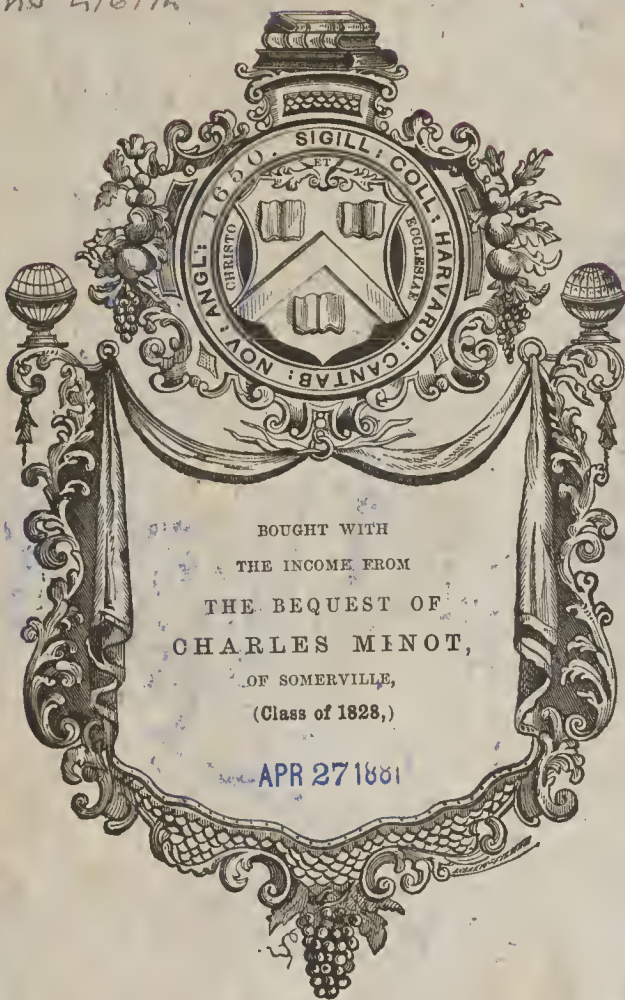


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JOURNAL
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ASIATIC SOCIETY OF BENGAL,

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Nos. I. TO IV.—1861.

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

SIR WM. JONES.

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CONTENTS.

	<i>Page</i>
Andaman Islands, papers relating to the Aborigines of the, ...	251
Antiquities near Jabalpur, a few notes on,	211
Asia, a new planet, on the discovery of,.....	291
Budhagupta, note on,	139
Comet of 1861, on the,	279
Eran or Erikaiṇa, Inscriptions of, redeeiphered and retranslated,	14
Gyges' ring in Plato and Nizámí,	151
Idylls, Indian No. 1. (Raghu Vansa),	111
Inscription, Bactrian, Translation of an,	337
————— Notes on the same,.....	347
————— Donative, of the tenth century; the Sanskrit Ori- ginal and its substance in English: with Remarks on the later kings of Dhárá in Málava,.....	195
————— Sanskrit, from Chedi, Decipherment of an,	317
Kashmir, Memorandum on the progress of the great Trigo- nometrical Survey of, with map and observations on the late conquest of Gilgit and other incidental matters,	99
Land-grants, on the two issued by king Hastin, bearing date in the years 156 and 163 after the subversion of the Guptas,	1
Letter on certain recent statements touching the Guptas, &c., .	383
Literary Intelligence,	47, 389
Mahánuddy river, notes on the Rainfall in the Basin of the, and the floods consequent thereupon,	216
Malacology Indian, No. 2, Contributions to,.....	347 <i>d</i>
Mánava Sútras, on Dr. Goldstücker's edition of the, (notices of new works relating to Sanskrit Literature),.....	42
Meteorological Register kept on Ross Island, for December, 1859,.....	32

Meteorological Register (Abstract of the Hourly) taken at the Surveyor General's Office, Caleutta, for the months of May, June and July, 1863,.....	i.
————— for August, September and October,...	xxv.
————— for November and December,	xlix.
————— for January, February and March, 1861,	lxv.
Meteorites, Report on the Shalka, Futtehpore, Pegu, Assam and Segowlic, sent from the Asiatic Society of Bengal to the Imperial Museum of Vienna,	129
Proceedings of the Asiatic Society of Bengal for January and February, 1861,	49
————— for March, April and May,.....	159
————— for June and July,	294
————— for August, Sept., Oct., Novr., and Dec.,.....	395
Rocks, Sub-Himálayan, between the Ganges and the Jumna, on the,	22
Thibet, Yunan and Burmah, Memo. on the countries between, Toranájyas of Eran, Gwalior and Kashmir, on the identity of the, Yangtse-kiang River, from Hankow to Pingshan, notes on the,	367 267 222

INDEX TO NAMES OF CONTRIBUTORS.

Bayley, E. C. Esq., Notes on Bábu R. L. Mitra's paper on the Translation of a Baetrian Inscription from Wardak,	347
Blanford, Messrs., H. F. and W. T. of the Geological Survey of India, Contributions to Indian Malaeology, No. 2,.....	347d
Cowell, E. B. Esq., M. A., Notices of new works relating to Sanskrit Literature, (Dr. Goldstücker's Mánava Sútras),...	42
———— Gyges' ring in Plato and Nizámí,.....	151
Fytcbe, Lt.-Col. A., A note on certain Aborigines of the Andaman Islands,.....	263
Griffith, R. T. H., Esq. M. A., Indian Idylls, No. I.,	111
Hall, Fitz-Edward Esq. D. C. L., A Donative Inscription of the Tenth Century; the Sanskrit Original and its Substance in English: with Remarks on the later kings of Dhára in Málava,	195

Hall, Fitz-Edward Esq. D. C. L., Decipherment of an Inscription from Chedi,	317
— Letter on the Guptas, &c.,	383
— Note on Budhagupta,.....	139
— Of two Land-grants issued by king Hastin, bearing date in the years 156 and 163 after the Subversion of the Guptas,	1
— The Inscriptions of Erikaiṇa, now Eran, re-deciphered and re-translated,.....	14
Haidinger, Dr. W., Report on the Shalka, Futtehpore, Pegu, Assam and Segowlie Meteorites sent from the Asiatic Society of Bengal, Calcutta, to the Imperial Museum of Vienna,	129
Harris, Capt. J. C., Bengal Engineers, Notes on the Rainfall in the Basin of the River Mahánuddy and the floods consequent thereupon,	216
Mackay, Rev. Dr. W. S., The Great Comet of 1861,	279
Mazure, The Very Rev. Thomine de, Vicar Apostolic of Thibet, Memorandum on the countries between Thibet, Yunan and Burmah, with notes, &c. by Lt.-Col. Yule,	367
Medlicott, H. B. Esq. B. A., F. G. S., On the Sub-Himalayan rocks between the Ganges and the Jumna,	22
Montgomerie, Capt. T. G., Bengal Engineers, F. R. G. S., Memorandum on the progress of the Kashmir Series of the Great Trigonometrical Survey of India, with Map and Observations on the late conquest of Gilgit and other incidental matters,	99
Pogson, N. R. Esq., F. R. A. S., Discovery of the New Planet "Asia,"	291
Rájendralál Mitra, Bábu, on the Identity of the Toramānas of Eran, Gwalior and Kashmir,	267
————— Translation of a Bactrian Inscription from Wardak,	337
Sarel, Lt.-Col. H. A., B. A., F. R. G. S., Notes on the River Yangtse-kiang from Hankow to Pingshan,	222
Yule, Lt.-Col. H., Bengal Engineers, A few notes on Antiquities near Jabalpur,	211

LIST OF ILLUSTRATIONS, &c.

Sketch of Gilgit and the Adjacent Countries,	104
Fig. of the form of the Segowlie Meteoric Specimen in the Society's Museum,	138
Ancient Temple near Jabalpur,	212
Map of the Yangtse-kiang from Hankow to Pingshan,	222
The Aborigines of the Andaman Islands,	251
Facsimile of an Inscription from Wardak,.....	337
Plates (I. and II.), Fossil shells,	347 <i>d</i>
Map of the Countries between Thibet, Yunan and Burmah, ...	367



JOURNAL
OF THE
ASIATIC SOCIETY.

No. I. 1861.

Of Two Land-grants, issued by King Hastin, bearing date in the years 156 and 163 after the Subversion of the Guptas.—BY FITZ-EDWARD HALL, ESQ., D. C. L.

Shortly before his final departure from India, Mr. Edward Thomas was apprized, by me, of the existenee of two unpublished inscriptions deposited in the museum of the Benares College. On his obligingly consenting to furnish me with his reading of them, they were transmitted to him ; and, in May, 1857, he was so good as to send me his decipherments from England. At that time I was unable to avail myself of the fruit of his labour, for guidancee or for suggestion, as I no longer had access to the originals. Having, however, at last obtained the loan of them, and having given some study to the Hindu alphabets now obsolete, to say nothing of the assistanee for which I am beholden to Mr. Thomas, I purpose to lay out the result of my researohes on these aeneient relies.

With the aid of the transliterations exeecuted by Mr. Thomas, the very same with which he favoured me, an abstraet version of one of the memorials in question was prepared by the late Professor H. H. Wilson. This abstraet Mr. Thomas has printed :* but the Sanskrit has hitherto remained inedited.

In treating of these inscriptions, Mr. Thomas notices that the late Major Kittoe eommunicated, regarding them, with Colonel

* *Essays on Indian Antiquities, &c.*, by Mr. James Prinsep ; Vol. 1. pp. 251 and 252.

Sykes, and that "they seem to have been originally proeured from Nagode in Bundalkand." Major Kittoe, when about to leave this country, presented them to me; and by me they were made over to the Benares College, of which they are now the property.

It is chiefly in respect of their incidence on the litigated topic of the Gupta era, that Hastin's proclamations possess any value. Professor Wilson surmised that both exhibit the same date; and herein he mistook, there being two dates. Neither of them, verbally considered, did he unriddle aright, as I shall evidence; and yet, by happy accident, a wrong theory conducted him to the equivalent, in words, of the later.*

* "One copy has षषोत्तर वषगे; the other, त्रिषष्टोत्तरे वषते. Putting them together, the probable reading is त्रिषष्टोत्तरे वर्षशते," that is to say, "in the 163rd year." So writes Professor Wilson, whose romanization I have, for uniformity, turned into Devanāgarī.

As for the words given above as first, there appear, on the plates, after the initial ष, two complex characters, unmistakeably ढ and चा, which it will not answer to pass by as if they were superfluities. Mr. Thomas gives them, in his decipherments, in their archaic delineation, but resolves only one of them, the second, which he takes to be for च्च. Again, what next follows, the Professor's षो, is, past all gainsay, शो; and, in place of षगे in his वषगे,—and so of षते in his वषते—I read, without a misgiving, शते as he also did eventually.

The first symbol of the mislection वषगे, and the first of the mislection वषते, are still to be disposed of. In the originals they have identically the same aspect, that of almost a square, with a hook, curved forwards, depending from its lower right-hand angle. Mr. Thomas explains it, in one of the grants, as ब; in the other, as वृ, which it nearly resembles. My व्द incurs small risk of being impugned. After all, Professor Wilson held it as probable that ष— which the shape of the old ब is distantly like—was intended; with nothing subjoined, however, but with र surmounting it. For his ष only substitute, in my readings, व्द, and the figures 156 and 163 will come out, in the two inscriptions respectively. Concerning the first letter of the tentative वर्षशते it remains to be said that it has no representative whatever in the two pairs of words which are fused into the tertium quid now conclusively invalidated.

One and the same person having originated both the grants, we could not expect to find them divided by any considerable interval of time. Independently of all that has been said above, the date of what I call the earlier contains a manifest inaccuracy. This I venture to heal; and in such a manner as to do no

In supersession of a proposal formerly put forth, and from which my present state of information would have withheld me, I now accede to the view that the Kahaun inscription is dated from the overthrow of the Guptas, of whom Skanda must have been virtually the last.* The land-grants adverted to have wrought this reversal

chronological violence. If, to this end, I am satisfied of the probability that the reading षट्त्रिंशत्तमः was intentional, correct Sanskrit demanding षट्त्रिंशदुत्तरं, I scarcely doubt that any scholar will discern, from my subsequent annotations, that the inscriptionist was, presumably, not quite incapable of such an aberration from grammatical orthodoxy as I here assume in him.

It may be added that षट्त्रिंशत् was, very likely, the vernacular transitional form intermediate between the pure Sanskrit षट्त्रिंशत् and the Hindî षत्तस. The Mahārāṭī is षत्तस. With this compare the Prākṛit षत्तस. See Professor Cowell's admirable edition of Vararuchi's Grammar; III., 44.

* See the Journal of the American Oriental Society, Vol. VI., p. 530. Annexed is the commencement of the Kahaun memorial, with a version of it which I regard as more tenable than the one I published as above.

यस्योपस्थानभूमिर्द्विपतिशतशिरःपातवातावधूता
गुप्तानां वंशजस्य प्रविष्टतयशसस्तस्य सर्वोत्तमर्द्धैः।
राज्ये शक्रोपमस्य क्षितिपशतपतेः स्कन्दगुप्तस्य शान्ते
वर्षे त्रिंशद्दशैकोत्तरकशततमे ज्येष्ठमासि प्रपन्ने॥

'The month of Jyeshṭha being current, the empire of Skanda Gupta—the floor of whose audience chamber had been swept by gusts from the bowing of the heads of kings by hundreds; sprung from the line of the Guptas; of wide extended fame; opulent beyond all others; comparable with S'akra; lord of hundreds of monarchs—being extinct for the hundred and forty-first year,' etc.

My former translation, which will be referred to further on, runs as follows; 'The month of Jyeshṭha having arrived, in the one hundred and forty-first year; the empire of Skanda Gupta * * * being quiescent,' &c.

Al Birúní, as reproduced, in French, by M. Reinaud, asserts: "Quant au Goupta-kāla l'ère des Gouptas, on entend, par le mot Goupta, des gens qui ont été méchants et puissants; et l'ère qui porte leur nom est l'époque de leur extermination."

Now, the use, in close juxtaposition to mention of the Gupta kingdom, of so equivocal a term as शान्त, in one inscription, and of भुक्ति, in another the later of Hastin's, was enough, as soon as observed, to arrest attention. The former word, to be sure, bears the import of 'quiescent,' 'serene,' 'tranquil,' 'unperturbed,' 'flourishing,' no less than of 'discontinued,' 'extinguished;' but the latter, if unqualified by a temporal particle, denotes 'possession,' or 'fruition,' only as a

of opinion ; and it will be perceived that, in expounding them I decline Professor Wilson's rendering of their cardinal expressions.

thing of the past. Ordinary meanings which it has—all of them metaphorical of 'eating'—are 'used,' 'worn,' 'consumed,' 'disbursed,' 'expended.' In the older of Hastin's grants the phrase is भुक्ति which, like भोग, may signify, 'tenure,' 'ineumbency ;' other customary senses of it being, at the same time 'dissipation,' 'waste,' 'destruction.' In order to substantiate the counter-position to that which I take touching the acceptation of शान्त, मुक्त, and भुक्ति, as chronologically bearing, in the phraseology of inscriptions, on the state of an empire, it must be made out that, in other writings of the same nature, these words imply duration to the period particularized.

The partiality of the Hindus to euphemism is notorious ; and it is, therefore, not surprising that where, as in the Kahaun inscription, reference is made to an era determined by the annihilation of a series of powerful princes that diction which is least dyslogistic should be studiously selected. Congruously with such avoidance of an invidious term as has been indicated, it is likewise not at all singular that a direct encomium should be bestowed on a potentate who, however truculently he may once have lorded it, having been dust and ashes nearly a century and a half, could be favourably commemorated without antagonism to the impulses of family pride and without hazard of irritating popular prejudice. Pending the emergence, as established historical entities, of dynastic successors to Skanda, it will, then, be perfectly safe to look upon him as the last of the Guptas. Even should it transpire that he was survived by descendants who were not entirely disendowed of power, yet in him, so far as we are informed, the lustre of his lineage underwent definitive and irremediable eclipse. On collation of the wording of Hastin's grants with that of the Kahaun pillar, we thus discover no trifling corroboration of the statement derived from the Arabian traveller : and his language, in passing, will endure no alternative construction.

Skanda Gupta's inscription is in the measure known as *Sragdhará*. In extracting the figures from the third verse of its first stanza, as 133, Mr. Prinsep imagined that he followed the original in putting दृ for the fifth syllable. In so doing, he has broken the metre. His reading, prosody apart, required दृ ; but there was less than this, he saw, in his facsimile. And, again, 'two,' would in right Sanskrit, be expressed, in the place where he meant to impose it, by दृग्, not by his दृश्. The true numeral is दश 'ten.' Once more, only a few words before the error here redressed, he read, for शान्ते, which is in his facsimile, शान्तेः "after the decease" or "of the repose, i. e., death,"—of Skanda Gupta,—in allusion to विषे "in the year." See this Journal, for 1838, pp. 37, 38.

The records under consideration are on thin plates of copper. The older set consists of two pieces, having, each, a superficies of about eight inches by five. In the other set are three plates, of which two measure seven and a half inches by five and a half; while the third, only partially written over, is a little more than five inches long, and averages two in width. Near the top, the plates are perforated midway between the sides, for convenience of tying them together; and each set is accompanied by an engraved ring.

In the main, the paleography employed in these inscriptions is closely homogeneous with that which distinguishes the Allahabad monolith of Samudra Gupta. Their η alone is indubitably more recent. Strangely enough, however, two of their characters, s and h , everywhere occur of an earlier configuration; and of gh and sh the older forms and those of Samudra Gupta both appear in them. Still these conclusions are not inevitable; for there is nothing unreasonable in the supposition that, in some quarters of the country, by force of local influences, the constituents of the antique alphabet were not all modernized simultaneously.

My annotatory observations on small matters will be found, it is anticipated, as circumstantial as the most microscopic critic could ask for.

Not to go out of India, we have, it should seem, an example of an epoch denominated to memorialize the discomfiture of a hostile people. Agreeably to a scholiast of Varāhamihira, this is the case with the familiar era of *Saka*; and an expression used by Brahmagupta points to the same fact. See Colebrooke's *Miscellaneous Essays*, Vol. II., p. 475.

INSCRIPTION NO. I.

नमो महादेवाय ।* खस्ति । घट्पञ्चाशोत्तरे† ऽब्दशते गुप्तव्य-
 राज्यभुक्तौ महावैशाखसांवत्सरे‡ कार्तिकमासे§ शुक्लपक्षतृतीयाया-
 मस्यां दिवसपूर्वायां ऽपतिपरिव्राजककुलोत्पन्नेन॥ महाराजदेवाह्य-
 प्रनम्ना महाराजप्रभञ्जननम्ना॥ महाराजदामोदरसुतेन गोसहस्रह-
 स्यश्चहिरण्यनेकभूमिप्रदेन॥ गुरुपितृमातृपूजातत्परेणा ऽयन्तदेवना-
 ह्यभक्तेना** ऽनेकसमरशतविजयिना†† स्ववंशामोदकरेण महाराज-
 श्रीहस्तिना स्वपुण्याप्यायनार्थमात्मानं स्वर्गसोपानपङ्क्तिभिरारोहय-
 ता ‡‡ ब्राह्मणवाजसनेयमाध्यन्दिनकौत्ससगोत्रगोपस्वामिभवस्वामि-
 सन्ध्यापुत्रदिवाकरदत्तभास्करदत्तसूर्यदत्तेभ्यो §§ वसुन्तरघेण्डिकग्रा-
 मोऽतिह्यः ।

* महादेवय, on the plate; and wrongly. Mistakes of this sort,—short vowels for long, and the reverse,—due either to carelessness or to ignorance, abound in these inscriptions. With the reservation of material instances, and a few others, they have been silently rectified in my copies for the press. Such misseripts as पुजा and महिमतां scarcely deserve more ceremonious handling.

Interpunction is pretty freely introduced; and the sign looks very like a *visarga*. *Visargas*, where they should be, are not seldom left out; and of *anuswaras* there is a like excess and defect. They have been set right tacitly, with two exceptions. Concurrent words which rigorous euphony would interlock, are sometimes found asunder; and they have not been conjoined. The originals in all cases double consonants which have *r* over them. I have simplified this duplication.

† In the notes to my introductory remarks, this error has been dwelt on at length.

‡ Improved from सम्बत्सरे, In the last stanza towards the end is षष्टिम्बर्ष. It is rare, I believe, for ब to be put for व in an inscription so old as the present.

§ Substituted for मासं. Or, permissibly, मास might be taken in composition with what ensues.

॥ Erroneously, on the plate, कुलोत्पन्नेन.

॥ An unmeaning ना which here follows has been dismissed.

** भक्तेन नैक, in the original, which also shows an excrescent त after शत.

†† On the plate the nasal element of वंश—is yoked to the sibilant, in the shape of न. And so in the second grant.

‡‡ These documents, between them, once give वाजसनेय orthographically; वाजिसनेय, once; and वाजिसनेय, thrice.

§§ For the inscriptionist's दत्तस्य.

समन्ताद् गर्ता । उत्तरे पार्श्वे मोनपूर्वभूक्तिमर्यादा । सन्ध्यापुत्रप्र-
मुखानां सोद्रङ्गः सोपरिकरः अचाटभटप्रावेश्यः चौरवजं च ।

तदस्मत्कुलोत्थैः* मत्पादपिण्डोपजीविभिर्वा कालान्तरेष्वपि न
व्याघातः कार्यः । एवमाज्ञप्तम्† योऽन्यथा कुर्यात् तमहं देहान्तर-
गतोऽपि महताऽवधानेन‡ निर्दहे ।

उक्तं च भगवता परमर्षिणा वेदव्यासेन ।

पूर्वदत्तां द्विजातिभ्यो यत्नाद् रक्षऽ युधिष्ठिर ।

महीं महीमतां श्रेष्ठ दानाच्छ्रेयोऽनुपालनम् ॥

बहुभिर्वसुधा भुक्ता राजभिः सगरादिभिः ।

यस्य यस्य यदा भूमिस्तस्य तस्य तदा फलम् ॥

घष्टिं वर्षसहस्राणि स्वर्गे मोदति भूमिदः ।

आच्छेता चाऽनुमन्ता च तान्येव नरके वसेत् ॥ इति ॥

लिखितं च वक्रामात्यप्रनम्ना ॥ भोगिकामात्यनरदत्तनम्ना भोगिकर-
विदत्तपुत्रस्यर्धदत्तेनेति । दूतको भाग्रहः ।

TRANSLATION.

Glory to the great God !¶ Well be it !

In the year one hundred and fifty-six of the extinction* of the
sovereignty of the Gupta kings, in the year Mahāvais'ákha,† on the
third day of the light fortnight of the month Kártika, in the fore-

* The other grant combines this word euphonically with the foregoing.

† It is the mere rudiment of a superscribed circle which I here read into
an *anuswara*, in the original. In the other inscription even this is missing.

‡ Is there such a voeable? Perhaps अवधानेन is meant. I translate as if it
were. The second inscription has the same anomaly.

§ Both sets of plates have distinctly रक्ष्य, which here is nothing.

॥ नम्ना on the plate, by oversight. In the other grant is प्रनम्ना. Hence, by
abrasion, the Hindi पन्तो.

¶ S'iva, on presumption, not by proof.

* "Occupation," says Professor Wilson: an explication already discussed.
He adds: "भुक्ते or भुक्तौ; but it may also be read मुक्ते: or मुक्तौ, 'from the
end, or cessation.'" To this liberty of option Mr. Thomas emphatically
demurs; and with the strongest of reasons. Any the slightest conversaney with
Sanskrit paleoglyphs is incompatible with a decision so indulgent.

† It has not been ascertained what system of computation is here contem-
plated. Professor Wilson renders: "in the year (of the cycle) Vais'ákh."

noon of that *day*;* by the great king, the auspicious Hastin, sprung from the house of the Parivrājaka princes,† great-grandson of the great king Deváhya,‡ grandson of the great king Prabhanjana,§ and son of the great king Dámodara ; giver of thousands of kine, of elephants and horses, of store of gold pieces, and of land ; diligent in homage to his spiritual guides and to his father and mother ; most devoted to the gods and to Brahmans ; victorious in many hundreds of battles ; the delighter of his race ; with view to enhance his own worthiness, and that he might make himself to mount by the flights of steps celestial, the village of Vasuntarashendika|| has been ceded, absolutely, to Gopaswámin, Bhavaswámin, Sandhyáputra, Divákara-datta, Bháskaradatta, and Súryadatta, Vájasaneya-Mádhyaandina Brahmans, of the stock of Kutsa.¶

For this he has no warrant. The prefix which I give is sufficiently clear on the plate.

* Here I follow Professor Wilson, who writes : “ in the fore-part of the day.” दिवसपूर्वा is, however, illegitimate Sanskrit, in this senso.

[Since the receipt of this paper for publication, Mr. Hall has sent the following, which he desires to have here inserted : “ The compound in the text is perfectly legitimate Sanskrit, but not a substantive, and having nothing to do with “ forepart of the day,” or my ‘ forenoon :’ for I here deferred to Professor Wilson unadvisedly. A re-perusal of the Iran inscriptions, as they actually read, has taught me how to unlock this quaint and antiquated expression. Understanding तित्थि, I would construe, not over-literally, ‘ on that, *i. e.* the aforesaid lunar day, and on the day of the week therewith coincident.’ Correct accordingly in Inscription II. as well.”—EDITORS.]

† “ By the exalter of the family of the chief of the ascetics,” according to Professor Wilson. Partly from misreading the Sanskrit, this is unallowable. The Parivrājakas now come to light for the first time.

‡ Not “ Dwarhya,”—Devarhya ?—as Professor Wilson wishes. In both inscriptions the name is most legibly incised ; and Mr. Thomas’s decipherments bear out my lection unhesitatingly.

It would be rash to speculate that there is a mistake for देवाक्षय ‘ named Deva.’

§ Seemingly, Prabhanjana. The second grant clears up all uncertainty.

|| By possibility, this name is Vasantarashendika.

¶ कौत्स, past doubt, in the Sanskrit of both inscriptions. Mr. Thomas so understands, in the other ; कौत्स, in this. Professor Wilson puts “ of Kans’ika ;” appending, as a foot-note : “ The reading of one is ‘ Kosiya ;’ of the other

In all directions *this village has fosses of demarcation*. On the north side is the boundary of Mona and *that of Púrvabhúkti*.* To Sandhyáputra and the rest *the place is assigned*,† privileged from the ingress of fortune-tellers and soldiers, and *with right to rid itself of robbers*.

By virtue of these presents, impediments *to the franchises herein patented* are not to be opposed, even in after times, by those who arise in my family, or by those who are maintained by subsistence accruing from my shares.‡ Thus it is enacted. Let one do otherwise *than as I have decreed* and, though *my soul shall have transmigrated* into another body, I will, with intense vigilance, bring him to destruction.

‘Kaus’alya.’ Ought it to be Kas’yapa?” The sibilants are nowhere interchanged, in these instruments.

The names of only the first two of the douces enumerated above have place in Professor Wilson’s translation; and the village bestowed away is there represented by a blank. On what comes next, and down to the preceptive verses, he remarks, premising “with the boundaries (specified):” “then follow a number of unintelligible names of places, after which there is a prohibition to any of his successors to revoke the gift.”

* My decipherment and rendering, at this point, may be liable to amendment.

† On the import of two terms which here succeed, in the original, our dictionaries shed little light. With respect to the second I have ventured a guess, which I am unable to recall, in a paper not by me at this moment. The first may define the village under alienation, vertically to the mid-air.

There is something of experiment in the meanings attached to the remaining particulars of the paragraph. See the Journal of the American Oriental Society, Vol. VI., p. 541.

‡ This is obscure. The royal ‘fourths’ cannot be designated by these ‘shares.’ Only at calamitous conjunctures was twenty-five per cent. the price, accredited by the Laws of the Mánavas, of the safe-guard exercised by Hindu kings.

It has, of course, occurred to me that पाद् signifies ‘feet.’ ‘Subjects’ would then, be intended. But they would hardly be denoted by such a periphrasis as we here encounter. More than this, the idea involved savours unconventionally of haughtiness.

If I be not in fault, Hastin refers to the deductions from his revenues, appropriated for the sustenance of his relatives. As kindred of majesty, they must have had superior opportunities to oppress undetected. पाद् means ‘portion’ generally, no less than ‘quarter.’

And it has been declared by the worshipful and preminent sage, Vyása of the *Veda* :

Strenuously guard, O Yudhishtira, land presented aforetime to the twice-born : *for* more laudable is protection after *gift* than is donation, most excellent among rulers.

By numerous kings, *for instance*, Sagara and others, the earth has been enjoyed. To him of whomever, at any time, is a territory, appertains then the fruit of *merit attached to the bestowments of land made by his predecessors*.

For sixty thousand years the donor of land rejoices in paradise ; *but* just as many does the disseizor, and *so* the abettor of *disseizin*, abide in a region of dolor.*

The end. And *this was* engrossed by Súryadatta, son of the financier† Ravidatta, grandson of the financier and minister Naradatta, great-grandson of the minister Vakra. The commissioner *in the transaction was* Bhágraha.

INSCRIPTION, NO. II.

नमो महादेवाय । स्वस्ति । त्रिषष्ट्युत्तरेऽब्दशते गुप्तनृपराज्यभुक्ते
महाश्वयुजसांवत्सरे‡ चैत्रमासे§ शुक्लपक्षद्वितीयायामस्यां दिवसपू-
र्वायां नृपतिपरिव्राजककुलोत्पन्नेन महाराजदेवाह्वयप्रनम्रा महाराज-
श्रीप्रभञ्जननम्रा महाराजदामोदरसुतेन गोसहस्रहस्त्यश्वहिरण्या-
नेकभूमिप्रदेन गुह्यपितृमातृपूजातत्परेणा ॥ ऽत्यन्तदेवब्राह्मणभक्तेना-
ऽनेकसमरशतविजयिना स्ववंशामोदकरेण महाराजश्रीहस्तिना

* Professor Wilson's translation of these stanzas is not simply loose, but incorrect. Still, a minute critique on the subject may be dispensed with.

