6	88.0	69.0	78.5	Ditto	..	N.W.
16	29.527	88 4	88.6	68.7	88.5	69.0	78.75	Ditto	.	N.W.
17	29.525	88.5	88.8	68.0	87.4	73.6	80.5	Ditto	..	W.
18	29.489	89.0	89.0	68.9	87.6	73.0	80.3	Ditto	..	N.W.
19	29.429	88.8	88.2	65 0	87.0	67.0	77.0	Ditto	..	W.
20	29.453	89.5	89.9	65.0	87.2	67.3	77.25	Ditto	..	N.W.
21	29.455	90.0	90.5	64.5	88.2	67.2	77.7	Ditto	..	W.
22	29.435	91.1	91.4	68.0	89.4	67.0	78.2	Ditto	..	N.W.
23	29.467	90.0	90.6	68.3	88.9	71.0	79.95	Ditto	..	W.
24	29.465	89.5	90.1	69.1	88.0	70.5	79.25	Ditto	..	N.W.
25	29.455	90.0	90.5	69.0	88.5	70.5	79 5	Ditto	..	W.
26	29.459	90.8	91.6	69.0	89.2	69.9	79.55	Ditto	..	W.
27	29.569	90.5	91.0	67.9	89.4	73.5	81.45	Ditto	..	S.
28	29.553	91.0	91.3	67.0	90.5	71.0	80 75	Ditto	..	N.W.
29	29.507	90.3	90 6	68.0	89.6	71.0	80.3	Ditto	..	N.W.
30	29.477	88.5	89.4	67 5	88 4	69.0	78.7	Ditto	..	W.
31	29.527	88.0	88.0	70.0	87.5	68 5	78.0	Ditto	..	N.W.
Mean.	29.406	88.8	89.1	70.4	88.2	72.9	80.54	....	..	..

Cervus canadensis.


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