† So I apprehend, at a venture, what Professor Wilson esteems "the title or designation Bhogika." The name of Súryadatta's great-grandfather, Vakra, whom the Professor ignores, is bare of this qualification ; and hence it cannot denominate his family.

Words contained in these inscriptions, hitherto uninserted in our lexicons, or of which, as I here understand them, supplementary acceptations are desiderated are उद्रङ्ग, उपरिकर, चाट, दूतक, परिकेद, प्रनमृ, भोगिक, महीमत्.

‡ Thus, and rightly, on the plate. See a note on the first inscription.

§ सासं, with the *anuswára* faintly traced, in the original.

॥ First, पूजनत—was engraved. A त was then interliterated, in lieu of the न, left uncrased ; but the vowel of ज was not lengthened, as it should have been.

खपुण्याप्यायनार्थमग्निस्वामिपुत्रभारद्वाजसगोत्रवाजसनेयसब्रह्मचारि-
 ये देवस्वामिने शर्वस्वामिने च गोरिस्वामिने वाजसनेयसब्रह्मचारिणे
 कौत्ससगोत्राय दिवाकरस्वामिने च खतिस्वामिने वाजसनेयसब्रह्म-
 चारिणे भार्गवसगोत्राय वरुणशर्मणे* बप्पस्वामिने वासुलसगोत्राय
 कठसब्रह्मचारिणे † कुमारदेव वाजसनेयसब्रह्मचारिणे ‡ नमात-
 शर्मनागशर्मखरदेवकौद्रवदेवविष्णुदेवदेवनागकुमारसेनरुद्रशर्मदेव-
 दाङ्गरालम्बोष्ठदेदमितमहादेवगुणवकः § इत्येवमादिभ्यो ब्राह्मणेभ्यो
 ऽन्तरपट्टे कोर्परीकायाहारः साद्रङ्गः सोपरिकरः अचाटभटप्रावेश्यो-
 ऽतिख्यः । तस्याघाटाः पूर्वण कोर्परगता उत्तरेण निमुक्तककोणकः
 वङ्गरयामस्य दक्षिणपार्श्वे वलकमध्ये ॥ मष्टकः अत्रतसन्तारकः पश्चि-
 मेन नागसरी । दक्षिणेन बलवर्मपरिच्छेदः । तदस्मत्कुलोत्थैर्मत्पादपि-
 षोपजीविभिर्वा कालान्तरेष्वपि न व्याघातः कार्यः । एवमाज्ञप्तम् ।
 योऽन्यथा कुर्यात् तमहं देहान्तरगतोऽपि महताऽवधानेन निर्दहे ।
 उक्तं च भववता परमर्षिणा वेदव्यासेन ।

पूर्वदत्तां द्विजातिभ्यो यत्नाद्रक्ष ॥ युधिष्ठिर ।

महो महीमतां श्रेष्ठ दानाच्छ्रेयोऽनुपालनम् ॥

बज्जभिर्बसुधा भुक्त्वा राजभिः सगरादिभिः ।

यस्य यस्य यदा भूमिस्तस्य तस्य तदा फलम्** ॥

खदत्तां परदत्तां वा यो हरेत वसुन्धराम् ।

स विषया कृमिभूत्वा पिष्टभिः सह पचते ॥

षष्टिं†† वर्षसहस्राणि स्वर्गे मोदति भूमिदः ॥

आच्छेत्ता चाऽनुमन्ता च‡‡ तान्येव नरके वसेत्§§ ॥

* The vowel has been supplied.

† An intrusive रेव, after कुमारदेव, has been expunged.

‡ The engraver here forgot ए entirely.

§ Following कुमारसेन—is a small character resembling प. Probably it is superfluous. Yet Kumárasenapa may have been a name.

॥ The plate has मध्ये.

॥ य—, in the original.

** In the grant this verse runs :

सस्यय यस्य यदा भूमिस्तस्य तदा फलम्

†† Parts of the letters in षष्टिं वर्ष—are lost, from corrosion of the plate.

‡‡ स in the original.

§§ The त was omitted by the artist.

लिखितं च वक्रामाद्यप्रनम्ना* भोगिकनरदत्तनम्ना भोगिकरवि-
दत्तपुत्रेण महासान्धिविग्रहिकसूर्यदत्तेन । भाग्रहो दूतकः ।

There is so much that is common between this inscription and the first, that it seems needless to translate it in full. I shall, therefore, restrict myself to a punctual specification of its variations from the other.

It is dated in the forenoon, on the second day of the moon's increase in Chaitra, in the year Mahás'wa-yuja,† one hundred and sixty-three years after the domination of the Guptas had been laid to rest. Prabhanjana has the epithet of 'auspicious.' The clause about the stairs to elysium is dropped. The donees are as follows : Agniswámiputra, a Vájasaneya catechumen, of the stock of Bharadvája ; Devaswámin ; S'arvaswámin ; Goriswámin, a Vájasaneya catechumen, of the stock of Kutsa ; Divákaraswámin ; Swatiswámin, a Vájasaneya catechumen, of the stock of Bhṛigu ; Varuṇas'arman ; Bappaswámin, of the stock of Vasula,‡ a Kāṭha catechumen ; Kumáradeva, a Vájasaneya catechumen ; Namátas'arman ; Nágas'arman ; Rukharadeva ; Kaudravadeva ; Vishṇudeva ; Devanága ; Kumárasena ; Rudras'arman ; Devadángā ; Rálaboshṭha ; Dedamita ; Mahádevagunvaka.§ These and other Bráhmans are collated, in perpetuity, to the benefice of Korparíka, which, apparently, was situated in the heart of a village.|| The estate thus assigned was bounded, on the east, by the ditch of Korpara ; on the north, by Nimuktakakonaka, in the village of Vangara ; on the south, by

* Here precede two characters. They may be a bungling repetition, abandoned unfinished, of नम्ना. A little forward are पुत्रेण, सूर्यदत्तेन, and भाग्रहो.

† "Ashwayuj (?)," writes Professor Wilson. To this grant, which he does not translate, he devotes a few notes, and nothing more. They have mostly been cited.

‡ This family has long passed away. It may be remembered in the larger Hindu genealogies : it is not in the smaller. For what may be the same name see Vol. XXIX. p. 18.

§ These persons, from Devadángā inclusive, bear very strange appellations, as best I can unlock them. I do not guarantee that they have been groped out infallibly. This remark also applies to some proper names just below.

|| Otherwise, "in Antarapatta?" Else, "in Antarapadda?"

Mavrika and Amvratasantáraka, in Valaka; and, on the west, by Nágasari. To the south lay the allotment* of Balavarman.

The three stanzas of the other grant are repeated in this; but, before the last of them, we have another: 'He who resumes land, given by himself, or given by another, transformed to a dung-worm, along with his progenitors, receives retribution.'

Súryadatta is now become 'great feical.' He styles his grandfather 'financier,' and no longer 'minister.' Bhágraha, as seven years before, is the commissioner. His name here precedes his title, in the Sanskrit.

Each of the sets of plates as I have said already, is accompanied by a rude signet ring. 'Of the fortunate Hastin,' is inscribed on one of the rings; and 'The fortunate King Hastin,' on the other.†

Saugor, December 22, 1860.

* I conjecture that some subdivision of land was, in old times, technically styled परिच्छेद.

† श्रीहस्तिनः and श्रीहस्तिराज. The latter should terminate in—राजः or—राजस्य. The genitive is preferable.

The following passage of an inscription was faultily printed at p. 18 of the last volume of our Journal. Nor is the interpretation of it there offered altogether free from inexactness. A re-translation is subjoined to the original.

सिद्धिः । संवत् १११५ वर्षे फाल्गुनवदि गुरौ ।
 मदपतितकपोलः कान्तदन्तः कपालस्
 तिमिततिमिरजालः सच्चलत्कर्णतालः ।
 कुलिशकठिनशृण्वादण्डराजन् मनोवि-
 द्भकदलनकरालः पातु वः शम्भुबालः ॥

'Auspiciousness! Year of Samvat, 1115: Thursday, the 8th day of the dark fortnight of Phálguna.

'May the son of S'ambhu—with exudation fallen on his cheeks; of brilliant tusks; whose head impedes all darkness; waving his ears; adorned with a staff-like proboscis, hard as adamant; potential in removing mental obstructions—protect you.'

The metre is the *Máliní*. There is a prosodial blemish in dividing the word at the conclusion of the third versc.

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*The Inscriptions of Erikaina, now Eran, re-deciphered and re-translated.—By FITZ-EDWARD HALL, Esq. D. C. L.*

A paper on these interesting relics, including reduced copies of Captain Burt's facsimiles, with the decipherments and translations of the late Mr. James Prinsep, has already appeared in the pages of this Journal. It will be found in the seventh volume, that for 1838, pp. 631-635.

One of the inscriptions, the older, is engraved, in nine lines, on the western face of a large quadrilateral column, still erect and in good general preservation. It is twenty-nine inches in width, by a height of twenty. The other, which has an aspect eastward, spans the throat of a colossal image of a swine; not unnaturally mistaken, by the ignorant, for the similitude of a trunkless elephant. It speaks of the temple, of which the idol was aforetime the chief glory, or the reproach; an edifice now lying in littered dilapidation, its ruin being ascribed, in the oral traditions of the neighbourhood, to the great Muhammadan iconoclast of the twelfth century. This writing contains eight lines; and it measures, in height, about ten inches. The first line, considerably outrunning any of the rest, is a little within two and a half feet long. Captain Burt, in a volume I remember to have seen some years back, has, I believe, described the megalithic erections on which these records are incised. As a faithful account of them could hardly be missed of by a person of intelligence, and as, once given, it need not be repeated, I shall confine myself to the inscriptions.

Their contents are summarized, by Mr. Prinsep, in these words:

“The temple was built by Dhanyavishṇu, the confidential minister of Rājā Mātrivishṇu, the son of Harivishṇu, grandson of Varuṇavishṇu, and great grandson of Indravishṇu; in the first year of the reign of Rājā Tārapāni of Surāshtra (?): and

“The pillar was erected by Vaidalavishṇu, the son of Harivishṇu, also\* grandson of Varuṇavishṇu, and at the cost of Dhanyavishṇu,

\* This word should be expunged. “Hastivishṇu,” a mere lapse of the pen, as is evident to any one who reads two pages on, I have exchanged for ‘Hari-

on the fourteenth of As'hādha, in the year one hundred and sixty-five, in the reign of Budhagupta, in Suráshtra, comprehending the country between a river whose name, though partially erased, may be easily made out as the Kálindi, or Jamna, and the Narmadá, or Nerbudda."

As the inscription relating to the temple was formerly interpreted, it dates during the reign of "Tárapáni," and yet "before his time." Still, as Mr. Thomas justly observes,—though not with reference to this incongruity,—Mr. Prinsep "was clearly disposed to infer that the temple was built prior to the erection of the pillar;"\* and the supposition is borne out by the extract cited above. With several other of his positions, it must now give place to deductions built upon privileges of investigation which were denied to my predecessors. For instance, Dhanyavishṇu is not called "minister;" "Vaidalavishṇu" is the offspring of an erroneous reading, and so a present to history which may as well be returned; there is no mention of "Suráshtra" in either inscription; and Tárapáni" is undoubtedly a misdecipherment for 'Toramána." This last fact, if my memory does not fail me, was detected by Mr. Thomas. But what is by far most important of all, the date of the more ancient inscription† was unravelled amiss as to the numerical day of the

vishṇu.' The inadvertence escaped the editorial eye of Mr. Thomas. See his valuable publication entitled "Prinsep's Indian Antiquities," &c., Vol. I., p. 248.

\* Ibid., Vol. I., p. 340.

† Since writing this paper, I have had time, before sending it to the press, to refer, for a solution of the date in question, to my friend Bápú Deva S'ástrin, Professor of Mathematics in the Benares College. He apprizes me, in reply, that it conforms to the era of Vikramáditya, and does not conform to that of S'aliváhana. It is, therefore, all but demonstrably certain that Budhagupta was reigning on Thursday, the seventh of June, in the year of our Lord one hundred and eight, new style. Toramána must have flourished shortly after him; with something of likelihood, indeed, as his next successor. To Budhagupta's registration, relatively to the other Guptas, we have not the smallest trustworthy clue. As for chronologic adjustments grounded on comparison of the letters on old Hindu coins, they cannot, I maintain, be other than exceedingly insecure. In order to pronounce with assurance on the time of any of the Guptas but Budha, we must pause for fresh facts.

moon ; while the designation of the lunar fortnight to which that day is referred was passed by altogether. Counted from an unknown epoch, no Hindu date, unintegrated by the particularity at last amended, is available for eral determination. The omission to distinguish the demi-lunation would only add to the irksomeness of exploratory computation ; but any process of reckoning based on Mr. Prinsep's premises would, of necessity, have a delusive issue, if any at all.

Had Mr. Prinsep inspected the documents in discussion with advantage of the facilities I have been able to command, it is beyond question that his conclusions respecting them would have differed, as on matters of moment, so as to points of unimportance, from those he has recorded. Writing under obligation of the reserve impressed by this consideration, I shall stay to expatiate on but a few of the discrepencies, touching secondary details, which, on collation of our results, the attentive reader will discover. At the same time, I have weighed these cases, one and all, with my best diligenece. Standing before the originals, I compared my facsimiles, letter by letter, with those that have been lithographed ; and every the slightest dissimilarity of the copies was patiently tested by the perishing archetypes.

In fine, it is not undeserving of note that the inscriptions are, to a remarkable degree, clear from faults imputable to the artists who executed them.\* The peculiarities presented in the Sanskrit will be specified in the appropriate place.

Experimentally, if the Udayagiri inscription be made out rightly as to its leading features, and if its year be counted from Vikramáditya, the Chandragupta which it is said to uame must have borne sway about the middle of the first century before Christ. See Major Cunningham's *Bhilsa Topes*, p. 151 ; and this Journal, for 1858, p. 227.

\* Subjoined are all the examples ; पञ्चषष्ठ्यधिकः ऽवरणविक्षोः, in one inscription ; पुरेगाभ्यः, in both ; अशिरै. The rectifications will be seen in the sequel. No account is here taken of the vowels which time has obliterated ; but they are not numerous.

Consonants gratuitously doubled I have given single. Maitráyaṅya has, thus, been simplified to Maitráyaṅya. Coins are in existence which exhibit even Vikramáditya.

Ready intelligibility has, further, been consulted by acquiescing to the laxity of the inscriptionist where he neglects the canons which regulate the coalescence of consecutive vowels.

On the northern flank of the column, among several names, is that of Kailásajas'ambhu, as best I can unlock it. If *sanka*, apparently the epithet attached to it, be indicative of his profession, and if it signify "stone-cutter," it may be that we know who wrought, mechanically, the adjacent lines promulgating the piety and the pride of King Mátṛivishnu and his brother.

## INSCRIPTION I.

जयति विभुञ्चतुर्भुजञ्चतुरर्णवविमुलसखिलपर्यङ्कः ।  
जगतः स्थित्युत्तिन्ययादिहेतुर्गण्डकेतुः\* ॥

\* The first five lines of this inscription as engraved have, each, one or more letters fretted away at the right-hand extremity. Many is the bucolic tool that has owed its edge to the royal column, debased, of later years, to the uses of a whetstone. The restorations of these abrasures are indicated by brackets, in what follows.

- Line I.—स्थित्युत्तिन्य (यादि-)  
 ,, II.—आषाढमासश्च (क्त-)  
 ,, III.—महाश्च (द्र-)  
 ,, IV.—ऋतुयाजि (नो)  
 ,, V.—वरुणवि (व्योः)

The न्य of line I. is but very slightly damaged. A word thus beginning, and expressive of 'destruction,' is here wanted. Such a word was easy enough to find: and I have tacked to it a suppletive particle, quite in the Hindu taste, howsoever averse from our own. The metre is thus brought out identically the same as that at the commencement of the second inscription. Mr. Prinsep reads चय, in contradiction to the warrant of his facsimile, and at the cost of good prosody. It should be remarked that, in the antique character with which we are concerned, syllables rarely occupy a larger area, laterally, when containing, than when not containing written uninitial vowels; these, with the unique exception of the *u* as sometimes united with *r*, being, invariably, either superscript or subscript.

At the end of the second line Mr. Prinsep found in his facsimile, nothing but an upright stroke; and he has not surmised it to be part of any letter. But the stone has distinct traces of what can be only a श. To piece out शुक्त from this is sufficiently obvious. At the opening of the third line, द्वादश्या is unmistakable, in every element of it; and there is no ground for Mr. Prinsep's comment, that "the word is written, corruptly, *tryordas'yám*, in the original." Most fortunately, peremptoriness of assertion in this behalf is practicable. There is question of the date, concerning which I have already spoken.

शते पञ्चषष्ट्यधिके वर्षाणां भूपतौ च बुधगुप्ते आवाढमासशुक्लदा-  
दश्यां सुरगुरोर्दिवसे संसुरभु\* कालिन्दीनर्मदयोर्मध्यं पालयति लोक-  
पालगुणैर्जगति महारुद्रश्रियमनुभवति सुरभिसचन्द्रे च अस्यां संवत्स-  
रमासदिवसपूर्वायां स्वकर्माभिरतस्य क्रतुयाजिनो अधीतखाध्यायस्य  
विप्रर्षमैत्रायणोयन्टपभस्येन्द्रविष्णोः प्रपौत्रेण पितुर्गुणानुकारिणो वरु-  
णविष्णोः पौत्रेण पितरमनुजातस्य† स्ववंशवृद्धिहेतोर्ह्रिविष्णोः  
पुत्रेणाऽत्यन्तभगवद्भक्तौ विधातुरिच्छ्या स्वयंवरयेव‡ राजलक्ष्म्याऽ-  
धिगतेन चतुःसमुद्रपर्यन्तप्रथितयशसा अक्षीणमानधनेनाऽनेकशत्रु-  
समरजिष्णुना महाराजमाटविष्णुना तस्यैवाऽनुजेन तदनुविधायिनाऽ  
तत्प्रसादपरिगृह्येतेन धन्यविष्णुना च माटपित्रोः पुण्याप्यायनार्थमेव  
भगवतः पुण्यजनार्दनस्य जनार्दनस्य ध्वजस्तम्भोऽभ्युच्छ्रितः ।

खस्यस्तु गोब्राह्मणपुरोगेभ्यः सर्वप्रजाभ्य इति ।

Of the next suppliant I have little more to say than that my guess, on which I do not in the least conceit myself, is the best I can now wait to offer. How ill it assorts with the demands of the context has not passed unnoticed. Mean-  
time, the passage in which it occurs is one of very immaterial significance. The  
reduced facsimile of Mr. Prinsep, like the original, has an explicit रु before my  
speculative द्र; and, nevertheless, he reads ह्र. In what immediately succeeds  
he is utterly at fault.

For the supplementations to the fourth and fifth lines recourse has been had  
to the other inscription.

\* This, I take it, is the word in which Mr. Prinsep thinks he sees "Su-  
rāshṭras."

† More than once have I met with this hoary solecism in Sanskrit books; but  
where, recollection does not serve me to indicate.

‡ In consequence of misreading this word, Mr. Prinsep espied something  
about a "regency."

§ All along here Mr. Prinsep is quite abroad. He creates a "Vaidalavishṇu;"  
my 'victorious, in many a battle, over his enemies' is transformed, by him, into  
"Indravishṇu;" and Mātrivishṇu is represented as being tautologically called  
his great-grandson, and yet does not show himself thus in the English version.  
The other inscription should have dissuaded from this.

## TRANSLATION.

Triumphant is the four-armed *divinity*: omnipresent; of whom the broad waters of the four seas are the couch; cause of the continuance, origin, destruction, and the like, of the universe; whose ensign is Garuḍa.

In the year one hundred and sixty-five, on the twelfth *day* of the light fortnight of the month A'shāḍha, on the day of the Preceptor of the gods;\* and when Budhagupta—ruling, with the genius of the regents of the quarters, over the interval, chosen land of the gods, between the Kálinḍí and the Narmadá; possessing, throughout the world, the lustre of the mighty Rudra; a moon of excellent rays—was king: on that *lunar day* specified with the year, month, and week-day *aforesaid*;† by the great-grandson of Indravishṇu,—a Bráhmaṇ saint, of the illustrious Maitráyaṇíya monarchs,‡ who took delight in his duties, celebrated solemn sacrifices, and was well-read in the scriptures;—grandson of Varuṇavishṇu, who imitated the excellencies of his father;—son of Harivishṇu, who was the counterpart of his sire, and derived prosperity to his race;—the great king, Mátrivishṇu, a most devout worshipper of Bhagavat; who, by the will of the Ordainer,§ acquired, like as a maiden *sometimes* elects her husband, the splendour of royalty; of fame recognized as far as the four oceans; of unimperfect wealth; victorious, in many a battle, over his enemies;—and also by his younger brother, Dhanyavishṇu, who does him obeisance, and is revered because of his favour;—with purpose to advance the merit of their mother and father, this memorial monument to the divine Janárdana,|| slayer of the demons, was erected.

\* Or Brihaspati. The day is Thursday.

† This superannuated style of formula, characterizes the second inscription also. For a note on it see supra, foot-note.

‡ Not, as Mr. Prinsep has it, “the Maitráyaṇáyakṛipabha race. In both records alike the original is indubitable. This dynasty is likened to a constellation. At least, I can suggest no other explanation of the adjunctive *prabha*. ‘Illustrious’ may be esteemed to convey the intended comparison with requisite fidelity.

§ Vīdhátri; i. e. Brahmá.

|| Vishṇu, the predilective deity of the Maitráyaṇíya princes, as is patent throughout these publications.



May happiness attend the kine, the Bráhmans, the magnates, and all the subjects. The end.

## INSCRIPTION II.

जयति धरणुद्धरणो घनघोणाघातघूर्णितमहीध्रः ।  
देवो वराहमूर्तिस्त्रैलोक्यमहागृहस्तम्भः ॥

वर्षे प्रथमे पृथिवीं पृथुकीर्तौ पृथुद्युतौ महाराजाधिराजश्रीतोरमाणे  
प्रशासति फाल्गुनदिवसे दशमे इत्येवं राज्यवर्षमासदिनैः एतस्यां  
पूर्वयामे\* खलक्षणैरुक्तपूर्वायां† खकर्माभिरतस्य क्रतुयाजिनोऽधीत-  
खाध्यायस्य विप्रर्षेर्मेत्रायणोयन्द्रपभस्येन्द्रविष्णोः प्रपौत्रस्य पितुर्गुणानु-  
कारिणो वरुणविष्णोः पौत्रस्य पितरमनुजातस्य स्वर्णशृङ्गिहेतोर्ह-  
रिविष्णोः पुत्रस्याऽत्यन्तभगवद्भक्तस्य विधातुरिच्छया स्वयंवरयेव  
राजलक्ष्म्याऽधिगतस्य चतुःसमुद्रपर्यन्तप्रथितयशसः अक्षीणमानधन-  
स्याऽनेकशत्रुसमरजिष्णोः महाराजमातृविष्णोः स्वर्गतस्य भ्रात्राऽनु-  
जेन तदनुविधायिना तत्प्रसादपरिगृहीतेन धन्वविष्णुना तेनैव‡  
महाविभक्तपुण्यक्रियेण मातृपित्रोः पुण्याप्यायनार्थमेव भगवतो वरा-  
हमूर्तेर्जगत्परायणस्य नारायणस्याऽशीर्षः प्रासादः स्वविषयेऽस्मिन्ने-  
रिकैणे कारितः ।

स्वस्त्यस्तु गोब्राह्मणपुरोगेभ्यः सर्वप्रजाभ्य इति ।

\* On the stone there is an erasure where I propose ने until ingenuity shall improve on it.

The lithograph has पूर्व, and, a little before, राज्य, to neither of which does the stone lend support. The former decipherment is, hereabout, very precipitate.

† Mr. Prinsep shuts his eye to the long vowel of लक्षणै- in his facsimile: and for his स्तम्भ I by much prefer ° रक्त; though this too may possibly be bettered.

‡ A vertical fissure traversing the front of the idol here first lays one under real difficulties. Higher up it has carried away half of the घ in the epithet अक्षीणमानधन. The letters completely destroyed, beginning with that in the sixth line, fill the room of those which are bracketed as below.

## TRANSLATION.

Triumphant is the god who, in the likeness of a boar, lifted up the earth; who, by blows of his hard snout, tossed the mountains aloft; the *upholding* pillar of that vast mansion, the threefold world.

In the first year that the auspicious Toramāna, sovereign of great kings, of extended fame and wide-spread effulgence, is governing the earth; on the tenth day of Phālguna; even so, in the year and month and on the day of his reign before mentioned, during the first watch of the said *lunar day* as circumstantiated: of the great-grandson of Indravishṇu,—a Brāhman saint, of the illustrious Maitrāyaṇīya monarchs, who took delight in his duties, celebrated solemn sacrifices, and was well-read in the scriptures; grandson of Varunavishṇu, who imitated the excellencies of his father;—son of Harivishṇu, who was the counterpart of his sire, and derived prosperity to his race;—*that is to say*, of the great king Mātṛivishṇu, who has departed to elysium,—a most devout worshipper of Bhagavat; who, by the will of the Ordainer, acquired, like as a maiden *sometimes* elects her husband, the splendour of royalty; of fame recognized as far as the four oceans; of unimperfect wealth; victorious, in many a battle, over his enemies,—the younger brother, Dhanyavishṇu—who did him *due* obeisance, and was revered because of his favour; whose

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Line VI.—तेनैव (स) हा-

„ VII.—प्रा (साद्ः)

„ VIII.—सर्वप्रजा (भ्य इ) ति.

With regard to the स which is purely conjectural, it was prompted by the succeeding letter, which, however, looks only very dimly like ह. Whatever it may be, the appendant vowel is liable to no doubt. Mr. Prinsep at this place declined to extract any thing whatever from his facsimile. The only sense educible from my reading is most suspiciously far-fetched.

In the seventh line, the letter which is assumed to be स is broken off at the left; and of its vowel there is no vestige. Here, and in what follows, Mr. Prinsep appears to have hit the probable substitute for a fraction and a flaw. A word for 'temple,' as one cannot but see at a glance, is precisely what is desiderated.

About the symbols missing in the eighth line there can be no diversity of opinion. The valedictory blessing is the same, to a letter, in both the inscriptions; and, in the matter of legibility, it is everything that could be desired.

righteous deeds have been notably unintermitted;—with purpose to advance the merit of his mother and father, in his dominions, in this town of Erikaina, has caused this substantial temple of the adorable Náráyana, in form a boar, *affectionately* attached to the world, to be constructed.

May happiness attend the kine, the Bráhmans, the magnates, and all the subjects. The end.

*Camp Eran, Saugor District, December 31, 1860.*

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On the Sub-Himalayan rocks between the Ganges and the Jumna.—
 By HENRY B. MEDLICOTT, A. B., F. G. S., Professor of Geology,
 Thomason College, Roorkee.

(ABSTRACT.)

Pointing out briefly how, from the abundance of the fossil evidence, the Siwalik strata had at once taken their position in the acknowledged series of rock-formations, while very little indeed was known of their physical structure; and, how at the same time other groups of Indian rocks, whose stratigraphical relations were well known, had not as yet been accurately placed in the general succession, owing to the absence of such fossil evidence, Mr. Medlicott stated that his own attention had been specially directed to investigating the physical structure of the district referred to; not to the collection of fossils.

The rocks included are the Siwalik and the Nummulitic groups, and a series of schistose rocks, older than both these and lying to the north of them. The present notice was principally concerned with the newer groups, (the Upper Nummulitic and the Siwaliks,) the separation of which from the lower and more indurated underlying strata is generally well defined.

Up to the present time, our knowledge of these groups was as follows. The most connected sketch hitherto given is by Capt. R. Strachey, (Quar. Jour. Geol. Soc. London, Vol. VII. p. 292, 1851). This paper chiefly related to the rocks of the higher ridges and of Thibet, but the author refers also to the fossiliferous rocks at foot of the range. The section, given by Capt. Strachey, passing through Nainee Tal,

shews but a very bad development of the Siwalik rocks, and he could nowhere "find or hear of any fossil remains among them." He assumes them, however, to be the representatives of the rocks near Dehra. He then proceeds to notice a series of sandstones, with occasional small seams of lignite, and imperfect vegetable impressions, and with beds of marl, and occasionally salt-springs, which form the northern boundaries of the longitudinal valleys, or Dúns, the connection of which with the outer Siwaliks he could not trace, but conjectured that there must be great faults. Suggestions were thrown out, that these might be of the European Saliferous age, or possibly the extension of the strata containing rock salt which are found further to the west in the Salt range and in the hill district of Mundee. It was also suggested, as possible, that they might have some connexion with the fossiliferous beds near Subathoo. In 1853, a brief notice of the rocks about Subathoo, by Major Vicary appeared, (*Quar. Journ. Geol. Soc. London, Vol. IX. p. 70.*) In this paper, the author noticed the true Siwalik rocks, south of the Pinjore-dun, and also, a sandstone not unlike that of the Siwaliks, in the north of the dun, in which he had sought for fossils in vain. The connection of this with the outer Siwaliks is concealed. North of this we meet with confused strata of variegated shales, also unfossiliferous. On the ridge of Kussoolie, and beyond it to Subathoo, the fossiliferous rocks of the Nummulitic period shew, associated with variegated rocks, &c. These are made subjacent to the fossiliferous strata. All these groups, Major Vicary separates from the Simla series, by a great fault. Regarding the age of these older and inner rocks, neither Major Vicary nor Capt. Strachey offer any conjecture.

In M. D'Archiac's valuable treatise on the Nummulitic fossils of India, Major Vicary's section is copied and he is quoted as the authority for other statements. In these, there is an important discrepancy or error, which must be noticed. M. D'Archiac speaks, in the most unequivocal manner, (pp. 175-6) of mammaliferous strata, representatives of the Siwalik formation, about Subathoo—and there-
overlying the Nummulitic rocks. Inasmuch as Mr. Medicott's own researches had pointed out that the strict limitation of those fossils to the "Siwalik hills" is one of the most interesting facts in the geology of the district, he devoted repeated examination and enquiry on

the spot to investigating these statements, but he could find no trace of such fossils; nor could he reconcile M. D'Archiac's statements with Major Vicary's published account. Possibly the explanation of the difference is this. Major Vicary does mention fossil bones at and near to Subathoo, he says, "Saurian remains are, however, plentiful; I am not so sure with respect to mammalian remains, but, as the specimens are in good hands, I hope soon to settle that point." These remains, however, he in every case describes as occurring in blue or red shales alternating with or underlying Nummulitic strata. Without in the least questioning Professor Owen's skill in identifying genera from obscure remains, Mr. Medlicott was forced to think Major Vicary far too experienced and too intelligent a collector, to have failed in recognizing as mammalian such abundant remains as are mentioned by M. D'Archiac—"Elephas, equus, bos, cervus, &c., des debris de dent d'un elephant mastodontoide," and other similar statements. A clue to the explanation is to be found in M. D'Archiac's own words—that the sands, gravels and conglomerates with bones of large mammalia rest quite conformably on the Nummulitic beds near Subathoo, (p. 176.) Now there is not even an allusion to such rocks by Major Vicary; on the contrary he says, "The blue shale, on which the quarter-guard of Subathoo stands, contains fossil bones in abundance," and so in other cases. In truth, there are no such rocks at Subathoo, as those spoken of by M. D'Archiac. Such rocks are unquestionably the common habitat of Siwalik fossils, and it is not improbable that, in consequence of original deficient labelling of specimens and possibly of subsequent intermingling, or, in consequence of a misunderstanding of written or verbal communications, some true Siwalik fossils were mistaken as coming from near Subathoo.

Mr. Medlicott's own researches, extending over a direct distance of more than two hundred and fifty miles, from the parallel of Naince Tal to beyond the Sutlej, led him to expand considerably the series of rocks which were known to occur within these limits. This, for the present, could be most conveniently done under the two groups already known, viz. the Nummulitic and the Siwalik. Of these groups, the latter is continuous beyond the limits of the area examined; the former are much more irregular. The upper Nummulitic group

does not even reach the Jumna, on the east; while on the west also, its continuity is interrupted, though not permanently.

Thus the connection suggested in Capt. Strachey's paper and map between the lignite sandstone, N. of the Kotah Dún, and the fossiliferous sandstone of Subathoo, is not established. The Kotah Dún rocks really correspond to the Siwalik-like sandstone, N. of Pinjore Dún, in Major Vicary's section.*

Between the two groups, the most decided physical separation exists, a fault of enormous throw, amounting to the entire thickness of the two series, cutting off the Siwalik group from all to the north of it. To the east of the river Jumna, this great fault runs at a variable elevation along the flank of the hills lying to the north of the Dúns; the rocks, in junction on the north, being the limestones, slates, and grits of the lower Nummulitics and of the undetermined subjacent rocks—(the Masuri or Nainee Tal series): while to the west of the Jumna, the rocks in junction are generally these same schistose rocks, but often, especially at higher levels, the upper Nummulitic series.

North of this fault, there is no so decided a boundary; the junction of the upper Nummulitic series with the slaty series, lying to the north of it, is not (though so represented) a great fault. There is, undoubtedly, considerable local faulting; but, generally, the junction appears to be the original contact of deposition between unconformable strata. The upper Nummulitics in fact, seem to rest upon a ledge of the slaty rocks, upon a denuded surface of which they had been deposited.

There is a most marked geological separation to be made in the series spoken of as Nummulitic, upper and lower. Of the lower group, the best and least disturbed section is at the Król mountain on the new road to Simla. At this locality there is a well defined series (from 500 to 800 feet) of hard limestones with variegated slaty shales and grits, which may be called the Król group. It rests, unconformably, upon a great thickness of very thin bedded slaty shales and gritty flags, often highly carbonaceous and black; which may or may not prove to be a member of the lower Nummulitic series.

* All are confounded under one colour in Mr. Greenough's map.

The upper sub-division of the Nummulitics is best seen near Subathoo, and gives three sub-groups in descending order —

1st.—Sandy—hard sandstones largely predominate; well exposed in Kussowli hill. In this group (at Kussowli and elsewhere) some well-preserved leaves and stems of trees, and other remains of terrestrial vegetation have been found.

2nd.—Sandy-argillaceous—lumpy sandy red clays. These are characteristically seen in flanks of Dugshai hill.

3rd.—Calcareo-argillaceous—well seen near Subathoo. These are all connected by conformity in stratification, and by transition in mineral character, and form one continuous sequence. They may be called the *Subathoo group*.

In rocks so contorted it is difficult to estimate thickness, but 1800 to 2000 feet may be given as the minimum.

All fossils hitherto procured, have been from the lower half of this series, as seen near Subathoo.

The beds of this upper or Subathoo group are often found folded into the contortions of the Król group and the subjacent slates—(Król and Bój mountains, &c.)

This Subathoo group is entirely distinct, as shewn, from the band of limestones and slaty clays long known to extend along the Southern border of the Western Himalayas. It does not appear to extend to the East of the Junna: at least no trace of it is seen between the Junna and Nainee Tal.

The separation we have made here from stratigraphical considerations was in a manner anticipated by D'Archiac from a consideration of the fossil evidence alone; at least he pointed out the entire distinctness of the organic remains of Subathoo as compared with those of the Punjab, of Scinde, of Beloochistan, and of Cutch (p. 175.) But in the concluding section of this description (p. 179) where reasoning on the very uncertain observations of others, he is far from correct in stating that no appreciable unconformity could be observed between the two, or indeed between the Nummulitic strata generally and the overlying Siwalik series.

The evidence for supposing the Król group, as given above, to be also of Nummulitic age, is not perfectly conclusive. Mr. A. Schlagintweit has announced the discovery of Foraminifera in the neighbour-

hood of Nainee Tal, "identical with those which accompany the Eocene Nummulitic formation," and those rocks at Nainee Tal are considered by Mr. Medlicott, to be the true representatives of the Król beds; but independently of this, the conclusion was arrived at from observations in the salt range, and in the Himalayas of Huzra and Poonch.

There is a great similarity in the section about Murree and north of Kotlee in the Kashmir territory, to that at Subathoo. Three or four miles north of Kotlee there is a stony rib of hard limestone, with an E. S. E. direction; on both sides of this are brown clays and lumpy earthy limestone of the same character as the Subathoo rocks, succeeded by a great thickness of red clays and hard limestones: in fact, the series called above the upper Nummulitic. These rocks are noticed by Mr. Schlagintweit, "to the south of Kashmir a zone of Nummulitic marls and of sandstones, of thirty-nine to fifty miles broad, borders the Himalaya towards the plains of India."* The relations of this series to the massive limestone ridge are precisely the same as with the Król limestone; the ridge at Dundeele being altogether analogous to the rib thrust through the Nummulitic strata at Dihur on the Sutlej: the resemblance lithologically is also perfect. Again, Murree stands on a mountain of red clays and sandstones; the Moochipora ridge to the N. and N. W. of it is of the hard limestone, and along the junction Nummulitic rocks, identical with those at Subathoo, are easily traceable, although not well developed. In this hard sub-crystalline, and generally unfossiliferous limestone of the Moochipora ridge, Nummulites have been found, as already noticed by Dr. Fleming, (Quar. Journ. Geol. Soc. London, 1853, p. 200). On passing to the salt range, this Subathoo series was found to be entirely wanting, although so largely developed to the north. In the salt range, the thick soft sandstones and variegated clays of the Siwalik formation rest directly on the clear Nummulitic limestones, as noticed by Dr. Fleming; † the very junction layers containing only rolled Nummulites. But there is nothing, at least in the east of the range, to represent the Subathoo group. There is nothing either to suggest the idea that these can be assimilated to the salt range Nummulitic rocks; on the contrary all

* Report No. 2, 1856, J. A. S. B. Vol. XXV. p. 118.

† Journ. As. Soc. Bengal, Vol. XXII. p. 229, &c.

stratigraphical and mineral affinities of the Subathoo group are with the Siwalik type rather than with that of the Salt-range Nummulitic strata. These latter appeared to be more probably the representatives of the great limestone deposits which were found all along unconformably subjacent to the Subathoo group. These on the main range of hills have been more developed than on the salt range: they have also been much more indurated, and very much more disturbed, but are supposed to be one and the same.

While, therefore, in deference to its fossils, the Subathoo group has been classed as upper Nummulitic, it must be remembered that considered stratigraphically, it should be considered as the commencement of the Siwalik conditions of deposition.

The northern extension in the outer Himalayas of this lower Nummulitic series, the Król group and the subjacent slaty schists, has not been as yet worked out. The section through Simla to Kotgurh (forty miles N. E. of the Król) presents no contrasting junctions like those already described in the outermost zone: there are several lines of special crushing and contortion, but they do not introduce new rocks. The degree of disturbance is not on the whole increased, and the increase of metamorphism is very gradual and strangely capricious. Thus at Simla highly schistose rocks overlie smooth slaty grits. Indeed, it seems highly probable that the rocks of this section will be identified with, or found closely connected with, the Król series. Simla stands on the northern rise of a great synclinal bend, of which the Tara-Devi hill is the southern rise; at Jatog, the western spur of the Simla ridge, there are some hard cherty limestones that may well be the Król limestone; the thin-bedded slaty grits in the glen below Simla are very similar to the series subjacent to the Król group; among all these are frequent re-appearances of the carbonaceous (graphitic) ingredient that is so well developed on the S. W. base of the Król hill.

Besides their greater induration, these lower Nummulitic rocks differ from the Subathoo group in the presence of trap rocks. Towards the east these are very abundant: west of the Jumna, trap rocks are scarce.

Siwaliks.—Little has been added to our knowledge of these rocks since Capt. (now Col. Sir Proby) Cautley described them in 1836.

(Trans. Geol. Soc. London, Vol. V. p. 267.) Indeed even the suggestions thrown out by him have not been followed up further. He pointed out that the connection between the subordinate range and the higher hills could be traced in the Nahun district, where the two were continuous without any intervening Dún, yet none of the many subsequent fossil-seekers seem to have adopted the hint.

Capt. Cautley roughly divided the whole series into three groups, without defining the extent of each; the lowest, coarse clays containing reptilian and mammalian remains. 2nd, blue marl with freshwater shells, and 3rd, sandstones and conglomerates, which were the chief source of the larger mammalian remains. The true value, or even the correctness, of these sub-divisions Mr. Medlicott was not prepared to establish, but several facts point to a much wider difference between the groups than Cautley supposed. Considerable faulting exists, and the rocks brought into junction by these faults, suggest some new facts. In the valley north of Nahun, thick soft grey lignite sandstones with subordinate beds of lumpy, gritty red clay are, by the great fault already noticed, brought into contact with a crushed rock of the Subathoo Nummulitic strata, and of the infra-Króf shales. South of Nahun, where the Markunda extricates itself from the higher hills, the lower beds of the same series, in which clay predominates, are in junction, along a fault, with thick shingle beds of the outer Siwaliks, the topmost beds of the whole series, and in which the lower hills commence.* The Nahun rock is continuous along the hills bounding the north side of the Dún both to east and west. It is the lignite sandstone, the same as that noticed by Capt. Strachey as occurring below Nainee Tal, (from this, the Dechouree iron-works now derive their ore) and it is also the Siwalik-like sandstone noted by Major Vicary, north of the Pinjore Dún. Capt. Cautley always considered these Nahun rocks as belonging to the Siwalik formation, but it does not appear that he identified them with the sandstones north of the Dún.

* This fault, with the same rocks in contact, is easily followed through these hills intervening between the Kiarda and Pinjore Dúns for some forty miles: it can sometimes even be seen in the Dúns close to the base of the hills on the north.

The continuity of this fault renders it probable that its throw is very considerable. To attain anything like an exact estimate of this, the position of the Nahun beds in the general series must be ascertained. This is by no means an easy question. And though not prepared to settle the point definitely, it may be useful to show how the matter stands.

Capt. Cautley referred the Nahun rocks to the *lowest* member of his threefold division of the Siwaliks (see above). Now large mammalian remains are found in the earthy sand and boulder beds immediately to the south of the fault, thus the top and the bottom beds of the entire series so far as we know them, are here brought into contact. But, further, the boulders in this outer rock, at the junction, are boulders of the lignite sandstone of Nahun hill; there is no other rock in section to the north that could have yielded them. And this fact would seem to involve either a want of strict correspondence between the Nahun hill beds, and any others in the section to south of them, or else, a total break of conformable sequence in that section. A much more careful examination of fossils and of the strata, than a preliminary survey would warrant, will be required to decide this.

This raises a question as to the successive deposition, and upheaval of great banks of these Siwalik strata, which again recurs in the west. It has long been noticed, that there was a great expansion of the Siwalik area in the west, commencing just beyond Kalka and Kasowli. It is occasioned by a curve in the great boundary fault, which here alters its direction to about 15° W. of N.; while the outer line of the Siwalik hills preserves nearly its former direction. In Mr. Greenough's map the sharpness of change in the boundary about Belaspur is exaggerated both by inaccuracies in position of localities and because he includes the Sabathoo, or upper Nummulitic group, the inner or northern boundary of which is much more irregular than the main fault which separates this group from the Siwalik series.

Now the Siwalik rocks occupy this increased area, not by the extension of the strata already noticed, but by the successive introduction, by faults, of other bands of rock not strictly identifiable with the outer Siwaliks. Even at the Sutlej there are two such bands between the Nahun ridge and the main fault, as seen near Belaspur.

It is not intended to state that our knowledge of the existence and distribution of fossils in these rocks is conclusive; but, so far as known, with the single exception of the discovery by Lieut. (now Col.) Durand of fossils near Nahun, there is *no known instance of fossils being found out of the first zone of these rocks—the Siwaliks proper.*

If we attempt to base our inferences upon lithological grounds from the composition and texture of the strata, in a continuous section like this, we must include the upper Nummulitic group, for, as already stated, it has, in these respects, very marked affinities with the Siwalik series. Many of the lumpy red clays of the Dugshai group, are not distinguishable in composition or in hardness from the clays of the upper Siwaliks: the sandstones, also of the same group are markedly of the same general type. Each of these bands then has affinities with the one on either side of it, and at the same time has irreconcilable contrasts also. The Belaspur conglomerates overlie, with, at least, general conformity thick red clays, and hard sandstones, exactly like the Dugshai group, yet without any intervening beds to represent the Kussowli group: and these conglomerates undoubtedly contain debris of the Nummulitic series. The rocks south of the Gumber fault are very similar to the Belaspur band, and the bottom strata are of an intermediate type between the Dugshai, and the lower Siwalik strata, being in fact with difficulty distinguishable from the rocks of the Nahun range, with which they are in contact. And lastly we have the Nahun rocks which are lithologically undistinguishable from the lower strata of the Siwalik hills, while the upper strata of these same hills contain boulders of these Nahun rocks.

All these facts seem compatible only with a long continued, and generally contemporaneous process of upheaval, denudation, and deposition, under conditions commencing with the upper Nummulitic rocks. This conclusion is entirely at variance with the premature generalization at which Mr. D'Archiæ arrived.*

In conclusion, the importance of carefully labelling fossils, and distinguishing their localities cannot be too strongly insisted on.

* P. 176, D'accord avec tous les voyageurs qui ont parcouru le pays, Sir R. Murchison pense qu'un seul soulèvement brusque, sur une immense échelle, a relevé à la fois tous les dépôts tertiaires, inférieurs, moyens et supérieurs."

Meteorological Register kept on Ross Island, December, 1859.

	At Sunrise.			At 10 A. M.			At 4 P. M.			At Sunset.			Rain gauge above sea level 150 feet.
	Aneroid.	Tempera- ture.	Direction of Wind.	Aneroid.	Tempera- ture.	Direction of Wind.	Aneroid.	Tempera- ture.	Direction of Wind.	Aneroid.	Tempera- ture.	Direction of Wind.		Highest ob- served Tem- perature.
1	29,73	70	N.	29,75	77	N.	29,39	76	N.	29,24	76	N.	78
2	72	77,5	S.	79	77,5	S.	74	82,5	S.	77	76,5	S.	79
3	76	78	S. E.	84	81	S. E.	80	81,5	S.	80	81,5	S.	82
4	85	81	S.	88	80,5	S.	82	80	S.	82	80,5	S.	82
5	86	76	S.	95	81	S.	86	80	S.	84	80	S.	82
6	86	76	S.	96	80	S.	86	81,5	S.	88	80	S.	84
7	92	77	S.	97	80	S.	89	81	S.	90	80	S.	84
8	90	76	S.	95	80	S.	86	81	S.	87	81	S.	82
9	89	77	S.	97	81	S.	86	83	S.	87	82	S.	84
10	89	77	S.	96	79,5	S.	87	80	S.	88	81,5	S.	83
11	91	80	S.	99	83	S.	86	82	S.	94	81,5	S.	83
12	96	80	S.	30,02	82,5	S.	93	81	S.	94	81,5	S.	83
13	93	78	S.	00	82,5	S.	87	82	S.	88	82	S.	82,5
14	91	78	S.	29,99	82	S.	90	80,5	S.	88	82	S.	82,5
15	91	80	S. E.	30,03	83,5	S. E.	93	80,5	S. E.	94	81	S. E.	83
16	91	80	S.	02	82,5	S.	93	81	S.	93	81	S.	81,5
17	93	80	S.	04	81	S.	92	81	S.	89	81	S.	82,5
18	96	80	S.	03	82	S.	92	81	S.	87	80	S.	82,5
19	87	76,5	S.	00	82	S.	88	80	S.	87	80	S.	82,5
20	87	75	S.	29,98	81	S.	86	80	S.	87	80	S.	82
21	86	78	S.	96	81,5	S.	86	81	S.	87	80	S.	82
22	86	77,5	S.	94	81	S.	85	80,5	S.	87	80	S.	81,5
23	90	79	S.	98	81,5	S.	90	81	S.	91	80	S.	83
24	94	79	S.	30,02	82,5	S.	90	81,5	S.	91	81	S.	82
25	95	80	S.	06	81,5	S.	92	81	S.	93	80	S.	82
26	97	79	S.	29,96	80	S.	89	80,5	S.	90	80	S.	81
27	86	79	S.	95	80	S.	91	81	S.	91	80	S.	81
28	86	79	S.	90	80	S.	85	81,5	S.	86	81	S.	82
29	82	76	S.	92	79	S.	80	79,5	S.	81	79	S.	80
30	84	78	S.	91	80	S.	84	81,5	S.	85	81	S.	82
31	81	79	S.	91	80	S.	83	81,5	S.	85	81	S.	82

Strong gales all day from North increasing in intensity until about 6 P. M. calm from 7 to 8, then a hard gale from the South west for two hours.

Reading of the Aneroid during Cyclone of the 1st.

1 P. M.	29,59
2	52
3	46
4	38
5	33

The house was partially unroofed at this time and the observations ceased.

JANUARY, 1860.

	At Sunrise.		10 A. M.		4 P. M.		Sunset.		Rain.	Highest Temperature observed.	Remarks.
	Aneroid to the 21 & afterwards mercurial Barometer uncorrected.	Temperature.	Pressure.	Temperature.	Pressure.	Temperature.	Pressure.	Temperature.			
1	29.80	80	N. E.	29.88	82	N. E.	29.78	81	N. E.	82.5	
2	76	78	...	84	80	...	73	80	...	82	
3	80	80.5	...	84	82	...	73	81	...	82	
4	70	79	...	80	79	...	72	78	...	79	
5	75	77.5	...	84	78	...	72	76	...	79	
6	80	75	...	83	76.5	...	78	77	...	80	
7	83	75	...	88	77	...	83	80	...	77.5	
8	87	76	...	92	78	...	84	80	...	80	
9	86	76	...	95	79.5	...	84	81	...	80	
10	86	75	...	92	78	...	85	80	...	82	
11	85	75	...	92	78	...	85	81.5	...	82	
12	88	77.5	...	30.00	81	...	85	81.5	...	82	
13	93	76.5	...	01	79	...	94	82.5	...	83	
14	95	78	E. by S.	03	79	E. by S.	94	78	...	80	
15	96	79	N. E.	02	82	N. E.	91	81.5	...	82	
16	94	79	...	03	81	...	91	81	...	82	
17	95	79	...	05	81.5	...	91	81.5	...	82	
18	88	75	...	29.98	78	...	86	79	...	79	
19	88	71	...	95	75	...	88	78	...	78	
20	89	74	...	97	76	...	88	78	...	78	
21	93.4	71.5	...	98.4	77.5	...	86.2	82	N. by E.	81	
22	91.0	74	...	98.8	77.5	...	85.0	82	N. E.	81	
23	88.0	76	...	95.0	78.5	...	88.4	81.5	...	82.5	
24	91.5	75	...	98.6	77.5	...	85.0	80.5	...	82	
25	90.0	76	...	98.6	77.5	...	89.4	80	...	81	
26	91.4	75	...	98.6	77.5	...	89.8	81	...	81	
27	90.0	76	...	97.6	78	...	89.8	82	...	81.5	
28	90.0	77.5	...	30.010	82	...	88.8	82	...	82	
29	91.0	80	...	018	81	...	87.0	82	...	83	
30	91.4	79	...	012	81.5	...	90.8	81	...	82	
31	90.0	78.5	...	012	81.5	...	85.2	82	...	83	

FEBRUARY, 1860.

Days of Month.	Sunrise.			10 A. M.			4 P. M.			Sunset.			Rain.	Highest Temperature observed.
	Baromet. corrected.	Thermo- meter.	Direction of Wind.	Baromet. ter.	Thermo- meter.	Wind.	Baromet. ter.	Thermo- meter.	Wind.	Baromet. ter.	Thermo- meter.			
1	29,884	79	N. E.	29,940	82	N. E.	29,860	82,5	N. E.	29,870	82	83		83
2	980	79	..	966	82	..	860	82,5	..	870	82	83		83
3	914	80	..	984	82	..	876	82,5	..	880	82	83		83
4	920	80	..	996	82	..	876	84	..	870	82,5	84,5		84,5
5	908	79	..	998	81	..	888	83,5	..	870	82,5	84,5		84,5
6	920	77,5	..	970	82	..	850	83,5	..	870	82,5	84		84
7	912	77,5	..	974	81	..	844	83	..	870	82,5	84		84
8	864	76	..	924	80	..	850	82	..	870	82,5	83		83
9	800	75	..	906	79	..	834	82	..	845	82	82,5		82,5
10	856	79	..	930	82	..	835	83	..	845	82	83,5		83,5
11	900	76	..	930	81	..	824	84	..	845	82	84,5		84,5
12	900	76	..	954	79	..	850	83,5	..	845	82	84,5		84,5
13	824	75	..	900	79	..	790	83	..	845	82	84		84
14	810	74	..	890	79	..	791	82,5	..	845	82	83		83
15	800	79	..	960	82,5	..	864	83	..	845	82	83,5		83,5
16	872	80	..	994	82	..	894	83	..	845	82	84		84
17	900	80	..	30,000	83,5	..	780	84,5	..	845	82	85		85
18	850	76	..	29,924	86,5	..	800	83	..	845	82	84		84
19	814	80	..	900	83	..	780	82,5	..	845	82	83		83
20	840	80	..	940	83	..	820	83	..	845	82	84		84
21	870	78	..	931	83	..	804	83,5	..	845	82	85		85
22	830	75	..	890	79	..	778	82	..	845	82	83		83
23	820	77	..	890	82,5	..	789	82,5	..	845	82	83		83
24	800	78	..	860	82	..	800	83	..	845	82	84		84
25	750	78	..	840	82	..	790	82,5	..	845	82	83		83
26	750	75	..	850	81	..	780	82,5	..	845	82	83		83
27	750	75	..	884	81	..	755	82	..	845	82	83		83
28	800	76	..	850	78	..	780	81	..	845	82	81,5		81,5
29	750	72	..	850	78	..	780	81	..	845	82	81,5		81,5

MARCH, 1860.

21 F	Sunrise.			10 A. M.			4 P. M.			Sunset.		Highest Temperature observed.	Rain.
	Barometer uncorrected.	Thermometer.	Wind.	Barometer.	Thermometer.	Wind.	Barometer.	Thermometer.	Wind.	Barometer.	Thermometer.		
1	29,810	73	N. E.	29,890	80	N. E.	29,780	82	N. E.			83	
2	800	74	...	900	81	...	800	82,5	...	29,750	81	83	
3	774	74	...	880	80	...	750	81,5	...			82	
4	774	74	...	890	81	...	740	81,5	...			82	
5	820	73	...	930	80	...	830	81	...			82	
6	820	72	...	930	79	...	840	81	...			82	
7	810	72	...	910	80	...	776	81	...			82	
8	810	72,5	...	900	80	...	776	81	...			82	
9	810	74	...	890	81	...	788	82	...			83	
10	810	75	...	890	81	...	790	82	...			83	
11	900	74	...	950	81	...	850	84	...			84,5	
12	870	77	...	950	82	...	84	84	...			85	
13	800	78	...	890	83	...	800	84,5	...	800	83	85	
14	840	76	...	900	81	...	800	83,5	...			84	
15	870	78	...	900	82,5	...	840	84	...			85	
16	874	77,5	...	940	83	...	820	84	...			85	
17	874	80	...	900	83	...	810	84,5	...			85	
18	850	77,5	...	900	81	...			...			83	
19	774	76	...	880	80	...	764	84	...			84,5	
20	810	77,5	...	910	83	...	868	84,5	...			85	
21	810	78	...	900	83	...	790	84	...			85	
22	770	77	...	834	81,5	...	760	85	...			85	
23	820	79	...	900	85	...	798	85	...	800	84,5	85	
24	879	78	...	950	82,5	...	840	86	...			86,5	
25	860	77	...	912	82,5	...	810	84,5	...			85	
26	820	78	...	900	81,5	...	800	84	...			85	
27	840	79	...	930	83	...	820	84,5	...			85	
28	850	79	...	950	85	...	810	85	...			86	
29	850	79	...	900	83	...	790	84,5	...			85	
30	820	76	...	880	83,5	...	800	84,5	...			85	
31	800	79	...	890	83,5	...	750	84,5	...			85	

APRIL, 1860.

	Sunrise.			10 A. M.			4 P. M.			Sunset.		Rain.	Highest Temperature observed.
	Barometer.	Thermometer.	Wind.	Barometer.	Thermometer.	Wind.	Barometer.	Thermometer.	Wind.	Barometer.	Thermometer.		
1	29,800	77,5	N. E.	29,850	83	N. E.	29,780	84	N. E.	29,800	81	85	
2	800	77,5	Var.	890	84	Var.	776	85	Var.			86	
3	860	77	...	900	82	...	800	83	...			84	
4	800	81	...	850	83	...	772	84,5	...			85	
5	810	77,5	S. by E.	860	77	S. by E.	750	80,5	S. by E.			81	
6	800	88	...	870	84,5	...	760	84,5	...			85	
7	790	78	...	870	82,5	...	760	82,5	...			85	
8	782	82,5	S.	864	83,5	S.	766	83,5	...	29,800	81	83,5	
9	766	80	...	800	82	...	700	82	...	710	82	84	
10	724	81	S. by E.	812	83	S. by E.	740	83	...	780	85	86	
11	700	82	S.	808	84	S.	730	85,5	S. by W.			86	
12	800	82	S. by W.	890	84	S. by W.	780	85,5	...			86	
13	850	81	W.	924	83,5	W.	790	86	...			87	
14	870	79,5	...	960	82,5	...	760	83	...			83	
15	934	79	...	990	81,5	...			...			83	
16	900	76,5	...	960	82	...	850	82,5	...	850	82	83	
17	860	76	...	950	82	...			...			83	
18	850	76	...	980	82	...	836	83	...			84	
19	850	75	...	950	82	...	810	83,5	...			84	
20	850	75	...	950	82	...	850	84	...			84,5	
21	830	76	...			...	844	84,5	...			85	
22	800	77,5	...	930	82,5	...			...			85	
23	800	78	...	900	83	...	800	84,5	...			85	
24	860	77,5	...			...	816	84	...			85	
25	860	77	...	934	82	...	824	84,5	...			85	
26	820	78	...	920	83	...	824	85	...			86	
27	830	79	N. W.			N. W.	824	85	N. W.			86	
28	806	79,5	...	910	83,5	...	824	85,5	...			86,5	
29	806	80	...	950	84,5	...	750	86,5	...	760	86	87	
30	790	80	...	890	84	...	760	86,5	...			87	4,50

Strong winds and cloudy sky, strong squalls with rain, 4,50 inches of rain fell between 4th and 8th.

MAY, 1860.

	Sunrise.			10 A. M.			4 P. M.			Sunset.		Rain.
	Baromet.	Thermo- meter.	Wind.	Baromet.	Thermo- meter.	Wind.	Baromet.	Thermo- meter.	Wind.	Baromet.	Thermo- meter.	
1	29,774	80	W.	29,850	84	W.	29,720	85,5	W.		86	
2	740	81	...	830	84	...	740	86	...		87	
3	790	80	...	824	84	S. E.			...		86	
4	834	80	Calm.	890	85	Calm.			Calm.		87	
5	800	80	Var.	900	84	Var.	776	85,5	Var.	29,800	84	0,38
6	810	79	...	870	85	...	780	84	...		85	
7	840	79,5	W.	890	83,5	...	820	85,5	...		86	
8	820	82	Var.	810	84	W.	790	86,5	S.		87	
9	760	79,5	W.	850	84,5	S. W.	760	81	S. W.		86	2,28
10	738	82,5	...	836	83,5	W.			W.		86	
11	710	80	Var.	822	85,5	...	720	87,5	...		88	
12	684	78	W.	790	82	Var.	736	78	...		83	
13	720	81,5	S. W.	770	82,5	W.	690	86	...		87	
14	750	79	W.	765	85	S. W.	720	87	...		87	
15	740	80	...	796	83,5	...	734	86	...		86	
16	784	81	...	820	84	W.	760	85,5	...		86	
17	720	82	S. W.	850	84,5	...	745	85,5	...		86	
18	740	79	...	800	85	S. W.	730	84	...		86	
19	720	82	W.	800	84	...	750	84,5	...		86	
20	650	78	...	790	85,5	W.	726	82,5	...		86	
21	632	79	S.	700	80	...	700	82	...		86	
22	636	79	S. W.	700	80	...	630	79,5	...	29,650	80	0,45
23	630	78,5	Calm.	680	82	...	630	83,5	S. by E.		82	0,30
24	584	78,5	S. W.	700	82,5	S. W.	570	80,5	S. W.		84	0,44
25	610	79	...	670	81	Calm.	610	77	...		83	0,48
26	690	81	...	750	81	S. W.	600	85	...		82	0,60
27	726	82	...	675	82,5	...	600	85	...		86	1,50
28	720	83	...	750	85	...	716	87,5	...		88	0,35
29	750	83	...	800	86	...	830	87,5	...		88	
30	750	83	...	780	86	...	730	88	...		89	
31	750	83	...	800	86	...	724	80	...		87	9,98

Thunder and lightning.

Thunder and lightning.

JUNE, 1860.

Sunrise.	10 A. M.		4 P. M.		Self-registering Thermometer.		Rain.
	Barometer.	Thermometer.	Dew Point Temperature.	Wind.	Barometer.	Thermometer.		Wind.
1	83		*	S. W.	29,748	88	
2	29,726	83			700	86	
3	700	77	75		670	83,5	2,83
4	610	77	76		600	78,5	Thunder and lightning.
5	624	80	77,5		640	82,5	2,30
6	712	79	77,5		700	82,5	0,32
7	728	80	79		720	79	0,22
8	714	79	81		680	83	0,50
9	700	79	81		686	80	
10	660	80	80		684	80,5	
11	740	76	81		730	81,5	Slight Thunder.
12	764	81	81		750	85,5	
13	750	81	78		750	86	
14	720	81,5	79		738	84	
15	712	81	77		710	82	
16	700	81	80		700	85	Slight Thunder.
17	674	82	80				
18	710	81,5	78		690	84	
19	700	79	78,5		690	84,5	
20	740	80,5	78		740	82	0,83
21	744	80	77		730	81,5	
22	715	80	79		720	85,5	1,33
23	740	80	79		740	84	1,00
24	770	80	78		780	83,5	0,05
25	700	80	79		720	83,5	0,23
26	700	80	80		668	85	0,43
27	700	80	80				0,60
28	680	80	78,5		740	80,5	0,40
29	710	80	78		730	83,5	
30	710	79	77,5				15,24

* The Temperature of Dew Point shewn in this column is the reading of Daniell's Hygrometer.

JULY, 1860.

Sunrise.	10 A. M.			4 P. M.			Self-registering Thermometer.		Rain.
	Barometer.	Thermometer.	Temperature of Dew Point.	Wind.	Barometer.	Thermometer.	Max.	Min.	
1 29,730	79	29,800	77,5	S. W.	29,700	85	83	76	
2 700	80	750	79	..	690	83,5	84	79	0,20
3 680	80	730	76,5	..	700	85,5	85	76	
4 700	78	730	77,5	S.	700	78,5	81,5	74,5	2,68
5 740	76	750	76,5	S. by E.	756	81,5	82,5	79	
6 750	80	820	77	S.	770	82,5	83	79	0,30
7 760	80	824	78,5	S. by W.	776	84	85	80,5	1,00
8 760	81	836	78	..	770	85	86	79	0,10
9 764	81	820	78	..	772	85	85	76	1,00
10 768	78	825	78,5	..	736	84	85	77	0,30
11 710	81	720	79	..	680	84,5	84,5	76	0,20
12 660	78	710	82	..	630	82	82,5	76	0,60
13 650	79	700	77	..	676	80,5	82	77	0,35
14 676	79,5	740	77	..	710	84,5	83,5	79,5	
15 700	80	760	77	..	700	84,5	84	79	
16 704	80,5	760	77	..	690	85,5	84,5	80	
17 708	81	800	76	..	716	86	85	80	
18 710	80,5	800	76	..	730	82,5	84	80	
19 740	80	800	77	..	740	80,5	82	77	1,15
20 700	78	800	77	..	730	81,5	82	77	
21 700	79	760	77	..	700	82,5	83,5	78	
22 710	80,5	750	77	..	712	82,5	82,5	79,5	
23 710	80	790	76,5	..	740	84,5	83,5	78	
24 770	79	810	77	..	734	82,5	83	76	
25 690	78	740	77	..	690	78,5	80	76	1,15
26 660	77,5	780	77	..	690	79,5	80	74	1,10
27 710	76	810	77	..	724	81,5	82	76,5	1,33
28 750	79	840	79	..	728	83,5	84	80	
29 750	81	800	77	..	710	84	82,5	80	0,15
30 700	80,5	790	77,5	..	740	84	83	77,5	
31 730	81	800	77,5	..	740	84	82,5	80	1,61

Squally.
Ditto.

Abstract of Meteorological Observations made on board Her Majesty's Steamer "Punjab," I. N., and on shore at Muscat from the 1st to the 24th June, 1860, inclusive.

Date 1860.	Ship's Barometer.		Thermometer in the air.			Wet Bulb.		Temperature of the sea.	Rain.	Winds.		Latitude North.	Longitude West.	Course and distance in miles.		
	10 A.M.	4 P.M.	6 A.M.	1 P.M.	Maxim.	6 A.M.	1 P.M.			Direction.	Force.					
June. 1	29,87	29,77	86	90	90	78	80	86	None.	Southerly.	2	18,30	70,44	S. 79,30 W. 131		
2	29,85	29,76	87	89	89	79	79	85	"	S. Westerly.	3	18,06	68,10	W. 9 S. 164		
3	29,82	29,76	86	90	92	79	80	83	Light showers.	"	3 to 4	17,35	65,39	W. 12 S. 149		
4	29,75	29,65	83	86	86	80	78	83	Showery.	"	3	17,21	62,59	W. 5 S. 161		
5	29,72	29,65	83	87	87	77	78	83	Heavy shower.	"	3	17,13	60,22	W. 3 S. 150		
6	29,73	29,72	85	87	87	78	80	83	Showery.	"	3	16,56	57,35	W. 6 S. 160		
7	29,82	29,73	84	92	92	80	80	84	"	W. to N. W.	1	17,31	56,00	"		
8	29,77	29,68	84	91	91	80	78	84	None.	South.	1	"	"	"		
9	29,70	29,63	84	92	92	78	80	84	"	S. Westerly.	3	"	"	"		
10	29,75	29,65	83	91	91	78	81	84	"	"	2	19,28	58,54	N. 51 E. 188		
11	29,69	29,58	84	87	90	80	75	84	"	"	3	22,21	60,05	N. 21 E. 193		
12	29,67	29,56	87	102	102	78	80	87	"	Variable.	3	23,37	58,40	"		
13	29,62	29,53	93	104	105	76	78	87	"	"	"	"	"	"		
14	"	"	100	102	115	78	80	"	"	"	"	"	"	"		
15	"	"	98	98	98	77	81	"	"	"	"	"	"	"		
16	"	"	98	106	106	71	75	"	"	"	"	"	"	"		
17	"	"	98	101	101	71	78	"	"	"	"	"	"	"		
18	"	"	94	99	99	70	81	"	"	"	"	"	"	"		
19	"	"	90	92	95	75	85	87	"	"	"	"	"	"		
20	29,63	29,63	88	96	96	74	84	"	"	Variable.	3	22,25	60,48	"		
21	29,72	29,62	85	86	87	81	80	86	"	Southerly.	2	20,53	63,39	S. 59,47 E. 183		
22	29,67	29,62	82	87	87	80	81	84	"	"	3	19,39	67,27	S. 70 E. 225		
23	29,73	29,67	85	86	86	81	81	85	"	S. Westerly.	1	18,53	71,02	S. 77 E. 206		
24	29,71	29,63	83	86	86	80	82	85	"	"	1	"	"	"		
25	At	12,15	A. M.	anchored in Bombay Harbour.										"	"	"

GENERAL REMARKS.

- 1 A. M. Cloudy ; with cirri and cirro-cumuli ; 6 P. M. cloudless sky.
- 2 „ As yesterday, swell from S. W. increasing.
- 3 „ Cloudy ; with cirri, cirro-cumuli, and nimbi ; 5 P. M. slight shower.
- 4 „ Cloudy as above : P. M. showery, with distant thunder.
- 5 Clouded—several showers.
- 6 A. M. Partially clouded & showery ; 5.45 P. M., Kooria Mooraa islands in sight.
- 7 8 A. M. anchored at Hallania in Telegraph Bay.
- 8 At anchor—moderate S. W. breeze, with swell.
- 9 6 A. M. up anchor, and steered for Jibli island. Fresh breeze from S. W. with long swell ; cloudy, with cirri and cirro-cumuli.
- 10 Partially clouded as yesterday ; at noon, hazy.
- 11 Light cumuli and cirri ; hazy with great mirage.
- 12 Sky clear ; the air intensely dry and hot.
- 13 Sky cloudless, scorching hot-wind at night, coming in gusts.
- 14 Clouded, with cirri and cirro-cumuli.
- 15 Hazy, without clouds but with mirage ; air intensely hot and very dry.
- 16 Clouds, with light cirri ; sensibly as hot as yesterday.
- 17 Hazy ; light north-easterly breeze blowing.
- 18 Fresh breeze from N. E., partially clouded, much cooler.
- 19 Partially clouded and hazy ; at 1 P. M. left for Bombay.
- 20 Light cirri and cirro-cumuli ; moderate swell from S. W.
- 21 A. M. cloudy, with cirri and cirro-cumuli ; sea moderate, evening with cloudless sky.
- 22 A. M. Partially clouded, with moderate sea ; light rain in afternoon ; cloudless evening.
- 23 A. M. cloudy, with cirri and cirro-cumuli ; less swell, evening cloudy.

(Sd.) J. WELSH,

Assistant Surgeon.

(True Copy.)

C. U. AITCHISON,

Under-Secretary to the Government of India.

NOTICES OF NEW WORKS RELATING TO SANSKRIT LITERATURE.

Mánava Kalpa Sútra, being a portion of this ancient work on Vaidic rites, together with the commentary of Kumárida Swámin, (a facsimile of MS. 17, in the old E. I. II. Library,) with a preface by T. Goldstücker, London, 1861.

This large and deeply interesting volume consists of two somewhat disconnected halves,—a facsimile, lithographed in the shape of a *puti*, of Kumárida's Commentary on the Mánava-kalpa-Sútras, and a preface of 268 pages on various topics connected with Professor Müller's "History of Ancient Sanskrit Literature."

Among other subjects, Dr. Goldstücker has discussed the question of the period of the use of writing in India, and our readers will be interested to learn that the note* in our journal (No. II. 1859,) where this part of Dr. Müller's work was first printed as a communication to the Society, became his "first inducement to treat the matter on this occasion."

Dr. G. strongly holds that writing was known in India before Páṇini's time, and he chiefly bases his opinion on the occurrence in Páṇini and the Sútras of such words as *lipikara*, *paṭala*, *sútra*, *grantha*, *varṇa*, *kánda*, &c. *Sútra* he believes to be derived not from a "string of rules," but the primitive manner in which MSS. were bound,—a parcel of leaves kept together by a *string* through the middle. He draws an important distinction in Páṇini's use of *varṇa* and *kára*, "*kára* enters into composition with all vowels and consonants, provided the latter are followed by the letter *a*, while *varṇa* is joined merely to vowels and such consonants as are *without a vowel sound*;" and thus *varṇa* applies to the *written* consonant, as the spoken one must have a vowel to sound with it; and hence the propriety of the word *varṇa* as originally meaning "colour." Then again Páṇini has a Sútra† (vi. 3. 115,) in which he informs us that the owners of cattle

* "Prof. M. has sent the paper to the Society's Journal in the hope of eliciting some fresh information from European or native scholars in India on the interesting questions which it discusses."

† कर्णं लक्षणस्याविष्टाष्टपञ्चमणिभिन्नच्छिन्नच्छिद्रसुवस्वस्तिकस्य ॥

कर्णं इत्येतस्मिन्नुत्तरपदे परे लक्षणवाचकस्य संहितायां विषये दीर्घः स्यात्
षष्ट। अष्टन्। पञ्चन्। मणि। भिन्न। छिन्न। छिद्र। सुव। स्वस्तिक। इत्येतान्

were at his time in the habit of marking their beasts on the ears, with signs of a ladle, pearl, &c., and also *eight* and *five*, which certainly point to a knowledge of written letters or numerals at that period, Similarly the use of *lopa* to express 'elision' as opposed to the *dars'ana* or 'visibility' of a letter, points to language existing in a written and not exclusively spoken form.

Various other topics of a similar character are discussed, (but sometimes with needless bitterness against opponents,) among others the age of Pāṇini and his position relatively to the Prātiśākhya, Kātyāyana, the Uṇādi Sūtras, &c. Dr. Goldstucker maintains that the Prātiśākhya are more modern than Pāṇini, and he endeavours to prove that many of their rules are intended to supply deficiencies in the latter's Sūtras, and if the more perfect rule were the more ancient, it would be inconceivable that Pāṇini could have deliberately inserted a less complete one in his grammar. Similarly he would explain the many corrections of Pāṇini in Kātyāyana's vārtikas by a wide difference in their epochs. "The explanation I hold can only be derived from the circumstance that Pāṇini and Kātyāyana belonged to different periods of Hindu antiquity—periods separated by such a space of time as was sufficient to allow—

1. Grammatical forms which were current in the time of Pāṇini to become obsolete or even incorrect.
2. Words to assume meanings which they did not possess at the period when he lived.
3. Words and meanings of words used by him to become antiquated.
4. A literature unknown to him to arise.

By this later literature, Dr. G. understands the Āraṇyakas, Upaniṣads, Vājasaneyī Saṁhitā and Śatapatha Brāhmaṇa.

We have no space to enter into the interesting arguments by which he endeavours to maintain this new position; we would confine ourselves to one collateral point in the investigation, which seems to us to possess peculiar interest as well as novelty.

वर्जयित्वा । द्विगुणाकर्णः । त्रिगुणाकर्णः । पशूनां स्वामिविशेषसम्बन्धापनार्थं यच्चि-
 न्नं क्रियते तदिह लक्षणं । लक्षणस्य किं । शोभनकर्णः । अविष्टादीनां किं । विष्ट-
 कर्णः । अष्टकर्णः । पञ्चकर्णः । मणिकर्णः । भिन्नकर्णः । द्विगुणाकर्णः । द्विगुणाकर्णः ।
 चुचकर्णः । स्वस्तिककर्णः ॥

It is well known that the usual date for Páṇini, in the fourth century B. C., rests on a combination of slight circumstances which only gains its currency from the utter absence in Indian literature of any thing approaching to historical certainty. Dr. Johnson used to talk of the 'one-eyed monarch of the blind,' and, compared with the hopeless obscurity of all other Indian literary dates, that of Páṇini from Buddhist books backed by the story-teller Somadeva, really does seem to give a shadow of basis for historical research; still it is well for the Sanskrit student to be occasionally reminded by such a rough realist as Dr. Goldstücker, of the uncertain materials on which at best we ground the assumed era for Páṇini. It is only in Hindu literature that such a list of infinitesimal probabilities would be allowed to add up into an assumed certainty,—and even then we have no right to be content with doubts and guesses, if better materials are in our reach.

Dr. Goldstücker professes to have settled the era of Páṭanjali on far more reliable grounds, and as the question is of no little importance, we wish to give our readers a clear idea of his reasonings. They rest on a single rule in the Mahábháshya,—Páṭanjali's great commentary on Páṇini's Sútras and Kátyáyana's supplementary aphorisms,—a rule well worth all Pythagoras's 'golden rules,' if it leads us to the one authenticated date in the literary history of ancient India.

In one of his rules, Páṭanjali refers to the Maurya kings, which proves that at any rate he was posterior to Chandragupta, the contemporary of Seleucus, while the Rájatarangini shews that his grammar was known in Kashmir in Abhimanyu's reign about 60 A. D.; but another of his rules determines his date more precisely, as follows:

"In Sútra iii. 2. 111, Páṇini teaches that the imperfect must be used, when the speaker relates a past fact belonging to a time which precedes the present day. Kátyáyana improves on this rule by observing that it is used too when the fact related is *out of sight, notorious, but could be seen by the person who uses the verb.* And Páṭanjali again appends to this Vártika the following instances and remark, "*The Yavana besieged (imperfect) Ayodhyá; the Yavana besieged (imperfect) the Mádhyamikas.* Why does Kátyáyana say 'out of sight?' (because in such an instance as) 'the sun rose,' (the verb must be in the aorist). Why 'notorious?' (because in such an

instance as) ‘Devadatta made a mat,’ (the verb must be in the preterite). Why does he say, ‘but when the fact could be seen by the person who uses the verb?’ (because in such an instance as) ‘according to the legend Vāsudeva killed Kansa,’ (the verb must likewise be in the preterite).”*

“Hence he plainly informs us, and this is acknowledged also by Nāgōjibhaṭṭa, that he lived at the time—though he was not on the spot—‘when the Yavana besieged Ayodhyá,’ and at the time when ‘the Yavana besieged the Mádhyamikas.’ For the very contrast which he marks between these and the other instances, proves that he intended practically to impress his contemporaries with a proper use of the imperfect tense.”

The Mádhyamikas are the well-known Buddhist set founded by Nágárajuna; and the only period in which the conquests of the Greek kings in Bactria and Cabul could have extended as far as Oudh, must have been under Menander, who reigned from B. C. 144 to about B. C. 124. One coin of his has been found at Mathura, and Strabo expressly says, “πλέω ἔθνη κατεστρέψαντο οἱ Ἕλληνες ἢ Ἀλέξανδρος καὶ μάλιστα Μένανδρος (ἔ γε καὶ τὸν Ὑπανὼν διέβη πρὸς ἑὼ καὶ μέχρι τοῦ Ἰομάνου προήλθε).”

If these conjectures be correct Pátanjali was a contemporary of Menander, and thus one cardinal date has been ascertained in the chaos of ancient Indian chronology.

For the work itself, of which Dr. Goldstücker has here published a facsimile, we much regret that he has withheld from us the results of his editorial labours. A facsimile of the original is no doubt precious, but ‘*ars longa, vita brevis,*’ and why must every one spend his days and eyesight over a corrupt text which the learned editor is

* Páṇini अनद्यतने लङः Kátýáyana, परोक्षे च लोकविज्ञाने प्रयोक्तुर्दर्शनविषये Patanjali, परोक्षे च लोकविज्ञाने प्रयोक्तुर्दर्शनविषये लङ् वक्तव्यः । अरण्यवनः साकेतं । अरण्यवनो माध्यमिकान् । परोक्ष इति किमर्थं । उद्गादादित्यः । लोकविज्ञान इति किमर्थं । चकार कटं देवदत्तः । प्रयोक्तुर्दर्शनविषय इति किमर्थं । जघान कंसं किल वासुदेवः Kaiyyaṭa परोक्षे चेति । अननुभूतत्वात् परोक्षेऽपि प्रत्यक्षयोग्यतामात्राश्रयेण दर्शनविषय इति विरोधाभावः Nagojibhaṭṭa, भाषे जघानेति किम् । स बोधो हि नेदानोन्नानप्रयोक्तुर्दर्शनयोग्योऽपीत्यर्थः । अरण्यदित्युदाहरणे तु तुल्यकालः प्रवर्तत इति बोध्यम्

far better qualified to explain? On all principles of the division of labour, we had a right to demand a copious body of notes and corrections, whereas we are now obliged to sit down contented with a bare facsimile of an original which the editor himself pronounces "hopelessly incorrect."

The Mánava-kalpa-sútras belong to the old recension of the Yajur Veda, the Taittiríya Sanhitá. The present work contains the first four books—the Yájamána book in two chapters; the Agnyádhána; the Agnihotra; and the Cháturmásya sacrifices in six chapters. It only gives Kumáрила's commentary, but as the words of the Sútras are generally explained at some length, it would be possible to recover most of them from the *ṭiká*. Dr. G. mentions another MS. in the old E. I. H. Library, which contains the Sútras of the Agnishtóma rites in five Adhyáyas.

The Society has two MSS.* of a part of the Mánava Sútras (*Maitráyaṇi-sákháyám Mánava-Sútra*); and, at the end, the Sútras are said to consist of five divisions. 1, The *Práksoma-bhága*. 2, *ishṭikálpabhága*. 3, *agnishṭomabhága*. 4, *rájasúyabhága*. 5, *agnichayana-bhága*. These MSS. only contain the fifth portion in five adhyáyas. In the Sanskrit College Library there is a MS. (78 foll.) containing the *práksomabhága* in eight adhyáyas, which is therefore, for the most part, that portion of the text, which has been published by Dr. Goldstücker in Kumáрила's Commentary.

The following are the first words of each adhyáya:—

1. उत्तरत उपचारो विहारः. (Dr. G. fol. 1.)
2. आ भूते पश्चाद् गार्हपत्यस्योदीच उद्भूय संसृणाति.
3. ज्ञातधैवस्थितेऽग्ने सन्निध्यमानाय.
4. पूर्णे चन्द्रमस्युपवसेत्.
5. अग्नीनादधीत वसन्ते ब्राह्मणः. (Dr. G. fol. 55.)
6. उद्धराह्वनीयमित्युक्त्वा. (Dr. G. fol. 84.)
7. चातुर्मासान्यारण्यमानः पूर्वां पौर्णमासीमुपोष्य. (Dr. G. fol. 106.)
8. एन्द्राग्नेन पशुना यज्यमानः.

Its concluding words are इति मानवसूत्रे प्राक्सोमास्ये प्रथमप्रभृतिसमान पञ्चमविभागे (query प्रथमविभागे?) ऽष्टमोऽध्यायः समाप्तः ॥

E. B. C.

* One MS. contains 37 foll., the other 18 foll.; the commencing words are अग्निं चेष्यमान उखां सम्भरेत् ।

Literary Intelligence.

The following extract from a letter dated Peking, 4th November, 1860, addressed to our Curator by Mr. Swinhoe, will be read with interest.

"I am in receipt of your letter of the 22nd August, in which you acquaint me of the loss of the two bucks of *Cervus sika*. I am extremely sorry to hear the news, as it was only by the most uncommon good luck that I was enabled to procure those I sent you. If I am fortunate enough to visit Japan, or to extend my acquaintance in that quarter, I may be enabled to procure some more. All the Deer I sent you were received from Japan, and consequently *Cervus sika*. *Cervus pseudaxis*, from Formosa, you have only seen the skull of. There are several fine living examples of this Deer at Amoy, but I was unable to coax the proprietor to let me have one. The Dutch Commissioner at Amoy procured a fawn of this species and forwarded it some months ago to Holland, but I have not since heard as to whether it arrived safely or not. I think I told you, from Canton, that the Roebuck (*Cervus pygargus*) is preserved there in the gardens of a Mandarin. They are said to be from inland China, but people are not allowed to shoot them. A very fine species of Stag is found here, in the parks of the Chinese Emperor's summer palace. The grounds extend up some high hills now covered with snow, and it is here where these animals abound. Major Garret, one of the General's A. D. C.'s, has been out several times and shot a few. He has preserved the heads of three of the finest bucks; two young bucks and a doe fell to my share, and these I have carefully skinned. The old bucks are indeed noble animals. They stand to the shoulder about $4\frac{1}{2}$ feet, are brown on the back with white spots, the back of the neck being reddish, and the rump and under tail white. The horns are so shaped. * * * I think you told me that *Cervus Wallichii*, the Siberian Stag, was noted from North China. If such is the case, these are probably of that species. The bucks given to me are, one 2 years, and one 1 year; the doe had milk in her teats and was evidently suckling. A pair of gigantic horns were picked up by a cartman coolie in some Chinese house; these had two frontal snags. I must strongly believe them to belong to the Kashmiri Stag; but

I can get no account of them from the natives. They were probably brought here from some distance, as Stag's horns are valued in China for medicinal purposes.

"This is a great country for *Picidæ*, *Corvidæ* and *Fringillidæ*, but deficient in other families. I have procured and noted *Geococcyx canus* [?], *Picus bisuki* of Schlegel, (both found in Japan,) and a *lesser spotted Woodpecker* which I take to be *new*. The *Corvidæ* are *Corvus sinensis*, *C. torquatus*, *Fregilegus pastinator*, *Monedula daurica*, (Pallas,) *M. neglecta*, (a *black species*) of Schlegel, *Pica media*, and *P. cyana*; ALL in abundance. The *Fringillidæ* are the following: *F. montifringillas*, *F. spinus*, *F. sinensis*, *F. Vinota*, *F. borealis*, *F. coccothraustes*, and *Loxia curvirostris*. It is curious that the ordinary *Butcher-bird* of this district is *Lanius bucephalus*, whereas at *Pahinwan*, farther north, *L. lucionensis* was the *only species*. I have met with *Zosterops japonicus*, and am happy to announce that my little southerly species is *perfectly distinct*. The *only Parus* found here is *Parus palustris* of Europe, strange to say. But in birds I am disappointed. Of Quadrupeds or Mammals, I have a few; a Hedgehog, new, I believe, a *Mole*, and a small Mouse. Mons. Zill, an amateur naturalist accompanying the present expedition, who, by the way, is acquainted with you, has besides procured an *arctomys* [?] or *Squirrel-rat*. I have also a few Bats, *all* of one species, and several reptiles.

"The other day I picked up the feathers of an *Oreocinclæ*, the body having been probably eaten by a Hawk. I have not yet met with the bird alive so far north; indeed I have never met with but *two* in all my Chinese experience: you sent me among the skins sent an *Oreocinclæ dauma*. Have you any other species in India and do you know anything about their habits? I am very anxious to get some particulars about them. How many species do you know of, where are they to be found, and do you know anything of their habits, their nesting, &c.? Are their eggs and nests procurable? *Oreocinclæ varia* of Horsfield is confined, I believe, to Java, where it is said to be very scarce. It is a most singular and anomalous species, at times shewing itself in most distant parts of the world, in the most erratic manner, and apparently nowhere found resident."

PROCEEDINGS
OF THE
ASIATIC SOCIETY OF BENGAL,
FOR JANUARY, 1861.

*The Annual General Meeting of the Society was held on the 9th
Instant.*

A. Grote, Esq., President, in the chair.

The following gentlemen duly proposed at the last meeting, were balloted for, and elected ordinary members :—

Hon'ble J. C. Erskine, C. S.

Lewis Jackson, Esq., C. S.

Thompson Dodsworth, Esq.

The following gentlemen were named for ballot as ordinary members at the next meeting :

Captain H. Godwin Austin, H. M.'s 24th Foot, Surveyor General's Department, proposed by Colonel A. S. Waugh, seconded by Captain T. G. Montgomerie.

Captain A. B. Melville, late 67th N. I., Surveyor General's Department, proposed by Colonel A. S. Waugh, seconded by Captain T. G. Montgomerie.

Lieutenant W. J. Stewart, Bengal Artillery, Revenue Survey Department, proposed by Major Thuillier, seconded by Captain W. N. Lees.

R. Forrest, Esq., Civil Engineer, Superintendent of Canals, Dehra Dhoon, proposed by Colonel A. S. Waugh, seconded by Major Thuillier.

Harry Duhan, Esq., Extra Civil Assistant, G. T. Survey, Dehra Dhoon, proposed by Colonel A. S. Waugh, seconded by Major Thuillier.

Stewart Bailey, Esq., C. S., proposed by Mr. Atkinson, seconded by Mr. Grote.

Major Warrant, Bengal Engineers, proposed by Mr. Atkinson, seconded by Major Sherwill.

A. S. Harrison, Esq., B. A., Inspector of Schools for Behar, proposed by Mr. Atkinson, seconded by Mr. Cowell.

Frederick S. Growse, Esq. C. S., proposed by Mr. Cowell, seconded by Mr. Atkinson.

H. Bell, Esq., C. S., proposed by Mr. Atkinson, seconded by Mr. H. F. Blanford.

J. Brown, Esq., M. D., B. M. S., proposed by Dr. Fayrer, seconded by Mr. Atkinson.

The Secretary read the following report for 1860.

ANNUAL REPORT.

The Council in presenting their Annual Report have the satisfaction to notice the promising state of the Society's affairs during the past year.

The accession of members consequent upon the reduction in the rate of subscription has been considerable. The rolls of the Society during the ten years previous to the date of the reduction, only shewed an average of 146 ordinary members and 12 elections. Last year however, (in consequence of the reduction) a large increase took place, which has become still more manifest

Ordinary.	Paying.	Absent.
1850 142	136	6
1851 130	124	6
1852 139	122	17
1853 146	123	23
1854 155	129	26
1855 162	128	34
1856 167	131	36
1857 147	109	38
1858 133	95	38
1859 180	135	45
1860 242	195*	47

* Of these, one is a life member.

during the year new under review, as our rolls now exhibit exclusive of the losses by retirement (7) and by death (3) a total of 242 against 180 members, and of 69 against 53 elections of the preceding year. Deducting, however, the number, absent in Europe, there remains a total of 195 paying members.

The Council having resolved to nominate for the full number of Honorary members permitted by the Society's rules, six selections for vacancies on that list have taken place during the year, as follows:—

Dr. Albrecht Weber,
Dr. Robert Wight,
Dr. Aloys Sprenger,

Edward Thomas, Esq.,
Col. George Everest,
Mons. Stainslas Julien.

The Corresponding members of the Society elected during the year are the

Rev. H. Baker, Tinnivelly,
Mr. R. Swinhoe, Amoy,
Dr. M. Haug, Poonah.

The obituary of the past year contains the name of one of the oldest members and warmest friends of the Society, the late Professor Horace Hayman Wilson. The services rendered by him to the Society and to the cause of Oriental literature have already been put upon record in the proceedings for July last, when a resolution was passed, expressive of the Society's sense of the severe loss which it had sustained. Another casualty during the year on the list, unfortunately but too short a one, of English Orientalists, has deprived the Society of the intended editor of the late Sir H. Elliot's unpublished materials for a history of Mahomedan India, Mr. W. W. Morley.

Among its ordinary members, the Society has to regret the death of the Right Hon'ble James Wilson, S. Lushington, Esq., C. S., and Rajah Ramehand Sing.

FINANCE.

The President briefly drew attention to the deficit in the annual income of the Society and to the necessity of supplying it by continued exertions to obtain accessions of members. He thought the Society were to be congratulated on the state of the Oriental Fund, and on the activity which the report showed to have prevailed in that Department. He considered that for this activity much of the credit was due to Captain Lees.

The introduction of the reduced rates of subscriptions necessitated a division of the Society's members into two classes resident and non-resident. Of the 195 paying members now on the rolls, 101 belong to the former, and 94 to the latter class. Estimating their subscriptions at the two rates respectively, of 48 and 24 rupees per annum, the total income would amount to Rs. $4,848 + 2,256 = 7,104$, which is less than that derived from the average number, (146) of

subscribers paying 64 rupees a year under the old rates; the deficiency being rupees 2,240 which has to be provided for by an additional number of 46½ resident or 93 non-resident members.

The amount of contributions inclusive of the arrears of former

* CONTRIBUTIONS.			
1850	7,981	3	9
1851	8,583	4	5
1852	6,373	1	3
1853	7,778	9	3
1854	7,082	"	"
1855	7,166	"	"
1856	8,096	"	"
1857	7,068	"	"
1858	6,923	8	"
1859	6,750		
	<u>73,801</u>	<u>10</u>	<u>8</u>

Average of which is
Rs. 7,380-2-8

years realized during the last year is Rs. 6,441, which, compared with the average of collections of the previous ten years as shewn in the margin* is satisfactory.

The assets of the Society amount to Rs. 6,991-1-2 exclusive of the amount of outstanding claims, Rs. 5,747-1-6, a considerable portion of which will probably be realized during the current year. The liabilities fall short of Rs. 3,200 which is principally on account of printing, &c.

Statement No. 1 exhibits the total Expenditure at Rs. 14,973-4-4, while the total Receipts amount to Rs. 14,085-8-6, showing an excess of expenditure of Rs. 887-11-10 over the income.

INCOME.		
Contribution,	...	Rs. 6,704 15 8
Admission Fee,	...	" 1,120 0 0
Journal,	...	" 643 3 11
Library,	...	" 589 15 3
Museum,	...	" 3,605 6 1
Secretary's Office,	...	" 16 3 0
Vested Fund,	...	" 258 11 1
General Establishment,	...	" 20 4 4
Profit and Loss,	...	" 44 0 0
Miscellaneous,	...	" 9 2 8
Total,	...	<u>Rs. 13,011 14 0</u>

The monthly average being	Rs.	1,084 5 2
EXPENDITURE.		
Journal,	Rs.	1,750 14 0
Library,	"	1,735 8 9
Museum,	"	5,710 6 2
Secretary's Office,	"	1,707 6 9
Building,	"	1,159 1 0
Vested Fund,	"	3 0 1
Miscellaneous,	"	564 15 3
Contribution,	"	43 8 0
Stacey Coin Collection,	"	102 4 0
Income-tax,	"	120 0 0
Profit and Loss,	"	20 7 4
Total,	...	<u>Rs. 12,917 7 4</u>

Shewing a monthly average of Rs. 1,076 7 3½

The estimate of probable Income and Expenditure of the ensuing year is given in the margin.

LIBRARY.

Upwards of 400 volumes have been added to the Library during the past year, a considerable portion of which are presentations from learned Societies and Institutions. For the better arrangement of these and other accumulations, several new book-cases have been provided. The leading Scientific and Literary Periodicals of Europe obtained either by purchase or exchange, are as usual laid on the table of the reading room. A supplementary catalogue which had been completed in 1858, and corrected up to the present date, is in the hands of the Printer. A corrected MS. catalogue of the Sanserit Library, has also been finished.

The Coin Cabinet has received few additions during the year, but several offers for exchange and purchase of duplicates have been received since the Council notified their wish to collectors and others to dispose of their duplicates. A Sub-Committee has been formed, and a Coin Fund opened for the credit of all sums realized by sales, and as a provision from which the Committee will obtain the means of extending and improving the Society's cabinet.

MUSEUM.

Important and valuable contributions have been made to the

*Natives.	
Males,	78321
Females,	3490
Europeans.	
Males,	1880
Females,	946
Total,	<u>84637</u>

Average is 273 per day.

Museum, the popularity of which the Council has the gratification to observe is rapidly on the increase, as will be perceived from the daily average of visitors* to the Institution during the past year, which is 273 against 185, of 1859, the total for the year

being 84,637, exclusive of Sundays and Holidays.

Mr. Theobald's Catalogue of the shells in the Society's cabinet, the preparation of which was announced in the last annual report, has since been completed and published. The attention of the Natural History Committee has been drawn to his suggestion for the better preservation of some of the specimens. Mr. Theobald has now offered to make a new arrangement of the Geological collections, and Mr. Blanford has similarly undertaken to prepare a Catalogue of some of the Palæontological remains in the Society's Museum. Both these offers have been cordially acknowledged by the Council

They regret, however, to have to state that the Curator's Catalogue of Mammalia is still incomplete, the delay in its publication, which the President last year announced as certain to take place before the occurrence of their next annual meeting, has caused the Council much disappointment.

JOURNAL.

Four Nos. of the Journal have been published during the year. They include several valuable and interesting papers on subjects connected with the researches of the Society.

OFFICE BEARERS.

The Librarian and Assistant Secretary, Babu Gourdos Bysack, resumed the charge of his duty in July last, and has again obtained leave of absence, preparatory to his resigning the service of the Society, to which during his incumbency he has proved a very useful officer.

Babu Lalgopal Dutt, B. A., who officiated during his absence in the preceding part of the year, has been provisionally appointed as his substitute.

ORIENTAL FUND.

The Council have great pleasure in stating that during the past year the new series of the *Bibliotheca Indica* (which was announced in their last Report as about to be commenced,) has been begun, and four numbers have already appeared, being the commencement of three valuable works,—the translation of the *Súrya Siddhánta* by Pundit Bapu Deva, under the superintendence of the Venerable Archdeacon Pratt. The *Vais'eshika Sutras* with two commentaries, edited by Pundit Jaynarayan Tarkapanchanan and Nanda Kumar Tarkaratna; and the *Tarikhi Ferozshahi* of Ziaa Barni, edited by Sayid Ahmad Khan, under the superintendence of Captain W. N. Lees. The Council would especially draw attention to the last mentioned publication, the first only, they hope, of a series of such works, and furnishing much valuable and contemporary material for the student of Mahomedan Indian history. They have undertaken, in the course of next year, to continue the series

by the publication of the *Tarikhi Masaudi*, by Abul Fazl Baihaki, Sultan Masaud's Secretary. The late Mr. Morley had prepared the text from several MSS., and had just before his decease, at the instance of Mr. E. Thomas, offered it to the Society for publication, an offer which his executors have since carried out by forwarding the MS. which is now in the Society's possession.

Mr. F. E. Hall has further engaged to edit the *Dasa Rûpa*, the oldest authority on the dramatic theory of the Hindus, and to add an English translation to his edition of the text.

The editors of the old series have been actively employed in completing the works which yet remain unfinished.

The titles of the fasciuli of the old series published during the past year are :

1. Dictionary of Technical Terms used in the sciences of the Mussulmans, edited by Moulavies Abd-el Huq and Gholam Kadir, under the supervision of Captain W. N. Lees, LL. D., Nos. 156, 158, 159, 162, 165, Part. II., Fasc. XII. to XVI.

2. The Conquest of Syria, commonly ascribed to Aboo Abd Allah Mohammad, by Omar Al Waquidi, edited by Captain W. N. Lees, LL. D., No. 164, Fasc. VII.

3. *Sanhita* of the Black *Yajur Veda* with the commentary of Madhava Acharya, edited by Dr. E. Roer and E. B. Cowell, M. A., Nos. 157, 160, 161, 166, Fasc. X. to XIII.

4. The *Marcandeya Purana*, edited by Rev. K. M. Banerjee, No. 163, Fasc. IV.

The titles of the fasciuli of the new series, are :

1. Hindu Astronomy, the *Surya Siddhanta*, translated from the Sanserit, by Pundit Bapu Deva S'astri, under the superintendence of the Ven'ble Arehdeacon Pratt, No. 1, Fasc. I.

2. The *Tarikh-i-Feroz-shahi* of Ziaa al Din Barni commonly called *Ziaa-i-Barni*, edited by Saiyid Ahmad Khan, under the supervision of Captain W. N. Lees, LL. D. ; Nos. 2 and 3, Fasc. I. II.

3. *Vais'eshika Sutras* with *Upaskâra* and *Vivriti* Commentaries, edited by Pundits Jaynarayan Tarkapanchanan and Nanda Kumar Tarkaratna, No. 4, Fasc. I.

The meeting then proceeded to ballot for the Council and officers for the ensuing year. Mr. H. F. Blanford and Moulavie Abdool Lutif

Khan, Bahadur, were appointed scrutineers, and at the close of the ballot, the Chairman announced the following result :

COUNCIL.

A. GROTE, ESQ.,	<i>President.</i>
DR. T. THOMSON.	} <i>Vice-Presidents.</i>
MAJOR H. L. THUILLIER.	
BABU RAJENDRA LAL MITRA.	
BABU RAMAPERSAD ROY.	
HON'BLE SIR H. BARTLE FRERE.	
COL. BAIRD SMITH.	
CAPT. W. N. LEES.	
T. OLDHAM, ESQ.	
DR. W. CROZIER.	
DR. J. FAYRER.	
MAJOR. W. S. SHERWILL.	
R. JONES, ESQ.	
W. S. ATKINSON, ESQ.	} <i>Joint Secretaries.</i>
E. B. COWELL, ESQ.	

ABSTRACT STATEMENT
OF
RECEIPTS AND DISBURSEMENTS
OF THE
ASIATIC SOCIETY,
FOR
THE YEAR 1860.

STATEMENT
Abstract of the Cash Accounts

RECEIPTS.		1859.	1860.
<hr style="border-top: 1px dashed black;"/>			
CONTRIBUTIONS.			
Received from Members.	..	6,750 0 0	6,441 7 0
ADMISSION FEE.			
Received from new Members,	..	1,248 0 0	2,016 0 0
JOURNAL.			
Sale proceeds of, and Subscriptions to, the Journal of the Asiatic Society,	..	339 0 0	1,094 8 9
LIBRARY.			
Sale proceeds of Books,	..	552 6 0	432 11 6
MUSEUM.			
Received from the General Treasury at 300 Rs. per month,	..	3,600 0 0	3,600 0 0
Savings,	..		14 2 3
Fines,	..		2 0 0
			3,616 2 3
SECRETARY'S OFFICE.			
Sale of Postage stamps,	..	0 0 0	11 0 0
Discount on ditto,	..	0 12 6	1 1 6
Refund of postage,	..	9 9 0	3 7 6
			15 9 0
VESTED FUND.			
Interest on Company's paper received from the Bank of Bengal,		245 0 0	245 0 0
GENERAL ESTABLISHMENT.			
Fines,	..	4 10 6	19 8 0
DEPOSITS,			
Prem Chaund Turkobagish,	..		4 0 0
Doctor E. Roer,	..		8 0 0
J. B. N. Hennessey, Esq.	..		18 0 0
J. Hovenden, Esq.	..		12 0 0
J. E. T. Aitchison, Esq.	..		12 0 0
W. Theobald, Esq. Jr.	..		24 0 0
J. P. Grant, Esq. Jr.	..		36 0 0
G. Shelverton, Esq...	..		18 0 0
Baboo Nobinehunder Roy,	..		5 0 0
John Strachey, Esq.	..		12 0 0
Rev. F. Mason,	..		0 10 0
Captain J. C. Haughton,	..		6 0 0
Rajah Bunsput Singh,	..		18 0 0
Lient. H. Seonee,	..		6 0 0
G. H. M. Batten, Esq.	..		18 0 0
			197 10 0
			Carried over, 14,078 8 6

No. 1.

of the Asiatic Society, for 1860.

DISBURSEMENTS.

	1859.	1860.
JOURNAL,	1,716 4 6	
Freight, .. ..	.. 106 11 0	
Printing charges, .. ..	.. 3,035 0 6	
Commission on sale of Books, .. ..	.. 2 4 4	
Purchase of Postage stamps, .. ..	.. 27 8 0	
Packing charges, .. ..	.. 10 9 9	
Purchasing a blank Record Book, .. ..	.. 1 8 0	
	<hr/>	3,183 9 7
LIBRARY,	2,276 1 3	
Salary of the Librarian for 12 months at Rs. 70 per month, .. ..	.. 840 0 0	
Establishment ditto, .. ..	.. 73 0 0	
Purchase of Books, .. ..	.. 110 0 0	
Book Binding, .. ..	.. 252 14 0	
Commission on sale of Books, .. ..	.. 3 3 2	
Landing charges, .. ..	.. 1 12 6	
Charges for bringing a baked clay Inscription from Gya, .. ..	.. 10 0 0	
Ditto for copying the supplementary Catalogues for press, .. ..	.. 12 0 0	
Freight for sending books to London, .. ..	.. 1 6 3	
Charges for cleaning books, .. ..	.. 27 12 0	
Petty charges, .. ..	.. 0 9 3	
	<hr/>	1,332 9 2
MUSEUM,	5,604 14 4	
Salary of the Curator E. Blyth, Esq. at Rs. 250 per month. 12 months, .. ..	.. 3,000 0 0	
House-rent Rs. 40 per month, 8 months, .. ..	.. 320 0 0	
Ditto, Rs. 80 per month, 4 months, .. ..	.. 320 0 0	
	<hr/>	640 0 0
Establishment, .. ..	.. 540 0 0	
Extra Taxidermists' salary, .. ..	.. 739 7 3	
Contingent charges, .. ..	.. 174 11 6	
Printing charges, .. ..	.. 772 8 0	
Purchase of 7 pairs of Deer horns, .. ..	.. 40 0 0	
Fixing and lining 6 glass cases with broad cloth, .. ..	.. 18 0 0	
A blank book for entering the names of Visitors, .. ..	.. 7 4 0	
Repairing and supplying new keys to the Museum cases, .. ..	.. 56 15 6	
Freight, .. ..	.. 11 11 0	
Charges for cutting the Kurruckpore Meteoric Iron, .. ..	.. 45 0 0	
Dawk Bangly charges, .. ..	.. 15 12 0	
Stationery, .. ..	.. 3 12 0	
	<hr/>	6,065 1 3
	<hr/>	Carried over, 10,581 4 0

				Brought over, 14,078	8	6	
MESSRS. WILLIAMS AND							
NORGATE, ..	..	36	4	0		
Sale proceeds of Goldstuecker's Sanskrit and							
English Dictionary, Vol. I. p. 3, ..				2	8	0	
Freight on Parcel received through Rajah							
Radhakant Deva,..	..			1	6	0	
Duty on ditto, ..	..			1	0	0
Received through Mr. Atkinson, as per his							
order to pay to the Entomological Society,							
London 4s. 3d. at 2 shillings per Rupee, ..				2	2	0	
				<hr/>			
					7	0	
					0	0	
				<hr/>			
				14,085	8	6	
BALANCE OF 1859.							
Bank of Bengal, ..	..	2,796	14	3		
Cash in hand, ..	..	9	14	9		
		<hr/>			2,806	13	0
Inefficient Balance, ..	..			72	0	0
				<hr/>			
				2,878	13	0	

Carried over, 16,964 5 6

				Brought over, 10,581	4	0
SECRETARY'S OFFICE, ..	1,715	13	9			
General Establishment, ..				790	0	0
Secretary's Office Establishment, ..				751	0	0
Petty charges, ..				15	9	3
Stationery, ..				84	8	6
Purchase of Postage stamps, ..				34	14	0
Postage paid, ..				15	8	0
A Sheet Almanac for 1860, ..				1	0	0
Two blank books, ..				10	4	0
Printing charges, ..				29	0	0
A Lever Embossing Press, ..				13	10	0
				<hr/>		
				1,745	5	9
BUILDING, ..	2,728	13	0			
Assessment, ..				270	0	0
Ditto for Lighting, ..				72	0	0
Preparing a new shade for the out offices, ..				36	0	0
Charges for metdling the compound, ..				14	2	0
				<hr/>		
				392	2	0
DEPOSIT, ..	65	12	0			
E. B. Cowell, Esq, ..				3	1	0
Prem Chaund Turkobagish, ..				4	0	0
W. Theobald, Esq. Jr. ..				32	0	0
Rev. Isidor Lowenthal, ..				4	0	0
Rev. F. Mason, ..				0	8	0
G. H. M. Batten, Esq. ..				6	0	0
Lieut. H. Sconce, ..				6	0	0
Rajah Bansput Singh, ..				6	0	0
Captain J. C. Haughton, ..				6	0	0
John Strachey, Esq. ..				6	0	0
G. Shelverton, Esq. ..				6	0	0
J. P. Grant, Esq. Jr. ..				12	0	0
J. E. T. Aitchison, Esq. ..				12	0	0
Major J. Hovenden, ..				12	0	0
J. B. N. Henesscy, Esq. ..				18	0	0
Dr. E. Roer, ..				8	0	0
Lieut.-Col. J. Abbott, ..				19	7	0
Major S. R. Tickell, ..				18	0	0
Baboo Nobinchunder Roy, ..				5	4	0
Moonshee Narain Doss, ..				7	8	0
				<hr/>		
				191	12	0
VESTED FUND, ..	0	9	10			
Paid Commission upon Interest on Company's Paper, ..				0	9	7
Ditto Income Tax on ditto, ..				4	13	0
				<hr/>		
				5	6	7
				<hr/>		
				Carried over, 12,915	14	4

Co.'s Rupees,.. 16,964 5 6

Errors Excepted.

GOURDOSS BYSACK,
Assistant Secretary.

*Asiatic Society's Rooms,
The 31st Dec. 1860.*

				Brought over, 12,915 14 4
MESSRS. WILLIAMS AND				
NORGATE, ..	..	57 14 0		
Paid Messrs. Gillanders, Arbuthnot and Co. as				
per their order, £100, at 2 shillings per Rupee,	..		1,000 0 0	
CONTRIBUTIONS, ..		128 0 0		
Receipt Stamps for collecting contributions				
under the new stamp Act, ..	..		2 8 0	
COIN FUND, ..		0 0 0		
Paid Manager of Calcutta Auction Company for				
an Iron Safe, ..	..	300 0 0		
Conveyance hire for ditto, ..	..	4 0 0		
Purchase of a blank book for Coins, ..	..	2 12 0		
			<hr/>	306 12 0
INCOME TAX.				
Paid Income Tax on Mr. E.				
Blyth's Salary, from July to				
November, 1860, ..	..	0 0 0		50 0 0
PROFIT AND LOSS.				
Cash stolen from the Society's				
Chest, ..	..	0 0 0		61 6 0
MISCELLANEOUS, ..		778 9 4		
Advertising charges, ..	..		14 1 0	
Meeting charges, ..	..		168 0 6	
Oiling, cleaning and regulating a Cloek, ..	..		4 0 0	
Paid E. Blyth, Esq., for the purchase of a				
Horse, ..	..	250 0 0		
Ditto for a green baize screen with roller for				
the Meeting Room, ..	..	60 0 0		
Ditto for 2 hanging Solar Lamps, ..	..	16 0 0		
Ditto for 4 wire pankha protectors, ..	..	6 8 0		
Ditto for a dozen of sissoo wood Chairs, ..	..	55 8 0		
Ditto stamp-fee to the Bank for blank Stamped				
Cheques, ..	..		1 9 0	
Salary of a ticca Mallee, ..	..		22 13 0	
Repairing 4 hanging Argand Lamps, ..	..		6 0 0	
Petty charges, ..	..		32 4 6	
			<hr/>	636 12 0
				<hr/>
				14,973 4 4
BALANCE.				
Bank of Bengal, ..	..	1,654 13 2		
Cash in hand, ..	..	85 7 6		
			<hr/>	1,740 4 8
Inefficient Balance, ..	..		250 12 6	
			<hr/>	1,991 1 2
				<hr/>
				Co.'s Rs... 16,964 5 6

EWD. B. COWELL,

Secretary, Asiatic Society.

STATEMENT,
Abstract of the Oriental

	1859.	1860.
<hr style="border-top: 1px dashed black;"/>		
SALE OF ORIENTAL PUBLICATIONS, Rs.	1,317 1 6	
Received by sale of Bibliotheca Indica,	.. 779 2 9	
Ditto by subscriptions to ditto,	.. 56 4 0	
Ditto by sale of White Yajur Veda,	.. 114 0 0	
Ditto by refund of Postage,	.. 0 15 0	
	950 5 9	
GOVERNMENT ALLOWANCE.		
Received from the General Treasury, at 500 per month, 12 months,	.. 6,000 0 0	6,000 0 0
VESTED FUND.		
Received interest on Company's Paper from the Bank of Bengal,	140 0 0 427 8 0	
Ditto Discount on Purchasing Co.'s Paper,	.. 196 10 5	
Ditto renewing Fee on ditto ditto,	.. 1 0 0	
	625 2 5	
DEPOSIT,		
Received from Mahomed Hajee,	.. 89 4 0	.. 26 3 0
CUSTODY OF ORIENTAL WORKS,		
Savings of Establishment,	.. 6 10 3	
Fines,	.. 7 1 9	
	.. 1 0 0	
	8 1 9	
BALANCE OF 1859.		
Bank of Bengal,	.. 11,166 11 11	
Cash in hand,	.. 25 15 8	
	11,192 11 7	
Inefficient Balancee,	.. 954 8 6	
	12,147 4 1	

Carried over, 19,757 1 0

No. 2.

Fund for the year 1860.

	1859.	1860.
SALE OF ORIENTAL PUBLICATIONS, Rs.	134 2 0	
Commission on the Sale of Books, ..	.. ..	6 14 9
VESTED Fund,	1 5 8	
Paid to the Bank of Bengal for purchasing 3 pieces of Company's Paper, dated 28th February, 1857, bearing Interest at 5 per Cent., ..	.. 6,000 0 0	
Ditto ditto interest due on those Papers, ..	.. 188 6 5	
Ditto ditto commission for purchasing the Papers, ..	.. 15 0 0	
Ditto ditto for collecting Interest on Company's Paper, ..	.. 1 0 9	
Income Tax on Company's Paper, ..	.. 8 12 0	
Fee for renewing ditto,..	.. 2 0 0	
	—————	6,215 3 2
CUSTODY OF ORIENTAL WORKS, ..	779 12 3	
Salary of Librarian at Rs. 30 per month, ..	360 0 0	
Establishment at Rs. 14 per month, ..	168 0 0	
Book binding,	140 4 0	
Books cleaning,	61 8 0	
A blank book,	3 2 0	
Packing charges,	1 4 9	
Stamp fee paid to the Bank for blank stamped cheques,..	.. 1 9 0	
	—————	735 11 9
BIBLIOTHECA INDICA,	59 8 9	
Freight, .. ..	.. 18 7 9	
Packing Charges, .. ..	.. 16 1 0	
Purchase of Postage Stamps, .. ..	.. 3 0 0	
Petty Charges, .. ..	.. 1 0 0	
	—————	38 8 9
COPYING PURAN,,	31 8 0	
Stationery for copying Puran, .. ..	.. ..	1 0 0
TAITIRIYA SANHITA,	1,150 8 0	
Copying charges, .. ..	.. ..	8 0 0
DICTIONARY OF TECHNICAL TERMS, ..	0 0 0	
Printing charges, .. ..	.. ..	2,036 0 0
TAITIRIYA BRAHMANA,	224 0 0	
Printing charges, .. ..	.. ..	983 12 0
SURYA SIDDHANTA,	0 0 0	
Printing charges, .. ..	.. ..	543 0 0
SANHITA OF BLACK YAJURVEDA, ..	0 0 0	
Printing charges, .. ..	.. ..	954 6 0
VASAVADATTA,	0 0 0	
Printing charges, .. ..	.. ..	423 12 0
	—————	Carried over, 11,946 4 5

Brought over, 19,757 1 0

Co.'s Rs. 19,757 1 0

*Asiatic Society's Rooms,
The 31st Dec. 1860.*

Errors Excepted.
GOURDOSS BYSACK,
Assistant Secretary.

				Brought over, 11,946	4	5
COPYING MSS.,	..	..	0 0 0			
Copying charges,	..	..	..	..	14	14 0
TARICKH FEROZE SHAHI,	..	..	0 0 0			
Printing charges,	..	..	..	..	270	6 0
WHITE YAJURVEDA,	..	..	0 0 0			
For subscription to 20 Copies of ditto,			..	..	855	9 4
WAKIDY,	..	..	0 0 0			
Printing charges,	..	..	..	..	246	0 0
LIBRARY.						
Purchasing books,	..	..	..	..	30	0 0
					<u>13,363</u>	<u>1 9</u>
BALANCE.						
Bank of Bengal,	..	..	3,923 12 4			
Cash in hand,	..	..	3 10 5			
			<u>3,927 6 9</u>			
Inefficient Balance,	..	..	..	..	2,466	8 6
					<u>6,393</u>	<u>15 3</u>
					<u>Co.'s Rs...</u>	<u>19,757 1 0</u>

EDWARD B. COWELL,
Secretary, Asiatic Society.

STATEMENT No. 3.

Liabilities.

	1859.	1860.
Hon'ble Sir J. W. Colvile, Kt., Rs.	276 8 0	276 8 0
J. W. Laidley, Esq.,	418 7 4	418 7 4
Deposits,	90 11 0	96 9 0
Messrs. Williams and Norgate,	1,383 2 8	647 11 11
Salary, Establishment, and Contingent charges, say,	0 0 0	700 0 0
Extra copies of Journal articles, about,	0 0 0	325 0 0
Mr. Theobald's Shell Catalogue,	300 0 0	300 0 0
Birds' Catalogue, (Binding,)	42 4 0	42 4 0
Journal No. IV. of 1860, about,	0 0 0	300 0 0

2,511 1 0 3,106 8 3

EDWARD B. COWELL,
Secretary, Asiatic Society.

Assets.

	1859	1860
CASH.		
Bank of Bengal,	2,796 14 3	1,654 13 2
Cash in hand,	9 14 9	85 7 6
Inefficient Balance,	72 0 0	250 12 6
Company's Paper,	5,000 0 0	5,000 0 0
	7,878 13 0	6,991 1 2
OUTSTANDINGS.		
Contributions,	4,607 5 4	4,313 14 3
Admission Fee,	192 0 0	352 0 0
Library, Sale of Books,	212 0 0	218 0 0
Journal, Subscription to end of 1857-58 and 1858-59,	1,415 5 0	531 3 3
Ditto, Sale of,	5 8 0	32 0 0
Government allowance for December, 1860,	0 0 0	300 0 0
	6,432 2 4	5,747 1 6

Errors Excepted.

GOURDOSS BYSACK,
Assistant Secretary.

Asiatic Society's Rooms,
The 31st December, 1860.

LIST OF ORDINARY MEMBERS
OF THE
ASIATIC SOCIETY OF BENGAL,
ON THE 31st DECEMBER, 1860.

The * distinguishes non-subscribing and the † non-resident Members.

- ~~~~~
- †Abbott, Lieut.-Col. J. Artillery, Delhi.
 Abdool Luteef, Khan Bahadur, Moulvi, Calcutta.
 †Aitchison, J. E. T. Esquire, M. D., Jhelum.
 *Alabaster, C. Esquire, China.
 †Alexander, Lieut. W. G. 93rd Highlanders, Rohileund Horse,
 Peshawur.
 *Allen, C. Esquire, B. C. S., Europe.
 Amír Alí, Khan Bahadur, Calcutta.
 *Anderson, Lieut.-Col. W., Bengal Artillery, Europe.
 †Anley, W. A. D. Esquire, Rajmehal.
 Areher, Dr. C., Calcutta.
 Atkinson, W. S. Esquire, M. A., F. L. S., Calcutta.
 Atkinson, Major, F. D., Calcutta.
 Avdall, J. Esquire, Calcutta.
 Ayerst, Rev. W., Calcutta.
 *Baker, Lieut.-Col. W. E. Bengal Engineers, F. R. G. S., Europe.
 Banerjee, Rev. K. M., Calcutta.
 †Batten, J. H. Esquire, B. C. S., Mynpooree.
 †Batten, George. H. M., Esquire, C. S., Allyghur.
 †Bayley, E. C. Esquire, B. C. S., Allahabad.
 Beadon, C. Esquire, B. C. S., Calcutta.
 Beaufort, F. L. Esquire, B. C. S., Calcutta.
 *Beekwith, J. Esquire, Europe.
 *Benson, Lieut.-Col. R., Europe.
 †Birch, Major Genl. Sir R. J. H., K. C. B., N. W. Provinces.
 *Blaggrave, Capt. T. C. 26th Regt. B. N. I., Europe.
 Blane, Major S. J., Calcutta.
 Blanford, H. F. Esquire, Geological Survey, Calcutta.
 †Blanford, W. T. Esquire, Ditto Ditto.

- †Blundell, E. A. Esquire, Singapore.
 *Bogle, Lieut.-Col. Sir A. Kt., Europe.
 Boloy Chand Sing, Bábu, Calcutta.
 †Bowring, L. B., C. S., Esquire, N. W. Provinces.
 *Boycott, Dr. T., B. M. S., Europe.
 Braddon, H. Esquire, Calcutta.
 †Brandis, Dr. D., Rangoon.
 †Brandreth, J. E. L. Esquire, C. S., Delhi.
 *Brodie, Capt. T. 5th Regt. B. N. I., Europe.
 †Browne, Horace, A. Capt., Pegu.
 *Browne, Rev. J. Cave, Europe.
 †Bunsput Sinha Raja, Allahabad.
 Busheerooddeen, Sultan Mahamed, Saheb, Calcutta.
 Byrne, L. F. Esquire, C. E., Calcutta.
 †Campbell, Dr. A., Darjiling.
 †Campbell, C. J. Esquire, C. E., Delhi.
 †Carnae, J. H. Rivett, Esquire, C. S., Midnapore.
 *Chapman, R. B. Esquire, B. C. S., Europe.
 †Christian, J. Esquire, Monghyr.
 *Colvin, J. H. B. Esquire, B. C. S., Europe.
 †Cooper, F. H. Esquire, C. S., Delhi.
 Cowell, E. B. Esquire, M. A., Calcutta.
 Crozier, Dr. William, B. M. S., Calcutta.
 †Dalton, Capt. E. S. 9th Regt. B. N. I., Chota Nagpore.
 †De Bourbel, Capt. R., Bengal Engineers, N. W. Provinces.
 Degumber Mitra, Baboo, Calcutta.
 †Diekens, Capt. C. H., N. W. Provinces.
 Douglas, Major C., Calcutta.
 Drummond, Hon'ble E., B. C. S., Calcutta.
 †Duka, Dr. Theodore, Monghyr.
 *Eatwell, Dr. W. C. B., F. L. S. Europe.
 *Edgeworth, M. P. Esquire, B. C. S., Europe.
 †Edmonstone, Hon'ble G. F., C. S., Allahabad.
 *Elliott, Hon'ble Walter, M. C. S., Europe.
 †Elliott, C. A. Esquire, C. S., Lucknow.
 *Ellis, Major R. R. 23rd Regt. B. N. I., Europe.
 *Elphinstone, Lieut. N. W. 4th Regt. B. N. I., Europe.
 *Erskine, Major W. C., Europe.

- Fayrer, Dr. J., B. M. S., F. R. C. S., Calcutta.
 Fisher, A., Esquire, Calcutta.
 Fitzgerald, Capt. C. M., Calcutta.
 †Fitzpatrick, D. Esquire, C. S., N. W. Provinces.
 Fitzwilliam, W. S., Esquire, Calcutta.
 †Forlong, Capt. J. G. R., Moulmein.
 Fraser, Capt. Alexander, Calcutta.
 †Freeling, G. H., Esquire, B. C. S., Bolundshur.
 Frcrc, the Hon. Sir H. Bartle, K. C. B., Calcutta.
 Futteh Ali, Moulvi, Calcutta.
 †Fytche, Major A., 70th Regt. B. N. I., Bassein.
 †Gardner, D. M., Esquire, C. S., N. W. Provinces.
 †Gastrell, Capt. J. E. 13th Regt. N. I., Serampore.
 †Geoghegan, J. Esquire, C. S., Maldah.
 *Gladstone, W. Esquire, Europe.
 Goodeve, Dr. E., Calcutta.
 †Gooroo Churn Doss, Babu, Jessore.
 †Goss, W. Forbes, Esquire, Nya Doomkah, Beerbiroom.
 Govin Chunder Sen, Bábu, Calcutta.
 Grant, J. P., Esquire, Jr., B. C. S. Hooghly.
 Grant, T. R., Esquire, Calcutta.
 Grant, Hon'ble J. P., B. C. S., Calcutta.
 *Grapel, W., Esquire, M. A., Europe.
 †Griffith, R. T. H., Esquire, Benares.
 Grey, W. Esquire, B. C. S., Calcutta.
 Grote, A. Esq., B. C. S., F. L. S. Calcutta.
 †Hall, F. E. Esquire, LL. D., Saugor.
 Halleur, Dr. H., Calcutta.
 Halsey, W. S. Esquire, B. C. S., Calcutta.
 *Hamilton, R. Esquire, China.
 *Hamilton, Sir R. N. E. Bart., B. C. S., Europe.
 Hannynghton, Lieut.-Col. J. C. 63rd Regt. N. I., Calcutta.
 Hardie, Dr. G. K., Calcutta.
 †Harris, E. B. Esquire, Civil Surgeon, Monghyr.
 †Haughton, Capt. J. C., Port Blair.
 Hearsay, Major-Genl. Sir J. B., 10th Light Infantry, Calcutta.
 †Henessey, J. B. N., Esquire, Dehra.
 †Herschel, W. J. Esquire, B. C. S., Nuddea.

- *Hichens, Lieut. W. Bengal Engineers, Europe.
 †Hobhouse, C. P. Esquire, B. C. S., Hooghly.
 †Hopkinson, Capt. H., Assam.
 †Hovenden, Major J., Bengal Engineers, Benares.
 Innes, Major J. J. M., Calcutta.
 †Ishurepershad Sinha, Raja, Bahadur, Benares.
 *Jackson, L. S. Esquire, Europe.
 *Jackson, W. B. Esquire, B. C. S., Europe.
 Jadava Krishna Sing, Bábu, Calcutta.
 Jallaluddin Mohammed, Prince of Mysore, Calcutta.
 †James, Capt. H. C., 32nd Regt. B. N. I., Rampore Beaula.
 James, Major T., Bengal Army, Calcutta.
 †Jerdon, T. C. Esquire, M. M. S., Darjiling.
 †Jogindra Narain Roy, Raja, Rajshai.
 *Johnstone, J. Esquire, Europe.
 Jones, R. Esquire, Calcutta.
 Joygopaul Bysack, Bábu, Calcutta.
 Judge, T. E. B. Esquire, Calcutta.
 †Kabeeroodeen Ahmed Shah, Bahadur, Sassarem.
 Kaliprasunno Sing, Bábu, Calcutta.
 Kassinath Roy Chowdry, Bábu, Calcutta.
 Kay, Rev. W., D. D., Calcutta.
 *Laidlay, J. W. Esquire, Europe.
 †Layard, Capt. F. P., 19th Regt. B. N. I., Berhampore.
 Lees, Capt. W. N., LL. D., 42nd Regt. B. N. I., Calcutta.
 Leonard, H. Esquire, C. E., Calcutta.
 *Liebig, Dr. G. Von, B. M. S., Europe.
 Lindsay, E. J. Esquire, Calcutta.
 Loch, G. Esquire, B. C. S., Calcutta.
 †Lord, Bishop of Calcutta, Right Rev., N. W. Provinces.
 *Low, Major-Genl. Hon'ble J., Europe.
 †Lushington, F. A. Esquire, B. C. S., Rajshae.
 Macfarlane, D. H. Esquire, Calcutta.
 †Maclagan, Capt. R., Roorkee.
 †Macleod, D. F. Esquire, B. C. S., Punjaub.
 Macrae, Dr. A. C., B. M. S., Calcutta.
 Mair, David K. Esquire, Calcutta.
 Maniekjee Rustomjee, Esquire, Calcutta.

- †Mann, E. G. Esquire, Rajshae.
 *Marshman, J. C. Esquire, Europe.
 Mazzuchelli, Rev. F. F., D. D., Calcutta.
 *Middleton, J. Esquire, Europe.
 †Medlicott, J. G. Esquire, Geological Survey of India.
 †Medlicott, H. B. Esquire, F. G. S., Roorkee.
 *Mills, A. J. M. Esquire, B. C. S., Europe.
 *Money, D. J. Esquire, B. C. S., Europe.
 Money, Alonzo, Esquire, B. C. S., Calcutta.
 Money, J. W. B. Esquire, Calcutta.
 †Montgomerie, Capt. T. G., B. E., F. R. G. S., Trigl. Survey, Dehra.
 †Morris, G. G. Esquire, B. C. S.
 †Muir, W. Esquire, B. C. S., Allahabad.
 *Muir, J. Esquire, Europe.
 †Murray, Lieut. W. G. 68th N. I., Rawul Pindee.
 †Narendra Narain Bhupa, Maha Rajah, Cooch Behar.
 †Newmarch, Capt. C. D., Pegu.
 †Nicholls, Capt. W. T. 24th Regt. M. N. I., Burmah.
 Nandalala Bose, Babu, Calcutta.
 *Obbard, J. Esquire, Calcutta.
 †Oldham, C. Esquire, Geological Survey of India.
 Oldham, T., LL. D., F. R. S., Calcutta.
 O'Shaughnessy, Sir W. B., Europe.
 *Ouseley, Major, W. R., Europe.
 Payne, Dr. A. J. Calcutta.
 †Pearse, Major G. G., Segowlie.
 †Phayre, Lieut.-Col. A., Rangoon.
 †Prasunno Nauth Roy, Raja Bahadur, Degaputti Rajshae.
 Pratapchandra Sinha, Raja, Calcutta.
 Pratt, Ven'ble Archdeacon J. H., Calcutta.
 Preonath Sett, Bábu, Calcutta.
 *Prinsep, C. R. Esquire, Europe.
 Prosonocoomar Tagore, Bábu, Calcutta.
 Radhanath Sikdár, Bábu, Calcutta.
 Rajendra Dutt, Bábu, Calcutta.
 Rajendra Lál Mitra, Bábu, Calcutta.
 Ramanath Tagore, Bábu, Calcutta.
 Ramaprasad Roy, Bábu, Calcutta.

- Ramgopal Ghose, Bábu, Calcutta.
 †Reid, H. S. Esquire, Naine Tal.
 Riddell, H. P. Esquire, B. C. S., Calcutta.
 †Riley, E. O., Esquire, Rangoon.
 Ritchie, W. Esquire, M. A., Advocate Genl., Calcutta.
 †Roberts, A. Esquire, B. C. S., Lahore.
 †Roer, Dr. E., Midnapore.
 *Rogers, Capt. T. E., Europe.
 *Royle, Dr. J., F. R. S., Europe.
 †Russell, A. E. Esquire, B. C. S., Balasore.
 †Russell, R. H. Esquire, B. C. S., Bancoorah.
 *Samuells, E. A. Esquire, B. C. S., Europe.
 Sampson, A. B. Esquire, Calcutta.
 Sanders, J. Esquire, Calcutta.
 †Saxton, Capt. J. H., 38th M. N. I., Cuttack.
 Schiller, F. Esquire, Calcutta.
 †Seenee, Lieut. H., Nowgong, Assam.
 Scott, Col. E. W. S., Calcutta.
 †Scott, W. H., Esquire, Dehra Dhoon.
 †Shelverton, George Esquire, Dehra Dhoon.
 Sherwill, Major, W. S., 66th Regt. B. N. I., F. G. S., F. R. G. S.,
 Dum Dum.
 †Sherwill, Capt. J., Darjiling.
 Simpson, Dr. B., Calcutta.
 *Smith, Col. J. F., Europe.
 Smith, Lieut.-Col. Baird, C. B., Calcutta.
 Smith, H. Scott, Esquire, Calcutta.
 †Spankie, R. Esquire, B. C. S., Saharunpore.
 Stainforth, H. Esquire, B. C. S., Calcutta.
 †Stanton, Capt. F. S., Bengal Engineers, Shergotty.
 *Stephen, Major J. G., 8th N. I., Europe.
 *Strachey, Lieut-Col. R., Europe.
 †Strachey, J. Esquire, B. C. S., Moradabad.
 †Stubbs, Capt. F. W., Bengal Artillery, Rawul Pindee.
 †Sutherland, H. C. Esquire, B. A., B. C. S., Dacea.
 †Suttishunder Roy, Maharajah, Krishnagur.
 Suttayasharana Ghosal, Rajah, Bhokylas, Calcutta.
 †Syud Ahmed Khan, Bahadur, Moradabad.

- Temple, R. Esquire, B. C. S., Calcutta.
 †Theobald, W. Esquire, Jr., Geological Survey of India.
 Thompson, Rev. J. C., Calcutta.
 Thomson, J. G., Esquire, Calcutta.
 Thomson, Dr. T., M. D., F. R. S., Botanical Gardens, Calcutta.
 †Thornhill, C. B., Esquire, B. C. S., Allahabad.
 Thuillier, Major H. L., Artillery, F. R. G. S., Calcutta.
 †Tiekell, Major S. R., Moulmein.
 Trevor, C. B., Esquire, B. C. S., Calcutta.
 †Turnbull, Capt. A. D., Roorkee.
 †Vanrenen, Capt. A. D., late 71st B. N. I., R. Survey, Jhansie.
 *Ward, J. J. Esquire, B. C. S., Europe.
 †Warrand, R. H. M., Esquire, B. C. S., Jessore.
 *Watson, J. Esquire, B. C. S., Europe.
 Wauchope, S. Esquire, B. C. S., C. B. Calcutta.
 †Waugh, Col. Sir A. S., Engineers, F. R. S., F. R. G. S., Mussoorie.
 Wells, Sir Mordaunt, Kt., Calcutta.
 Williams, F. Fisk, Esquire, Calcutta.
 Wilmot, C. W. Esquire, Pakour.
 †Wilson, W. L. Esquire, Beerbhoom.
 Woodrow, H. Esquire, M. A., Calcutta.
 *Wortley, Major A. H. P., Europe.
 Wray, C. G. Esquire, C. E., Calcutta.
 Young, Capt. C. B., B. E., Calcutta.
 Yule, Lieut.-Col. H., Calcutta.

 ELECTIONS IN 1860.
Ordinary Members.

- J. H. R. Rivett Carnae, Esquire, Midnapore.
 Capt. Alexander Fraser, Calcutta.
 T. R. Grant, Esquire, Calcutta.
 Major J. J. M. Innes, Calcutta.
 E. J. B. Lindsay, Esquire, Calcutta.
 Prince Mohammed Jallaluddin of Mysore, Calcutta.
 David K. Mair, Esquire, Calcutta.
 C. Oldham, Esquire, Geological Survey of India.
 Babu Preonauth Sett, Calcutta.
 Dr. Theodore Duka, Monghyr.

- Rev. J. C. Thompson, Calcutta.
Major G. G. Pearse, Segowlie.
Capt. T. G. Montgomerie, B. E., F. R. G. S., Great Trig. Survey,
Dehra.
Col. E. W. S. Scott, Calcutta.
Dr. D. Brandis, Rangoon.
Hon'ble Sir H. Bartle Frere, K. C. B., Calcutta.
H. S. Reid, Esquire, Nyne Tal.
Major J. Hovenden, Bengal Engineers, Benares.
Major F. D. Atkinson, Calcutta.
Capt. A. D. Turnbull, Roorkee.
H. B. Medlicott, Esquire, F. G. S., Roorkee.
Lieut. H. Seonce, Engineers, Assam.
W. S. Fitzwilliam, Esquire, Calcutta.
S. Wauchope, Esquire, B. C. S., Calcutta.
Rev. J. Cave Browne.
J. E. T. Aitehison, Esquire, M. D., Jhelum.
H. Braddon, Esquire, Calcutta.
Alonzo Money, Esquire, B. C. S., Calcutta.
R. Temple, Esquire, B. C. S., Calcutta.
Dr. H. Halleur, Calcutta.
C. P. Hobhouse, Esquire, B. C. S., Hooghly.
Capt. F. S. Stanton, Bengal Engineers, Shergotty.
Raja Jogendra Narain Roy, Puttea, Rajshae.
Capt. A. D. Vanrenen, late 71st B. N. I., Revenue Survey, Jhansie.
W. Ritchie, Esquire, Calcutta.
J. G. Thomson, Esquire, Calcutta.
Rev. W. Ayerst, Calcutta.
C. J. Campbell, Esquire, C. E., Delhi.
Raja Bunspat Sinha, Allahabad.
G. H. M. Batten, Esquire, Allyghur.
L. F. Byrne, Esquire, C. E., Calcutta.
W. Grey, Esquire, B. C. S., Calcutta.
J. P. Grant, Esquire, Jr., B. C. S. Hooghly.
E. G. Mann, Esquire, Rajshae.
Dr. B. Simpson, Civil Surgeon, Calcutta.
George Shelverton, Esquire, Dehra Dhoon.
A. B. Samy:on, Esquire, Calcutta.

- Syud Ahmed Khan, Bahadur, Moradabad.
 Capt. C. M. Fitzgerald, Calcutta.
 T. E. B. Judge, Esquire, Calcutta.
 Dr. A. J. Payne, Calcutta.
 W. Forbes Goss, Esquire, Beerbhoom.
 Major T. James, Bengal Army, Calcutta.
 E. B. Harris, Esquire, Civil Surgeon, Monghyr.
 Múnshée Amír Alí, Khan Bahadur, Calcutta.
 J. Christian, Esquire, Monghyr.
 J. E. L. Brandreth, Esquire, Delhi.
 C. G. Wray, Esquire, C. E., Calcutta.
 Bábu Degumber Mitar, Calcutta.
 Rev. K. M. Banerjea, Bishop's College, Botanical Gardens.
 W. A. D. Anley, Esquire, Rajmchal.
 E. O. Riley, Esquire, B. C. S. Rangoon.
 Capt. Horace Brown, Pegu.
 Capt. C. D. Newmarch, Pegu.
 R. T. H. Griffith, Esquire, Benares.
 Moulvi Abdool Luteef, Khan Bahadur, Deputy Magistrate, 24-Pergh.
 F. H. Cooper, Esquire, C. S., Delhi.
 Babu Gooroo Churn Doss, Deputy Magistrate, Jessore.
 D. H. Macfarlane, Esquire, Calcutta.

ELECTIONS IN 1860, CONTINUED.

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|-------------------------|---|-------------------|
| Prof. Max Muller. | } | HONORARY MEMBERS. |
| Dr. Robert Wight. | | |
| Edward Thomas, Esquire. | | |
| Dr. Aloys Sprenger. | | |
| Dr. Albrecht Weber. | | |
| Mons. Stanislas Julien. | | |
| Col. George Everest. | | |
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| Rev. H. Baker, Jr., Alipi,
South Malabar. | } | CORRESPONDING MEMBERS. |
| R. Swinhoe, Esquire, H. M.
Consulate, Amoy. | | |
| Dr. M. Haug, Poonah. | | |

LOSS OF MEMBERS DURING THE YEAR 1860.

By retirement.

C. E. Chapman, Esquire, Lahore.
 Major R. C. Tytler, Barraekpore.
 Capt. H. S. Bivar, Assam.
 Dr. F. J. Mouat, Calcutta.
 A. K. Dyer, Esquire, Calcutta.
 H. V. Bailey, Esquire, Calcutta.
 F. A. Goodenough, Esquire, Calcutta.

By death.

The Right Hon'ble J. Wilson, Calcutta.
 S. Lushington, Esquire, Pooree.
 Rajah Ramehund Sing, Moorshedabad.
 Prof. H. H. Wilson, *Honorary Member.*

LIST OF HONORARY MEMBERS.

M. Garein de Tassy, Membre de l' Institut, Paris.
 Sir John Phillippart, London.
 Count De Noc, Paris.
 Prof. Francis Bopp, Memb. de l' Academie de Berlin.
 Sir J. F. W. Herschel, F. R. S., London.
 Col. W. H. Sykes, F. R. S., London.
 Prof. Lea, Philadelphia.
 Prof. C. Lassen, Bonn.
 M. Reinaud, Memb. de l' Institut, Prof. de l' Arabe, Paris.
 Dr. Ewald, Gottingen.
 His Highness Hekekyan Bey, Egypt.
 Right Hon'ble Sir Edward Ryan, Kt., London.
 Prof. Jules Mohl, Memb. de l' Institut, Paris.
 Col. W. Munro, London,
 His Highness the Nawab Nazim of Bengal, Moorshedabad.
 Dr. J. D. Hooker, R. N., F. R. S., London.
 Prof. Henry, Princeton, United States.
 Lieut.-Col. C. H. Rawlinson, Persia.
 Lieut.-Col. Sir Proby F. Cautley, K. C. B., London.
 Rájá Rádhákánta Devá, Bahádúr, Calcutta.
 B. H. Hodgson, Esq., Europe.
 Dr. H. Falconer, F. R. S., B. M. S., Europe.

Hon'ble Sir J. W. Colville, Kt., Europe.
 Prof. Max Muller, Oxford.
 Mons. Stanislas Julien, Paris.
 Col. George Everest, Europe.
 Dr. Robert Wight, London.
 Edward Thomas, Esq., Europe.
 Dr. Aloys Sprenger, Germany.
 Dr. Albrecht Weber, Berlin.

LIST OF CORRESPONDING MEMBERS.

Kremer, Mons. A. Von, Alexandria.
 Porter, Rev. J., Damaseus.
 Schlagintweit, Herr H., Berlin.
 Schlagintweit, Herr R., Do.
 Smith, Dr. E., Beyrout.
 Tailor, J. Esquire, Bussorah.
 Wilson, Dr., Bombay.
 Nietner, J. Esquire, Colombo, Ceylon.
 Haug, Dr. M., Poonah.
 Bleeker, Dr. P., Batavia.
 Frederiek, Dr. H., Batavia.
 Baker, Rev. H., Alipi, East Malabar.
 Swinhoe, R. Esquire, H. H. Consulate, Amoy.

LIST OF ASSOCIATE MEMBERS.

Blyth, E. Esq., Caleutta.
 Káramut Ali, Syud, Matawalli, Hooghly.
 Long, Rev. J., Caleutta.
 MacGowan, Rev. J., Europe.
 Stephenson, J. Esq., Europe.
 Tregear, V. Esq., Bareilly.

FOR FEBRUARY, 1861.

The monthly General Meeting of the Asiatic Society was held on the 6th Instant.

A. Grote, Esq., President, in the chair.

The proceedings of the last meeting were read and confirmed.

Presentations were received—

1. From J. Obbard, Esq., a table of tides at the Kidderpore docks for the current year.

2. From the Secretary to the Government of India, Public Works Department, three sheets of a table showing the rise and fall of the River Indus, from 1845 to 1858.

3. From H. F. Blanford, Esq., a pair of horns of the common sheep of Southern India.

4. From G. C. Wallich, Esq., M. D., F. L. S., a copy of his work entitled "Notes on the presence of animal life at vast depths in the Sea."

5. From H. P. LeMesurier, Esq., a box containing twelve specimens of stone weapons called "celts."

6. From P. F. H. Baddeley, Esq., copy of a work entitled "Whirlwinds and Dust-storms of India," with a book of plates.

The following gentlemen, duly proposed at the last meeting, were balloted for and elected ordinary members:—

Capt. H. Godwin Austin; Capt. A. B. Melville; Lieut. W. J. Stewart; R. Forrest, Esq.; Harry Duhan, Esq.; Stewart Bayley, Esq., C. S.; Major W. E. Warrand; A. S. Harrison, Esq., B. A.; Frederick S. Growse, Esq., C. S.; H. Bell, Esq., C. S., and J. Brown, Esq., M. D., B. M. S.

The following gentlemen were named for ballot at the next meeting:—

N. T. Davey, Esq., Revenue Surveyor, Dacca,—proposed by Major Thuillier, and seconded by Captain Gastrell.

Hon'ble Samuel Laing,—proposed by the president, and seconded by Sir Bartle Frere.

C. Boulnois, Esq., B. A., Prof. of Law, Presidency College,—proposed by Mr. H. F. Blanford, and seconded by Mr. Atkinson.

Charles Barnes, Esq,—proposed by Captain Layard, seconded by the President.

Hon'ble H. B. Devereux,—proposed by the President, seconded by Colonel Baird Smith.

J. J. Gray, Esq., Maldah,—proposed (for re-election) by Mr. Atkinson, and seconded by the president.

A letter from Mr. C. G. Wray, announcing his withdrawal from the Society, was recorded.

The following letter from Mr. H. P. LeMesurier, Chief Engineer, Jubbulpore Line, E. I. R., was read to the meeting:—

Allahabad, January 14th, 1861.

A. GROTE, Esq., C. S.

DEAR SIR,—I have to-day forwarded to your address a small box containing twelve specimens of stone *hatchets* or celts, which you may consider worthy of a corner in the Museum of the Asiatic Society.

The circumstances under which these relics have been brought to light are as follows:—

Early in January, 1860, I was exploring the range of Ghats westward of the Chaehye Falls on the River Tonse, $24^{\circ} 47' 30''$ N. Lat., $81^{\circ} 20' 45''$ E. Long.; passing through the village of Neehee $24^{\circ} 59' 30''$ N. Lat., $81^{\circ} 9' 40''$ E. Long. I halted my riding camel near the village Mahadeo and Peepul tree. Whilst talking to the Zemindar my eye caught the outline of two stones resting against the upright Mahadeo, which stones I at once recognized as celts.

I dismounted, and found five celts of various sizes, more or less perfect strewn, around the Hindu emblem.

The Zemindar said, he did not know where they came from, but he concluded his forefathers had placed them where I now saw them, and he therefore performed his devotions before them with the same forms and ceremonies as his ancestors had done.

He was willing enough to give them to me for a trifling consideration, more especially when I explained to him that they had in all probability been originally used for killing and slaying cattle, or other similar purposes.

The discovery of these celts rekindled my antiquarian zeal. Mr. Alexander Grant and one or two other members of the Engineering Staff of the Jubbulpore Railway became also interested in the subject, and celts were discovered in considerable numbers during the months of January, February and March. Starting from the river Tonse at Chaehye the following somewhat irregular line will circumscribe the

celt-producing district in this part of India, beyond the limits of which, to the best of my knowledge, none of these instruments have been as yet discovered.

From Chachye then westward to Simireah, Birsingpore, and on to Kotee, thence north nine miles to Putna, and so still northerly down the Pysunnee Nuddy to Tirhowan or Kirwee, from which town in an easterly direction towards Mhowan on the Jumna, 25 miles to Huttowa, thence E. S. E. 18 miles to Scorajpore, then south 11 miles to Punassa on Tonsc, and so up Tonse S. W. back to Chachye.

Up to the present date, I should suppose that we have discovered upwards of one hundred celts, and I have ceased to search for them with any vigour in localities where they most abound. At Kirwee, for instance, a large number might be collected if there was any object to be gained by removing them from the temples and sacred places where they are now carefully stored.

I have found upwards of fifty celts myself, invariably at the Mahadeos, which abound in and near every village, and I am not aware that a single celt has been found in such a position as would lead us to suppose that it had remained concealed or hidden from the notice of the present inhabitants of the country.

Generally speaking, a single outlying celt is rare; there are more frequently two or three, and sometimes five or six, if not under the same tree, at all events in the immediate neighbourhood.

Of the celts which I forward to you, Nos. 1, 2, 3 were found near Manickpore, five or six miles north of Neehee near each other, perhaps within half a mile of the village.

Nos. 4, 5 and 6 at Surreaon, five miles N. by W. of Manickpore, at one Mahadeo; Nos. 7 and 8, at Khoh, four miles E. of Kirwee, and No. 9 at Tirhowan.

Tirhowan and Kirwee are two names for the same place.

Of Nos. 10, 11 and 12, I have lost the record, but I think they are three specimens from a batch of thirteen, which a native official at Kirwee collected for me.

Chitterkote, the Pysunnee Nuddy and Kirwee are places much venerated by Hindus, and abound in celts, which appear to have been collected together in the course of ages, by pilgrims coming across the hills, and by the inhabitants of the district, who found them in the spots where they had been abandoned by their original proprietors.

The natives (although I cannot induce them to assign any reason on the subject) are or were evidently as quick in discovering any celt or even portion of a celt as the most practised antiquarian.

Nos. 2 and 5 illustrate this fact, and many of the broken portions of celts which I have met with, retain but little trace of their original pattern.

I have as yet seen no celts in this district made from stone of other descriptions than the specimens I now send to you.

I am pretty well acquainted with the line of hills from Chunar to Kohrar Khas on the Tonse, but I have never seen a celt in that locality.

I have met with no celts save within the area which I have described in an earlier paragraph.

From Meyhere to Jubbulpore for a few miles east and west of the Deccan road I know the country very well ; it has yielded me no celts up to date.

The celt question has occupied my attention from time to time during the past ten years, but in January, 1860, I was not aware of the interesting discoveries of celts in the more recent geological formations upon the continent of Europe.

The result of much observation of localities producing celts, and of information collected from various sources, has impressed me with the opinion that the celt-using race were partial to dwelling near the sea shore, in the vicinity of bluff cliffs and head-lands. In all probability they derived a considerable portion of their food from the shell-fish and other easily-captured inhabitants of the rocks and pools.

This conviction is strengthened by the vast collections of limpet-shells bearing strong traces of fire, which I have frequently found at a depth of two or three feet below the present surface of the ground in the immediate vicinity of stone implements when carrying out excavations for engineering works.

It has always struck me very forcibly when examining the country under notice in this memo., that at the period when the celt-users dwelt in this part of India, the Gangetic plain was submerged, and the coast line was represented by the bold cliffs of the Vindhyan and Kymore ranges. Should such have been the case, the vicinity of Kirwee must have presented much very beautiful natural scenery

—numerous land-locked bays, surrounded by bold cliffs, with picturesque rocky islets at short distances from the mainland in all directions—the very spot of all others where I should have expected to find traces of the celt-making people—and there the celts now are, not only collected in large numbers at the more sacred spots, but scattered in twos and threes at every village along the hill foot.

The vicinity of Neehee and of Karehun a little to the west of Neehee, near the mouth of the Hindul valley, presents the same natural features, and is also rich in celts, which are not so numerous where the hills present a more uniform and regular outline.

The celts do not appear to have been carried very far from the spots where the Hindus found them; perhaps not more than a day's journey in any case. I think therefore that a careful examination for a breadth of ten miles on either side of each range of hills, throughout the country would enable us to plot on a map, the tracks and localities most frequented by the race whose history and period are now occupying some antiquarian notice.

I have never heard of a celt in the Doab, and I found no traces of them when examining the course of the Sutlej river up to the snow in the latter part of 1857.

At Manickpore I also found a manufactured stone of a peculiar shape, somewhat resembling a three or four pound grocer's weight as used in England. This stone, made from the same material as the celts, is of a pattern which I have, on more than one occasion, noticed in archæological museums. It is generally indexed as a "hammer." The Manickpore Brahmins had converted it into a Mahadeo.

It proves to be an instrument used by potters of the present day for patting the insides of the earthen vessels to smooth away any inequalities before baking the pottery. I noticed a village workman using a precisely similar article made of hard burnt clay two or three days after I had found what at the time I thought was a stone hammer.

I shall send the stone and clay implements to England at an early date to clear up any doubt as to the purpose which the so-called hammer was made to serve. The ruder arts have undergone so little change in India during the last 1,500 years, that carefully chosen collections of Indian tradesmen's tools would, if sent home, solve many mysteries. Every leather dresser in Cawnpore to this day uses a wooden celt exactly resembling the stone ones, save that the sides

are flatter, but the peculiarly bevelled cutting edge is strikingly similar to the ancient celt.

I have never found a trace of any flint celts, but in 1856, near Nyagurhee, 28 miles east of Chaehye, I found a very perfect chert arrow-head of the same shape and size as those which the owners of basaltic celts manufactured from such chert or flint celts as they could procure by barter or force from people who dwelt in a chert country.

A chert celt was almost always chipped into arrow-heads; I was once so fortunate as to unturf a level spot of ground in the Island of Alderney, where an extensive arrow-head manufactory had been carried on; and the whole process was explained to me as clearly as if I had walked into the workman's shed and watched his operations.

Should you think the celt enquiry worth pursuing, or a further collection made, I shall be happy to hear from you, and to carry out any suggestions you may offer.

With every apology for troubling you with this long story.

I remain, &c.

(Sd.) H. P. LEMESURIER,
Chief Engineer, Jubbulpore Line, E. I. R.

In a letter subsequently received from Maniekpore, Mr. LeMesurier says:—

“I have just heard that many celts have been found at Nagode recently. I have not seen them. I hear also that there are many at Kotee, 12 miles, N. E. of Nagode.”

“Captain Hodgson has this morning found five under one tree at this place.”

The Council submitted a report announcing that the following Sub-Committees had been appointed for the current year:—

FINANCE.

Colonel Baird Smith.

Babú Rajendralal Mitra.

PHILOLOGY.

F. E. Hall, Esq.

Rev. J. Long.

Dr. E. Röer.

Capt. W. N. Lees.

Babú Rajendralal Mitra.

LIBRARY.

Babú Ramaprosad Roy.
 Capt. W. N. Lees.
 R. Jones, Esq.
 Dr. J. Fayrer.
 Babú Rajendralal Mitra.

NATURAL HISTORY.

T. Oldham, Esq.
 Dr. T. Thomson.
 Dr. W. Crozier.
 W. Theobald, Esq.
 H. F. Blanford, Esq.
 Dr. J. Fayrer.
 Major W. S. Sherwill.

METEOROLOGY AND PHYSICAL SCIENCE.

The Ven'ble J. H. Pratt.
 Major H. L. Thuillier.
 Babú Radha Nauth Sikdar.
 T. Oldham, Esq.
 Col. Baird Smith.
 Dr. H. Halleur.

COIN COMMITTEE.

Capt. W. N. Lees.
 Babú Rajendralal Mitra.

Communications were received—

1. From Baboo Radha Nauth Sikdar, an abstract of the Meteorological observations taken at the Surveyor General's Office in May, June, and July last.
 2. From Lord H. Uliek Browne, extracts from the Report of Major H. Green, Political Agent at Kelat, for 1859-60, together with a copy of an inscription found on a rock near the village of Neihara in Beloochistan.
 3. From Capt. J. C. Harris, through Col. Baird Smith, a paper "On the relation between rain-fall and flood in the basin of the Mahanuddy river."
- Col. Baird Smith read the paper to the meeting, and made some interesting comments on the subject of it.

The thanks of the Meeting were accorded to Capt. Harris for his valuable paper, and also to Col. Baird Smith.

The paper will be published in a forthcoming number of the journal.

The Officiating Librarian submitted reports for November, December and January last.

LIBRARY.

The following additions were made to the library in November, December and January last.

Presented.

Whirlwinds and Dust Storms of India with a Book of Plates.—By P. F. H. Baddeley.—BY THE AUTHOR.

The Annals of Indian Administration, Part IV. Vol. IV.—BY THE GOVT. OF INDIA.

The Oriental Christian Spectator, Vol. I. No. 12.—BY THE BOMBAY GOVERNMENT.

Report on the Zanzibar Dominions. By Lt.-Col. Rigby,—being No. LIX. of the Selections of the Bombay Government.—BY THE SAME.

The Oriental Baptist for January, 1861.—BY THE EDITOR.

The Calcutta Christian Observer for January, 1861.—BY THE EDITOR.

Report of the Committee of the Bengal Chamber of Commerce.—BY THE CHAMBER.

The Twenty-first Report of the Proceedings of the Calcutta School Book Society.—BY THE SOCIETY.

Notes on the Presence of Animal Life at vast depths in the sea. By G. C. Wallich, M.D., F. L. S. &c.—BY THE AUTHOR.

Catalogue of Lepidopterous Insects in the Museum of the East India House.—BY THE SECRETARY OF STATE FOR INDIA.

List of the Geological Society of London, September 1st, 1860.—BY THE SOCIETY.

List of the Linnean Society of London for 1858-59.—BY THE LINNEAN SOCIETY.

Address of the President of the Linnean Society in 1858-59.—BY THE SAME.

Proceedings of the Royal Society of Edinburgh, Session 1858-59.—BY THE SOCIETY.

The Quarterly Journal of the Geological Society, Vol. XVI. Part 4, No. 64.—BY THE SOCIETY.

Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften, Philo-

sophisch—Historische classe, Band XXX. Heft 2 and 3, B. XXXI. II. 1, 2 and 3 and Band XXXII. Heft 1 and 2.—BY THE ACADEMY.

Register zu den Bänden 21 Bis 30 Der Sitzungsberichte der Philosophisch-Historischen classe, Band 3.—BY THE SAME.

Sitzungsberichte, Mathematisch-Naturwissenschaftliche classe, Band XXXVI. Nos. 13 to 16, Band XXXVII. Nos. 17 to 22 and Band XXXVIII. Nos. 23 to 28.—BY THE SAME.

Register Zu Den Bänden, 21 Bis 30 Der Sitzungsberichte der Mathematisch-Naturwissenschaftliche classe, Band 3.—BY THE SAME.

Archiv für Kunde Oesterreichischer Geschichts-Quellen, Band XXI. Halfte 2, Band XXII. II. 1 and 2, and B. XXIII. II. I. and 2.—BY THE SAME.

Almanach der Akademie der Wissenschaften, Part IX. 1859.—BY THE SAME.

Notizenblatt, Part IX. for 1859.—BY THE SAME.

Österr. Geschichts-Quellen, Bands XVI. and XVIII.—BY THE SAME.

Die Fossilen Mollusken, von Dr. M. Hörnes. II. Band, Bivalven.—BY THE SAME.

Ansprache gehalten am Schlusse Des Ersten Decenniums for 1859. Von W. Haidinger.—BY THE SAME.

Rede bei der Hundertjährigen Stiftungsfeier, Von G. L. von Maurer, (2 copies).—BY THE SAME.

Erinnerung an Mitglieder, Eine Rede. Von Dr. Carl Friedrich Philipp von Martius.—BY THE SAME.

Erinnerungen an Johann Georg von Lori, Eine Rede. Von Dr. Georg Thomas von Rudhart.—BY THE SAME.

Jahrbucher der K. K. Central—Austalt für Meteorologie und Erdmagnetismus. Von Karl Kreil, Band IV.—BY THE SAME.

Jahrbuch der K. K. Geologischen Reichsanstalt, 1859, X. Jahrgang, No. 2.—BY THE SAME.

Magnetische Untersuchungen, Von Dr. J. Lamont.—BY THE SAME.

Untersuchungen Des Erdmagnetismus, Von Dr. J. Lamont.—BY THE SAME.

Monatsbericht for 1859.—BY THE SAME.

Monumenta Saecularia, Classe I.—BY THE SAME.

Gelehrte Anzeigen, Band 48.—BY THE SAME.

Abhandlungen der Akademie der Wissenschaften Zu Berlin for 1854 and 1858.—BY THE SAME.

Antiquarisk Tidsskrift from 1855 to 1857.—BY THE ROYAL SOCIETY OF NORTHERN ANTIQUARIES OF COPENHAGEN.

Cabinet D'Antiquites Americaines a Copenhague.—BY THE SAME.

List of Works presented to the Royal Society of N. Antiquaries of Copenhagen from 1855 to 1857.—BY THE SAME.

The Northmen in Iceland, 1859.—BY THE SAME.

Annaler for Nordisk Oldkyndighed og Historie for 1846, 1847, 1848, 1851, 1852, 1854, 1856 and 1857.—BY THE SAME.

Atlas De l'Archéologie Du Nord.—BY THE SAME.

Transactions of the Royal Society of Edinburgh, Vol. XXII. Part I.—BY THE SOCIETY.

List of the Fellows of the Royal Society, 30th November, 1859.—BY THE SOCIETY.

Professor Huxley's Oceanic Hydrozoa.—BY THE ROYAL SOCIETY.

Observations made at the Magnetical and Meteorological Observatory at St. Helena, under the superintendence of Major-General Edward Sabine, Vol. II. 1844 to 1849.—BY THE BRITISH GOVT.

The Transactions of the Linnean Society of London, Parts 3 and 4, Vol. XXII.—BY THE SOCIETY.

Journal of the Proceedings of the Linnean Society, Botany, Nos. 7 and 8, Vol. 2; Nos. 9, 10, 11 and 12, Vol. 3; Nos. 13, 14 and 15, Vol. 4 and Nos. 1 and 2, Supplement to Botany:—Zoology, Nos. 7 and 8, Vol. 2; Nos. 9, 10, 11 and 12, Vol. 3 and Nos. 13, 14, 15, Vol. 4.—BY THE SAME.

Bulletin De l'Académie Impériale des Sciences de St. Pétersbourg, Tome I. (2 copies).—BY THE IMPERIAL ACADEMY OF ST. PETERSBURGH.

Mémoires de l'Académie Imperiale des Sciences de St. Petersburg, Tome I. Nos. 1 to 15.—BY THE SAME.

Purchased.

Baron D'Ohsson's Histoire Des Mongols, 4 Vols.

Revue des Deux Mondes for 15th October and 1st November, 1860.

Academiae Japensi Salecularia Tertia, Diebus 15th to 17th August, 1858.

The Annals and Magazine of Natural History, Vol. 6, Nos. 34 and 35.

The Literary Gazette, Nos. 121 to 124.

The Natural History Review for October, 1860.

Comptes Rendus, Nos. 14 to 18 of Tome LI.

Tables Des Comptes Rendus des Seances, Premier Semestre, 1860, Tome L.

Revue De Zoologie, Nos. 9 and 10 of 1860.

Annales des Sciences Naturelles Tome XIII. Zoologie, Nos. 1, 2, 3 and 4;—Botanique No. 1.

The American Journal of Science and Arts for September, 1860.

Essai de classification des Suites Monétaires De la Géorgie, Par M. Victor Langlois.

Geschichte des Qorâns, von Theodor Nöldeke.

Tuhfat ul Abrár of Mullá Jámí. By Forbes Falconer, M. A.

Salámán u Absúl ditto ditto.

Palæontology, or a Systematic Summary of Extinct Animals and their Geological Relations. By Richard Owen, F. R. S.

LALGOPAL DUTT,

Offg. Assist. Secy. and Librarian.

Report of Curator, Zoological Department, May and June.

1. R. Swinhoe, Esq., H. M. Consulate, Amoy. A rich collection of Chinese birds, many of which, however, are merely sent on inspection; and four species of mammalia presented to the Society. Also a small collection of birds from the Philippine Islands, and another from S. Africa, which are to be returned.

MAMMALIA.

NYCTINOMUS INSIGNIS, nobis, *n. s.* Like *N. Plicatus*, (Hardwicke), of Bengal, but very considerably larger and more darkly coloured, with the ear-conch proportionally somewhat larger. Male (in spirit) $5\frac{1}{2}$ in. from nose to tail-tip, the tail $1\frac{7}{8}$ in., and protruding 1 in. beyond the interfemoral membrane; expanse $16\frac{1}{4}$ in.; fore-arm $2\frac{1}{2}$ in.; longest finger $4\frac{1}{2}$ in.; tarse *plus* $\frac{7}{8}$ in.; breadth of ears apart *plus* 2 in. The finest of the Asiatic species hitherto discovered,—of course excepting *CHEIROMELES TORQUATUS*, which Temminck refers to the same genus.

RHINOLOPHUS ROUXI, Temminck. Rather small and dark-coloured, but otherwise not satisfactorily distinguishable from Bengal specimens.

LUTRA NAIR, F. Cuv.: *L. chinensis*, Gray; *L. tarayensis*, Hodgson, &c. A flat skin. Apparently identical with our common Bengal Otter, and a stuffed specimen we have from Algeria (!) is even undistinguishable, though obviously distinct from the common European Otter. A skull from S. Malabar is specifically identical with Bengal specimens,—at least it offers no differential character.

LEPUS SINENSIS, Gray, Hardwicke's *Ill. Ind. Zool.* Two skins (since mounted), and a skull. This is a very distinct small Hare, with shortish limbs, ears, and tail; by no means well represented by Hardwicke, either as regards form or colouring; but the species appears to be, beyond question, that which he has figured: nor can the fur

be justly termed "very harsh," as Mr. Waterhouse stated upon the authority of Dr. J. E. Gray (*Rodentia*, p. 81). As compared with the specimens under examination, the figure referred to is too deeply rufescent, and the paws are too dark-coloured and also too slender. Length 15 or 16 in. to base of tail, the tail (vertebræ) about 2 in., or with hair 3 in.; hind-foot from tarsal joint, 4 in. The general colouring approximates that of *L. RUFICAUDATUS* of Bengal and Upper India, but the fur is much longer, the piles being very straight, and having a greater admixture of black upon the upper-parts: the most conspicuous distinction consisting in the shortness of the ears in *L. SINENSIS*, then the fuller coat, and the shorter tail and limbs; the tail being more or less blackish on its upper surface. Nape, with the inner portion of the exterior surface of the ear-conch, pale fulvous, rather largely tipped on the ear with black; limbs also pale fulvescent; the throat and lower-parts generally white, more or less fulvous-tinged, especially in front of the neck. Skull that of a true *LEPUS*, as distinguished from *CAPROLAGUS* (*J. A. S. XIV*, 247), except that the supra-orbital process agrees with that of the latter in form. Extreme length of lower jaw with teeth, $2\frac{1}{2}$ in. (in a straight line); depth from coronoid, $1\frac{1}{2}$ in.; surface of crowns of upper grinders, $\frac{9}{16}$ in.

The Chinese Pangolin is erroneously assigned to *MANIS PENTADACTYLA* in *J. A. S. XXIX*, 93, as also (? from Chusan) by the late Dr. Cantor in *Ann. Mag. N. H. IX*, (1842), p. 482; it being the *M. JAVANICA*, Desm., as correctly determined by Mr. Arthur Adams in *Proc. Zool. Soc.* 1859, p. 132. The *M. aurita*, Hodgson, *J. A. S. V*, 234, is again identical; whereas *M. LEUCURA*, nobis, *J. A. S.*, *XI*, 454, is akin, but distinct,—having the same auricle, but much smaller and more curved claws, and less development of the bristles between the scales; the *leucoid* terminal third of tail occurs in all the specimens examined.

In *Ann. Mag. N. H. IX*, (1842), note to p. 274, Dr. Cantor remarks that "two fine Deer, *CERVUS AXIS*, of which the Chinese are very fond, were brought in 1840 in a junk from Formosa to Chusan." How the Formosa Deer could possibly be mistaken for *C. AXIS* by any practised zoologist, it is difficult to comprehend. I have lately received from Mr. Swinhoe (on private account) two living bucks and a doe of *C. SIKA* from Japan. This is different from the *C. pseudaxis* lately

imported into France from Mantchuria and the north of China, to which latter the Formosan animal will perhaps prove to belong. The doe of *C. SIKA*, in summer dress, is of a dull fawn-colour, *menilled* with whitish, though less conspicuously so than many Fallow Deer in summer; there is a large pure white patch on the buttocks below the root of the tail, the longest white hairs composing it diverging outwards (a character which may well be lost in a dry skin, to which attention had not been paid in this particular); the white being surmounted by a black border which is broadish in the middle and passing down a little on each side of the white, so as to form the letter T; tail longish, and white, with a brown mesial line; a black dorsal list, more strongly developed along the neck and between the shoulders; front of the neck, lower-parts, and inside of limbs, dull greyish a little albescent; outside and front of the limbs somewhat nigrescent, with the oval tuft of whitish hair below the hock (externally) very conspicuous: ear-conch somewhat large, grey without, contrasting with the fawn hue of the body, and with whitish hairs interiorly, especially fringing the anterior margin. The young buck is nearly similar, but the *menilling* is less distinct, as likewise the black dorsal and humeral list. The older buck is merely a little darker, with the pale spots all but obliterated; his horns are still those of an immature animal, having simply a brow-antler, and a forked crown, the bifurcation of which is parallel to the axis of the body. Height of the elder buck, at croup, about $2\frac{1}{2}$ ft.; tail (vertebræ) about 4 in., or with hair 7 in.; head about 11 in.; and ear about 6 in. Doe smaller, in the usual proportion.*

* In p. 112 *antea*, I described a new Cassowary by the name *CASUARIUS UNAPPENDICULATUS*; being the fourth known species of the genus. I regret to add that this hitherto unique bird has since died, and is mounted as a stuffed specimen, which I hope to exhibit at the next meeting of the Society. Already Mr. P. L. Selater has announced a fifth species, which he styles *C. BICARUNCULATUS*,—founded on a specimen now living in the London Zoological Gardens (*Proc. Zool. Soc.*, May 8th, 1860). He has likewise described a third species of Nandou, by the name *RHEA MACRORHYNCHA* (*ibid.*, April 24th), also from an example now living in the garden; and the Zoological Society are further fortunate in having obtained living specimens of the new barred Emeu (*DROMAIUS IRROATUS*, Bartlett), from W. Australia. The Society has at this time the finest collection of living *brevipennate* birds ever brought together,—*viz.* Ostriches (*STRUTHIO*) from N. and from S. Africa, three species of S. American Nandou (*RHEA*), two species of Emeu (*DROMAIUS*), three of Cassowary (*CASUARIUS*), and one of the three (or four?) species of 'Kiwi' (*APTERYX MANTELLII*). This sudden discrimination of so many species of *brevipennate* birds is most remarkable.

AVES.

Of the Chinese birds sent, those to be returned are distinguished by a cross (†) prefixed to their names.

†LITHOFALCO ÆSALON. Old female. Amoy.

SCOPS LEMPIJI, (Horsfield). Wing $6\frac{1}{8}$ in. Tail $4\frac{1}{4}$ in. Fowchow.

†SC. BAKKAMENA, (Pennant). Wing 6 in. Tail $2\frac{3}{4}$ in. Grey specimen.

ATHENE CUCULOIDES, (Vigors). Wing $6\frac{1}{2}$ in. Tail 4 in. Fowchow.

NINOX SCUTELLATUS, (Raffles). Wing $8\frac{1}{2}$ in. Tail 5 in. Fowchow.

(The four Owls here noticed are, all of them, of rather unusual size, and with strongly contrasted colouring; but are not to be justly separated as species, if even as races. A specimen of ATHENE CUCULOIDES from Chusan is also of the same large size.)

PICUS CABANISI, Maleherbe.

†CUCULUS STRIATUS, Drapiez.

†C. NISICOLOR, Hodgson. Before received from Macao.

CAPRIMULGUS DITISCIVORUS, Swinhoe. The supposed variety of C. INDICUS, with wings $8\frac{1}{2}$ in. long, noticed in *J. A. S.* XIV, 208, and there mentioned as "probably not Indian, but from the eastward." It was doubtless with other specimens from the dispersed Macao museum. The small race from the Nilgiris (and also the more elevated regions of Ceylon) noticed in the note, *loc. cit.*, I have since named C. KELAARTI.

†C. — *n. s.* "River Night-jar." A very beautiful species akin to C. MONTICOLUS, Franklin, of India, and C. AFFINIS, Horsfield, of Java.

ACANTHYLIS CAUDACUTA, (Latham): *Chætura nudipes*, Hodgson. Accords with Gould's figure in the 'Birds of Australia' in having a white forehead, but is otherwise undistinguishable from Himalayan examples.

CYPSELUS SUBFURCATUS, nobis (Horsfield's Catalogue); *C. affinis* (?) *apud nos*, *J. A. S.* XXIX, 95.

†MUNIA, *n. s.*? Akin to M. UNDULATA of India and M. PUNCTULARIA of Malasia. "Amoy."

†MUNIA, *n. s.* "Shanghai."

LIGURINUS SINICUS, (L.).

†CITRINELLA (?), Bonap., *n. s.**

†EMBERIZA CANESCENS, Swinhoe, 'Ibis,' Vol. II, 62. A pretty Bunting affined to *E. SCHLENICULUS*, L.

†*E. AUREOLA*, Pallas. "O-seer-keo, near Amoy."

†SPIZIXOS, nobis, *n. s.* Crestless, with black forehead and throat, and yellow on middle of belly. Otherwise similar to *SP. CANIFRONS*, nobis, of the Khásya hills; and perhaps identical with a second species of which Mr. McClelland possesses a figure, from Asám. "Pih-ling hills near Fowchow."

†GARRULAX, *n. s.* Very MALACOCERCUS-like.

†SUYA, Hodgson, *n. s.*

†POMATORHINUS MUSICUS, Swinhoe. "Formosa."

†P. — *n. s.* "Pih-ling hills near Fowchow."

MYIOPHONUS CÆRULÆUS, (Scopoli): *Turdus violaceus*, Latham; *Merle bleu de la chine*, Sonnerat; referred doubtfully to *M. HORSFIELDI* of S. India in *The Ibis*, Vol. II, 55. Conspicuously distinct from the Himalayan *M. TEMMINCKII*, being much smaller, with a black bill, and exhibiting many other differences. Closed wing $6\frac{1}{8}$ in.; tail $4\frac{1}{4}$ in. Bill to gape $1\frac{1}{2}$ in. Tarse 2 in. Amoy.

†TURDUS FUSCATUS, Pallas: *T. Naumanni*, Temminck. "Amoy."

GEOCICHLA DISSIMILIS, nobis, *J. A. S.* XVI, 144. Until seeing this second specimen, I was disposed to regard this bird as a casual variety of *G. UNICOLOR*, (Tickell); but it now seems to be a particular race, which in India is very rare.

†LARVIVORA, Hodgson, *n. s.* "Amoy."

†CUMYCIAS MELANOPS, (Vigors). "Amoy."

†HEMICHELIDON FERRUGINOSUS, Hodgson: *Muscicapa rufescens*, Jerdon; *Batalis Matui*, Layard; *Ibis*, II, 57. "Amoy."

†H. LATIROSTRIS, (Raffles): *Moscicapa cinereo-alba*, Temminck and Sehlegel. "Amoy."

†H. — *n. s.* (Affined to the preceding).

†ACROCEPHALUS (?) BISTRIGICEPS, Swinhoe, *Ibis*, II, 51. A peculiar type, intermediate to *Calamodyta* and *Locustella*

†LOCUSTELLA, *n. s.*

†MYIRAORA AZUREA, (Boddaërt), fæm.: doubtless *Tchitrea cæru-*

* To the list of Chinese birds must be added the common Crossbill (*LOXIA CURVIROSTRA*), a living specimen of which I have lately received from Mr. Swinhoe, together with a living *TURTUR CHINENSIS*.

leocephala, Quoy and Gaimard, apud Swinhoe, *Ibis*, II, 57.

DICURUS CINERASCENS, Horsfield. "Fowchow."

†HYPSIPETES, Vigors, *n. s.* From Pih-ling hills near Fowchow. Differs little from H. MACLELLANDII, Horsfield, but is darker on the back and paler on the ventral region.

ORIOLOUS CHINENSIS, Gm. Distinct from O. ACRORHYNCHOS, Vigors, which is common in the Canton district.

ZYGSTEROPS JAPONICUS, Temminck and Schlegel.

ANTHUS RUFOSUPERCILIARIS, nobis, *J. A. S.* XXIX, 105. Described from the Andaman islands and from Pegu. Two specimens from Amoy are decidedly of the same species; but, evidently in breeding dress, have the entire throat and sides of the head dilute ferruginous. Most probably this species bears a prior and better appellation.

†TURNIX DUSSUMERI, (Temminck).

†CHARADRIUS LESCHENAULTII, LESSON: *Ch. rufinus*, nobis.

ACTITIS GLAREOLA, (Gmelin). Amoy.

TRINGA MINUTA, Leisler. Amoy.

GALLINAGO MAJOR, (L.)

GALLICREX CRISTATUS, (Latham).

AIX GALERICULATA, (L.)

ANAS GLOCIANS, Pallas; *A. formosa*, Gmelin.

A. FALCARIA, Pallas, *Reise: A. falcata*, Pallas, *Fauna Rossoasiatica*; *Querquedula multicolor* (?), Scopoli, apud Swinhoe, *Ibis*, II, 67.

A small ACCIPITER, unlabelled, is probably from the Philippines (Luçon). It is in juvenile plumage, and appears to be referable to ACC. VIRGATUS, (Tem.), *mas*; but the tail-bands are narrower than usual, and the under-parts are whiter.

The other Philippine species are—

BUCEROS PANAYENSIS, Scopoli, *juv.*

CEYX TRIDACTYLA, Gmelin, if not also of Scopoli; *nee apud* Jerdon (*Ill. Ind. Orn.*), which is C. PURPUREA, (Gm.), of India and Burma; *nee apud* Jardine and Selby (*Ill. Orn.*), which is C. RUFIDORSA, Strickland, of W. Malasia. Two other species of this beautiful little group exist in the C. LEPIDA, Tem. (*Pl. Col.* pl. 595, f. 1), and C. MELANURA, Kaup,—both from the Moluccas. If Sonnerat's figure and description (*Voy. a la Nouv. Guinée*, p. 67,) refer truly to this

species, they are perhaps from a young individual, differing somewhat in plumage from the adult.

MULLERIPICUS JAVENSIS, (Horsfield); *Picus leucogaster*, Reinwardt. Can this be truly from the Philippines?

CALORNIS ALBIFRONS, nobis, *n. s.* Nearly affined to *C. DAURICUS*, (Pallas), with which it has probably been confounded; but with a shorter tail, the crown and throat white, with the same occipital black spot as in the other. Nape, mouth, rump and upper tail-coverts, brown; the lower-parts dingy-whitish with a brown tinge, and a brownish-ruddy stain on the cheeks. Wings and tail nearly as in the other. Bill and feet also similar. Length of wing 4 in.; of tail 2 in. only. Probably a female bird, less bright in colouring than the other sex.

CORYDALLA INFUSCATA, nobis, *n. s.* (*C. HASSELTII*, Brehm, of Java?) Larger than *C. RUFULA*, with a proportionally longer bill: the upper-parts much darker in colour, blackish with olive-brown lateral edgings to the feathers. Supercilia and lower parts albescent, whiter on the throat, with a few linear blackish spots on the breast. Outermost tail-feather chiefly white, with a dark stem; the penultimate dark on its outer web, and on the outer half of its inner web, leaving the intermediate portion white. Bill dark above, yellowish white below; legs and claws pale. Wing $3\frac{1}{2}$ in.; tail $2\frac{3}{4}$ in.; bill to gape 1 in.; tarse $1\frac{1}{2}$ in.; hind-claw $\frac{1}{2}$ in.

GRAUCALUS DUSSUMIERI, Lesson.

GR. LAGUNENSIS, Bonap., *Comptes Rendus*, tom. XXXVIII (1854), p. 540; where also the preceding species is noticed as inhabiting Mindanao, and as being distinct from the GR. FASCIATUS (*Coracina fasciata* of Vieillot). Now the name *fasciatus* applies admirably to the Philippine bird here confidently presumed to be DUSSUMIERI, which has the lower-parts from the breast beautifully banded with black and white; the rump-feathers also having a subterminal black band and white terminal edge, the tertiaries also being rather broadly white-margined, the secondaries less broadly so, and the primaries having only a white extreme margin; tail-feathers attenuating at tip to a somewhat acute point, whereas in *C. LAGUNENSIS* they are broad and rounded at the tips.

VOLVOCIFORA — ? In the following page of the *Comptes Rendus*, the late Prince of Canino recognised four species of Mr. Hodg-

son's genus *VOLVOCIVORA*, of which the present is most probably one. As compared to *V. SILENS*, (Tickell, *V. melaschistos*, Hodgson,) of India, it is of a paler colour throughout, especially on the rump where the feathers are much more strongly spinous; the abdominal region also is pale, and the lower tail-coverts are whitish; the secondaries being slightly margined and the tertiaries more strongly tipped with white. The second primary is also shorter, with reference to the third primary.

PSEUDOLALAGE, nobis, *n. g.* General aspect of *LALAGE*, Boie; but having the rump-feathers strongly spinous, whereas in *LALAGE* they are quite soft and flexible.

PS. MELANOLEUCA, nobis, *n. s.* Male black (glossed with green) contrasting with pure white, except on the rump and upper tail coverts where the white is tinged with grey; these colours disposed much as in the male of *LALAGE ORIENTALIS*, (Gm.), except that there is no white supercilium, and the white on the outside of the wing forms a single elongated patch, confined to the outer webs of the tertiaries and their greater coverts only; the white tipping the caudal feathers being also much less extended. Female pale grey above, but retaining the black on the wings and tail; the white of the fore-neck, breast, and flanks a little tinged with grey, having faintish transverse bars of the hue of the back. Length about 9 in., of wing $4\frac{5}{8}$ in., and tail $3\frac{1}{8}$ in.; bill to gape $1\frac{1}{8}$ in.; and tarse $\frac{7}{8}$ in. Female a trifle smaller. There is a faint appearance of barred markings on the pale rump of the female.

CARPOPHAGA SYLVATICA, Tickell. Young, which does not differ, that I can perceive, from that of the Indian and Burmese species.

CHALCOPHAPS INDICUS, (L.) Female. The same remark applies, except that there is a circle of rufescent feathers surrounding the bare skin of the orbits.

TURNIX OCELLATA; *Oriolus* (!) *ocellatus*, Scopoli: *Tetrao luzonensis*, Gmelin; *Hemipodius thoracicus*, Temminck. (*Caille de l'Isle de Luçon*, Sonnerat, *Voy. a la Nouv. Guin.*, p. 54). Female, distinguished by having a deep ferruginous-coloured nape, a blacker head with minute white specks, and some other minute distinctions, from the kindred races of Java and Malacca (*pugnax*, Tem., *atroregularis*, Eyton,) of India generally and Ceylon, (*taigoor*, Sykes), of Bengal

(*bengalensis*, nobis,) and probably others; but all are hardly other than local races of one species.*

Of the S. African collection, it will be sufficient to notice,

PASSER ARCUATUS, Tem. Female.

POLIOSPIZA, *sp.*; congeneric with P. TRISTRIATA, Rüppell.

SERINUS (?) SULPHURATUS; *Crithagra sulphurata*, Swainson (Jardine and Selby, *Ill. Orn.*, pl. 109).

MEGALONSPHONYX RUFICEPS, (Rüpp.). Identical with Abyssinian specimens.

HARPOLESTES (Cabanis) LONGIROSTRIS; *Telephonus longirostris*, Swainson, (2½ Centen.)

MONTICOLA RUPESTRIS, (Vieillot). Female.

BESSONORNIS RECLAMATOR, (Vieillot).

COSSYPHA SUPERCILIARIS, (L.)

RUTICILLA (MARGINELLA? Bonap.; in nestling plumage). All the tail-feathers dusky-tipped, with rufous extreme terminal margin. Wing 3½ in. Tail 2½ in.

MACRONYX CAPENSIS, (Vieillot?)

DICRURUS MUSICUS, (Vieillot). Young.

TCHITREA PERSPICILLATA, (Swainson.) Female.

GRAUCALUS, *sp.* Uniform ash-grey without markings, rather paler below; bill and feet black, the bill proportionally small. Wing 5¼ in.; tail 5 in.

PHYLLASTREPHUS CAPENSIS, Swainson.

PYCNONOTUS NIGRICANS, (Vieillot). Identical with a specimen said to have been brought from Jidha in Arabia!

TYMPANISTRIA BICOLOR, Reichenbach; *Columba tympanistria*, Temminck.

2. Mr. J. K. Hamilton, of Calcutta. A fine living PYTHON MOLURUS, about 12 ft. long, caught in the Bengal Sundarbans.

E. BLYTH.

* It is much to be regretted that Mr. Hugh Cuming's valuable collection of Philippine birds was permitted to be dispersed without any list having been published of them. A list of the known species of the Philippines is at present a desideratum.

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No. II. 1861.

Memorandum drawn up by the order of Colonel A. SCOTT WAUGH, Engineers, Surveyor General of India, F. R. S., F. R. G. S. &c. on the progress of the Kashmir Series of the Great Trigonometrical Survey of India, with map and observations on the late conquest of Gilgit and other incidental matters, by Captain T. G. MONTGOMERIE, Engineers, F. R. G. S. &c. in charge of the Series.

During the field season of 1860, the triangulation of the Kashmir Series has made good progress up the river Indus, and the position of Leh, the capital of Ladak has been finally fixed. Messrs. Johnson and Beverley had to carry their work over some very difficult, rugged, and confined ground that separates the more open valley of the Indus to the south east of Leh* from the table land of Rupshu and Hanle. This was effected in a most skilful and praiseworthy manner though it twice involved the ascent of a station by Mr. Johnson† of 19,979 feet and by Mr. Beverley‡ of another 19,958 feet above the sea, besides numerous other stations all over 17,000 feet above the sea.

A trigonometrical mark has been erected on a point 21,480 feet above the sea, but unfortunately there was not sufficient space to put a theodolite on it.

* Lat. $34^{\circ} 9' 30''.05$. Long. $77^{\circ} 36' 42''-57$. Height 11,279 Ft.

† Civil 2d. Asst. G. T. Survey.

‡ Senior Sub-Asst. Do.

Several points in China have been fixed, and amongst others the well known Gya peak is supposed to be included. The height of this peak which I saw last year appears to be from 23 to 24,000 feet above the sea. Further observations have been taken to the group of peaks that I saw at the same time in the Shayok direction: the peaks average considerably over 26,000 feet in height. Some progress has been made with the triangulation of Zanskar. In this work a very rugged and confined piece of ground has been crossed between the valley of the Indus and the more open valley of Zanskar.

On the upper course of the Shayok river (in the Nubra district) the triangulation has been commenced and a good many peaks fixed.

The topographical work was first taken up in the Kishengunga valley, which although drained by a large river is really, for the greater part, little better than a chasm in the mountains. Throughout it is very precipitous, and Ahmed Khan the chieftain of Kurná said to me, in reference to its rocky surface, "A traveller must put on grass shoes if he wishes to visit the Kishengunga valley." It is indeed all but impossible for even the best pedestrians without loads to follow the river from Kurná to Gurais, and any one wishing to do so would prefer going actually along the northern ridge of the Kashmir valley.

The Kishengunga valley, so difficult a piece of country at the best time of the year, had to be taken up when the snow was heavy, even at 9,000 feet. This added very much to the difficulties of the work, but as the Maha Raja's troops were shortly to cross the valley en route to Gilgit, it was necessary to finish early. The work was fortunately completed in very good time, and the whole of the surveyors were then transferred to fresh ground in Little Thibet and Ladak.

During the season topographical sketches were made of the whole of the valley of the Indus, from Skardo the capital of Little Thibet or Baltistan to Leh the capital of Ladak, as well as the whole of the Sooroo and Dras valleys, the plains of Deosai, and a large part of the Shigar valley north of Skardo with a portion of the Nubra or Shayok valley. This large tract of country, in all an area of about 12,000 square miles,—had been triangulated in previous seasons. It embraces all sorts of ground from an altitude of 27,000 feet down in a few

cases to 8000 feet above the sea, though seldom under 10,000 feet. It includes at least 300* square miles of glaciers for the most part of the larger kind. Those glaciers already surveyed to the north of the Shayok have proved to be quite as large as the ones previously measured,† by those very able and energetic topographical surveyors Captain Austen and Lieut. Melville of the Kashmir Series, near the Kún and Nún peaks in the Wurdwan and Sooroo districts. Captain Austen's ground in one part rose to nearly 27,000 feet, and one of the glaciers in the highest ground is about 11 miles in length and from $\frac{1}{2}$ to $1\frac{3}{4}$ miles in breadth. In Lieut. Melville's work, the peaks ran up to nearly 24,000 and under Kún one of the glaciers is about 10 miles long and from $\frac{1}{2}$ to $1\frac{1}{2}$ miles broad. Glaciers are in fact in this section of the Himalayas very much larger and more numerous than in any part of the Himalayas previously surveyed. Possibly this is in some measure due to the latitude, as all these glaciers lie between latitudes 33° and 36° north, but it must also be partly the result of the immense height of the peaks generally as, with the exception of those of Nepal, they exceed all other peaks of the Himalayas that have as yet been measured.

The glaciers in the neighbourhood of the Nanga Parbat and K (2) have not as yet been explored: they will undoubtedly be large, and those of the latter at any rate are, from all that has been seen and heard, likely to prove even larger than the ones already measured. From 3 to 4 marches are occupied in crossing the glacier at the head of the Braldo branch of the Shigar river.

The whole of the country sketched was of a very difficult character, testing both the physical and artistic powers of the surveyors to the utmost in moving about and delineating the country. Circumstances permitting, the whole of the glaciers in the neighbourhood of the Nanga Parbat and of K (2) will be explored during the next field season, as will those of Zanskar and other places. There is hardly any portion of the upper valley of the Indus without glaciers, but they are largest and abound most near the great Hima-

* Lieut. Melville's Sections measured 198 square miles; Capt. Austen's estimated, 150 square miles, in other Sections, 50 square miles. Total, 398 square miles.

† In 1858 and 1859.

layan and Karakorum ridges. The plains of Deosai are perhaps the most curious topographical feature of the country sketched during the season. These plains consist of about 580 square miles of gently undulating ground averaging at least 14,000 feet above the sea and surrounded on all sides by rugged mountains running up to from 16,000 to 17,000 feet. The drainage escaping through a not easily distinguished gorge near the Katasiri station, falls into the Dras river above Kirkitchoo. This tributary of the Dras river is called the Shigar and sometimes the Shingo river, it brings down gold with its waters, and gold-washing is carried on just below the junction. The Indus itself and several other of its tributaries are known to produce gold. The gold-washing is said not to be valuable, but it does sometimes give as much as 1 or 2 small rupees a day to a man, though a most barbarous method is employed in washing the earth. This earth is taken from the detritus which, I think, now generally lies above the highest flood line. After 2 or 3 washings a black heavyish sort of sand is left with the pieces of gold scattered here and there.

As far as my own experience goes I should say it was not a profitable business, for after half an hour's washing I only got 5 very tiny nuggets hardly worth an anna, and I had at the time the benefit of the assistance of an Australian gentleman. This gentleman thought that something might be done by investing in a cradle and apparatus. He said that a substance like the black sand mentioned above, had proved valuable in Australia.

When crossing the Himalaya range the plains of Deosai were a great obstacle to the progress of the triangulation, for although the depression of the Himalayas in that part gave a most extended view from very high points, still there being no habitations for the distance of 7 or 8 marches, and no village of any size for 11 or 12 marches, the operations were carried on under very great difficulties. In the plains the only firewood to be had is got by digging up the juniper roots and from very thin stunted willows, but on the mountains above, there was absolutely no firewood to be had of any kind, the stations being all from 16 to 17,000 feet in height. It was absolutely necessary to reside at least several days on these stations.

Provisions had at all stations to be brought from places 4 to 7 marches distant. The people of the country were moreover not very willing to enter the plains from the Kashmir side. The operations could only be carried on during the rainy season, and at that time there are but few breaks in the clouds which rush through this depression of the Himalayas into the valley of the Indus and across to the Karakoram mountains. With the greatest difficulty the signal men who worked the heliotropes and lamps at the various stations were fed, and on two occasions the main party were starved out and had to retreat in consequence of protracted cloudy weather.

Stations over 16,000 feet above the sea are not the most agreeable places for residence at the best of times, but when enveloped in clouds they are unmistakably unpleasant, though there is some slight compensation in the grandeur of a break up, or when the upper level of the clouds falls, as I have several times seen it fall, below the station on which I was pitched, leaving the camp on an island surrounded with a level sea of clouds from which the peaks of the various ranges stood out like other islands and the waves of cloud surged backwards and forwards across the lower ridges between. In clear weather the views were really magnificent and proportionately appreciated after the cloudy weather. The atmosphere was at such times wonderfully clear at those elevations.

It was across the plains of Deosai from Haramook that I took the first observation to the peak K (2) (28,287 feet above the sea) at a distance of 136 miles, the side of one of our largest triangles.

Notwithstanding all the difficulties the triangulation was successfully carried over the plains of Deosai during one season without relaxing any of the rigorous rules of the Great Trigonometrical Survey of India.

With reference to my last memorandum on the great flood of the river Indus, I have not as yet been able to obtain any further information as to its origin, though the expedition against Gilgit has succeeded as I anticipated it would.

The Maharajah has directed every enquiry to be made, and I hope to be able to give a correct account of the origin of the flood when I return to Maharajah's territories next year. Meantime the expedition has confirmed several important points in the geography

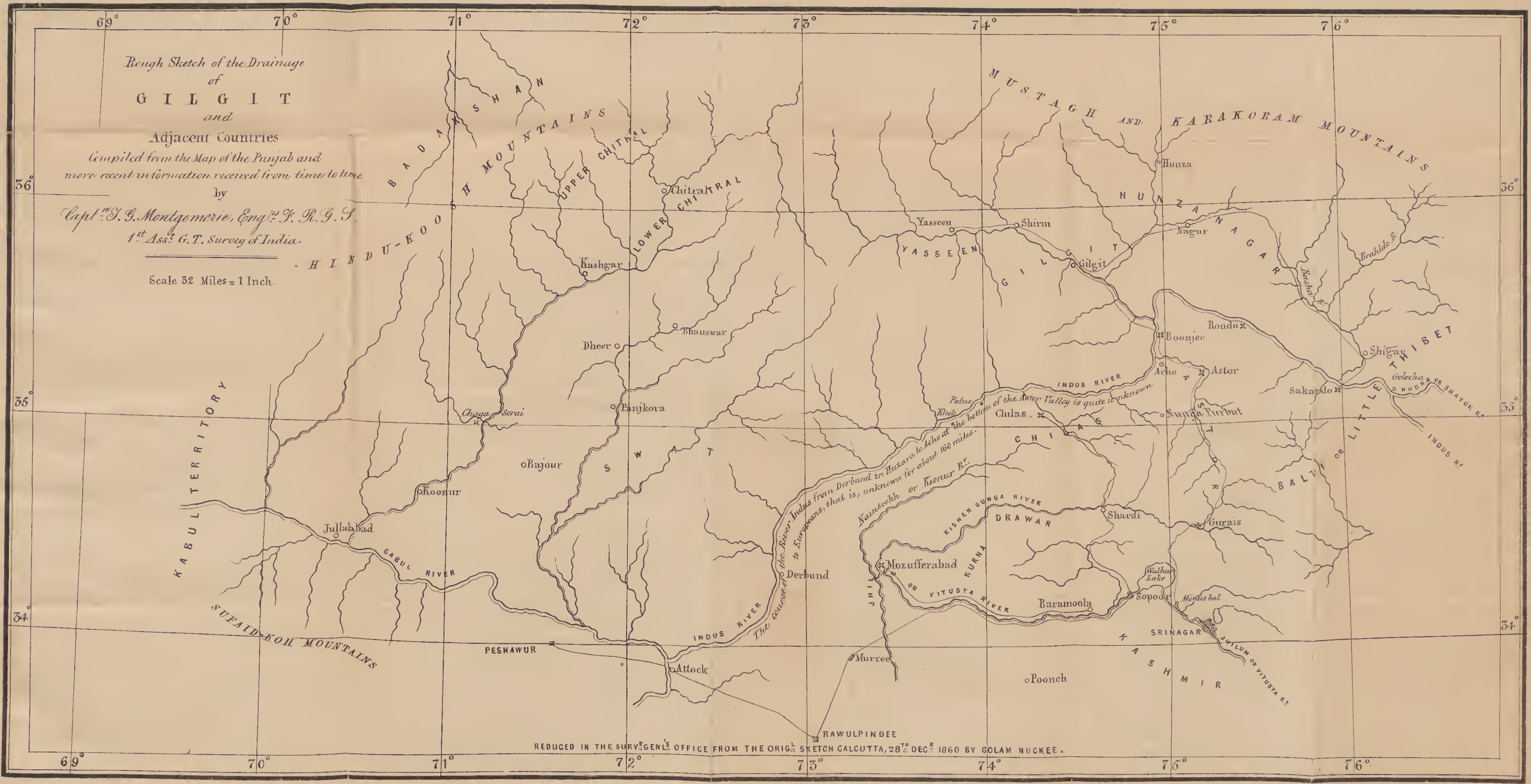
of the countries near Gilgit, and a short account of the expedition itself may be interesting.

The enclosed rough plan is the general result as to the geography of the country annexed, and also shows a portion of the neighbouring countries.

The Maharajah laid in a large supply of food at the forts of Astor and Boonjee during the summer of 1859. Hitherto one of the greatest obstacles to making a successful attack on Gilgit has been the difficulty of getting supplies. The natives are in the habit of using the old expression to the effect, that a small force going against Gilgit was sure to be defeated and a large force to be starved. To obviate this a hundred ponies were put at each of the 17 halting places between Kashmir and Boonjee, via Gurais and Astor, and whilst the weather permitted a hundred loads of grain were delivered daily at Boonjee.

In June and July of this year several detachments of sepoy were moved upon Gilgit mustering finally at Boonjee to about 4000 men under Colonel Devi Singh and Colonel Dooloo Singh. The whole body then advanced upon Gilgit crossing the Indus by means of a boat, further on the army crossed a tributary river by a rope-bridge of their own making, and another tributary by a wooden bridge. No opposition was met before reaching Gilgit itself, and there the Gilgities got inside their fort and held out for a short time, during which there was a little firing on both sides ending by the Gilgities surrendering, the Maharajah's force losing one man by the bursting of a gun and the Gilgities leaving one dead man in the fort supposed to have died a natural death during the siege.

Having settled affairs at Gilgit, the force advanced further up the valley to Shirni (Shirwat) fort, where there was some slight resistance ending as before in capitulation. The force then advanced on Yassín which is on the Gilgit river, and not on a separate tributary of the Indus. Yassín fell into the hands of the force and the son of Goramán who held Gilgit in addition to Yassín made his escape over the mountains to the west and on into Bádákshán. Goramán himself died during 1857. He was well known in the whole of the country between the Indus and Cabul and was generally called an Adamkhor, or man-eater, from a habit that he had of eating all



Rough Sketch of the Drainage
of
GILGIT
and
Adjacent Countries

Compiled from the Map of the Punjab and
more recent information received from time to time
by
Capt. S. G. Montgomery, Eng^l. R. G. I.
1st Ass^t. G. T. Survey of India.

Scale 32 Miles = 1 Inch.

REDUCED IN THE SURVEY GEN'L'S OFFICE FROM THE ORIGINAL SKETCH CALCUTTA, 28TH DEC. 1860 BY COLAM NUCKEE.

strangers that he could and of exchanging them for the large dogs so much prized in that part of the world. Goramán and his son had till this year held Yassin, and for a short time Gilgit also, though once or twice driven out by the Dogras from the latter.

In addition to the main body of the Dogra force advancing from the south, an armed body of Baltis advanced through Shigar and thence by the Nagar and Hoonza valleys threatening Gilgit on the east.

Another force was to have advanced from the west under the instructions of an agent from Dheer and Chitral, but it was not apparently in time, though possibly the mere talk of it made the Goramán's son unhappy as to his line of retreat.

This conquest, which may be said to have been made without loss of life, is highly creditable to the Maharajah and his officers who planned and carried it out. The effects are in some respects likely to be very salutary. In the first place, the mere fact of the Maharajah having a force in Gilgit overawes and keeps in check the robber-clans of Nagar and Hoonza who have for years infested the roads between Balti and Ladak on the one side, and Yarkand on the other, and latterly to such an extent that those roads in their immediate neighbourhood, though the shortest, have been almost completely closed to anything in the shape of a merchant. Keeping possession of Gilgit during the cold weather when all communication with Kashmir is closed, has always been the most difficult business. The Maharajah has, however, left nearly 3000 men in the valley and consequently in future it is to be hoped that his troops will hold their own and that the traffic from Skardo direct to Yarkand will again be resumed.

In the second place, this successful expedition has had a very wholesome effect on all the petty tribes lying between Gilgit and the Cabul territories, and ultimately will be of assistance in keeping the Swat valley in check. Swat being still one of the reculant tribes on our N. W. Frontier.

At the durbars of the Maharajah during this season men from Chitraul, Dheer, Swat, Kholi, Palus, &c. were in attendance, as well as from Chilas, Nagar and Hoonza who have been constant attendants for some years.

At the last durbar held by the Maharajah, Colonel Devi Singh made his salam, having just returned from the Gilgit expedition. Some of the Yassín men* were introduced at the same time. One long brass gun of about 3 lbs. bore accompanied the Colonel, his sepoy having taken it from the Goramán's son. This gun seemed to be well east and had a Persian inscription on it to the effect that it was made in Bádákshán, or had belonged to that place.

Among the minor results of the expedition was a great influx of presents to the Maharajah from all the chiefs between Gilgit and Kafiristan. Perhaps the most valuable in the eyes of the curator of the Asiatic Society's Museum would have been a splendid live male specimen of the Markhor, the greatest prize of Himalayan sportsmen. This animal was introduced into the full durbar guided by four men with gny ropes. It was really a handsome animal, of a light fawn colour, in good condition, with a capital pair of horns and a fine long beard. The top of the Markhor's head was perhaps $5\frac{1}{2}$ feet from the ground, the horns towering up above all the men in attendance. The keepers of this animal evidently held him in the greatest respect, though he had been a captive for at least two months. He was a present from the chiefs of Koli-Palus on the Indus.

The Chilassies sent in some very fine half domesticated goats, a part of which the Maharajah distributed amongst the European visitors to Kashmir. One of these goats now in my possession has a very fine pair of horns of the Markhor kind.

The country on either side of the Indus between the British district of Hazára and the Maharajah's valley of Astor has hitherto been all but impassable. With Chilas, Kholi and Pálús all under the orders of the Maharajah, a very slight pressure ought to open out the remainder down to the Hazára district, which would all tend to bring the Akhoon of Swat to reason, and perhaps eventually enable us to explore his valley and the whole course of the Indus river. At the same time, opening out the whole valley of the Indus is in itself no small advantage, if it will enable travellers to pass along in safety.

* The Yassín men in long dark Khákí coloured woollen dresses. Men of Swat in long dark blue woollen dresses.

Traffic will undoubtedly increase, and moreover the Punjab Government will have the means of getting full information in case the Indus should again be blocked up in any part of its own course or that of its tributary streams. In this latter respect the conquest of Gilgit with Yassín, Hoonza and Nagar is really very valuable, as it places under a friendly native state, the only great tributary of the Indus concerning which the British Government has hitherto been unable to get any reliable information. This tributary moreover is, in my opinion, the one in which the last great flood of the Indus was generated.*

If these countries are in thorough subjection to the Maharajah such a calamity as the cataclysm of 1858 ought not again to befall British subjects on the Indus without their having at any rate full warning; even if it were not possible to prevent or mitigate its evil effects by the scientific application of labour, as it most probably would be.

In my former memorandum I said that I thought floods might be generated in many parts both of the Indus and its tributaries. Captain Austen has just forwarded me the following, which fully confirms that opinion. "Camp Gol on Indus, 29th August, 1860. A flood occurred at Gol about 5 years ago in the month of June. Very muddy water came down the ravine (slowly at first) and the people who saw it, left their houses and ran up the hill sides. Twelve old men, who could not run away, were drowned, twenty houses and about five hundred apricot trees were washed away. There was but little snow on the hills at that time, and the ravine is by no means a large one. The villagers go up it constantly and yet were not aware of its being in any way dammed up, though the water must have been in considerable quantity, as the flood altered the course of the Indus. It is a mystery to me where sufficient water could have been collected. This account was given by Wazzír Husain of Gol."

(Sd.) H. II. G. A.

The Balti foreo that went from Shigar viâ Nagar to Gilgit had to cross a very large glacier. The route obtained by Captain Austen, attached to this, shews that it takes a man the whole day to cross it.

With reference to the Society's discussion about Kyangs. A great

* See memorandum published in *As. Society's Journal*, No. I. of 1860.

many Kyangs have been seen by myself and others. I have watched a herd for a long time at a short distance with a telescope. I have not heard them calling, but Mr. Johnson, who caught a foal* this year, says that they bray, he heard them several times quite distinctly, and the natives† with my camp say the same. I saw a very large skin of a Kyang shot by Mr. Johnson this season in Rupshu. There was a black mark all the way down the back, but not the least sign of any stripe on the shoulders, the skin of the tail was about 13 inches long, and the whole tail not more than $2\frac{1}{4}$ feet in length. But this I think exceptional, as some of those in the herd I examined had tails reaching nearly to the ground. The ears and tail struck me as being like those of a mule, and I thought them generally very high in the withers and much larger than any of the wild asses of the salt range.

The season of 1860 has not been a favorable one as far as the weather was concerned, it was indeed peculiarly unfavorable for the triangulation in the upper part of the valleys of the Indus. The late very heavy falls of snow in March were never thoroughly melted away. Before the triangulating party left, the whole of the smaller streams remained hard frozen during the day. The Kyangs and even the geese, ducks and other waterfowl all left the neighbourhood of the Chomoriri lake as early as the end of August. It was so cold that even at the end of July, I crossed over some snow bridges in Ladak that in ordinary seasons disappear before the end of June. The Mácháhoy glacier projected further than usual into the Dras valley, and its end did not melt back very much till the close of the season. Bad weather set in early in September and soon after all survey work was forcibly brought to an end.

It is to be hoped that we may have no more such seasons. With favorable weather I think we may succeed in carrying both the triangulation and topographical work up to the Chinese frontier. The triangulation may possibly advance a little further even as matters now stand. And if the present war with China results in friendly relations extending to all the provinces of that empire, we may hope to see a large traffic spring up between Hindustan and central Asia.

* This foal died after a fortnight's captivity.

† Kainchna or hainchna was the term used by them.

The triangulation of the Great Trigonometrical Survey may be joined on to that of Russia, and thus accomplish the project of Colonel Everest the late Surveyor General of India, who wished to measure the arc between Cape Comorin and Nova Zembla, an arc that would include nearly 70 degrees of the earth. To accomplish this there at present remains a gap of little over 5 degrees of Chinese territory, the operations of the Kashmir series extending beyond Lat. 36° and the government of Tobolsk now coming down below Lat 42°. At any rate if the war makes the Chinese officials on our North East frontier friendly, we may succeed hereafter in fixing the geographical positions of some of the great cities of central Asia.

T. G. MONTGOMERIE, CAP. ENGRS.

*1st Assistant Gt. Trigl. Survey of India,
In charge Kashmir Series.*

Route from Skardo viâ Shigar and Nagar to Gilgit.

No. of Marches.	Distance in Miles.	Names of halting-places.	REMARKS.
1	18	Skardo to, ...	
2	15	Shigar, ...	A large village.
3	16	Kushamul, ...	A village.
4	20	Chutran, ...	Literally hot water from a hot spring.
5	each of these marches occupies nearly the whole day.	Arundu, ..	Village.
6		Yak Kole, ...	Very bad road crosses a pass and goes over a very long glacier.
7		Hai-Hutun, ..	A bad road.
8		Hispir, ...	A village, march longer than usual.
9		Hoper, ...	A village.
10		Nagar, ..	Do.
11		Pakher, ...	Do. a long march.
12		Nillit, ...	Do. Do.
13		Chaparote, ...	Do. Do. in Gilgit.
14		Naomul, ...	Do. Do. Do.
14		Gilgit, .	Do. Do. Do.

N. B.—The Hoonza river is very much smaller than the Shigar. There are three roads from Hoonza to Yarkand, one that takes 12,

another 8, and another no more than 4 days. The last being only known to the natives of the country and not to the merchants who go to Yarkand. The man who gave the above said he had gone by the Nagar and Gilgit routes.

(Sd.) H. H. G. A.

Route from Kashmir to Gilgit via Gurais and Astor.

No. of Marches.	Distance in Miles.	Names of halting-places.	REMARKS.
		Srinagar to, ...	
1		Sinbul, ...	
2		Bundipoor, ..	
3		Trakbul, ...	
4		Jotkusu, ...	Cross the Kashmir ridge.
5		Kanzlawan, ...	
6		Gurais, ...	
12		Astor, ...	Cross the Himalayan watershed during 3rd march.
16		Boonjee, ...	
22		Gilgit, ...	Cross the Indus by boat close to Boonjee.
Total ... 22 marches.			

The routes given from Hoonza to Yarkand (though the 4 days may be apocryphal) all tend to shew that Yarkand must be nearer the longitude of Skardo than of Leh, the latter route being reckoned at least 16 days from the Karakoram ridge; and the 4 days may be given on the strength of the wonderful rapidity with which the Hoonza-Nagar people got warning of the Kafilas leaving Yarkand, so quickly indeed was this given that the Hunza-Nagris were able to make all their arrangements in Hunza and then to cross into the Shigar valley and still be in time to rob the Kafilas before they reached the inhabited parts of Ladak and Balti.

T. G. MONTGOMERIE, CAP. ENGRS.

Indian Idylls, No. I.—By R. T. H. GRIFFITH, Esq., M. A.

[Mr. Griffith, who has already distinguished himself by his translation of Kalidása's Kumára Sambhava,—in some respects the best English translation which has yet appeared of any Sanskrit poem,—has sent us the following Idyll, as the first of a series which is to comprise three or four of the best episodes of the same poet's other epic the Raghuvansa. In former years the Journal used to publish similar translations, as that of the first canto of the Kum. Sanbh. by Dr. Mill in 1833 ; and the Editors are gratified to be able to revive the long discontinued practice under such favourable auspices.—EDS.]

DILÍPA.*

Great authors of the world, almighty Pair,
 Listen, O listen to your servant's prayer !
 Ye who are knit, by Love's eternal tie,
 Close as the links that word and sense ally, †
 Hear, mighty S'IVA, gracious UMÁ, ‡ hear ;
 Inspire my words, and let their sense be clear !
 But ah, the folly ! Can I hope to guide
 My frail bark safely o'er a boundless tide !
 How men will mock the humble bard who sings
 The ancient glories of the Sun-born Kings, §
 Like a young ehild with little hands outspread
 For fruit that glows above a giant's head !

* The story, here roughly translated, is taken from the 1st, 2nd, and part of the 3rd books of *Kálidása's Raghuvansa*, or *Children of the Sun*. The whole poem has been translated into Latin by Steuzler, and into French by M. Hippolyte Fauche, and hastily thrown into English verse by the present translator. The poem contains some magnificent bits, but very much of it is, to our ideas, intensely prosaic and intolerably childish. The service of the cow in this story will, as Professor H. H. Wilson has observed, "raise a smile upon the face of a European critic, but it is not unpoetical and is intensely characteristic."

† The Mímánsá school of philosophy holds that a word and its meaning are eternally and inseparably connected.

‡ Umá's birth, beauty, love, penance, and marriage to Siva, are charmingly described in *Kálidása's Kumára-Sambhava*, or *Birth of the War-god*.

§ A race of princes, descended from the sun, whose capital was Ayodhyá in Oudh.

Yet by their lays the ancient Sons of Song*
 Give me free access to the glorious throng ;
 As diamonds pierce the way for silk to string
 Rich pearls to deck the forehead of a king.
 Yes, I must dare : their noble deeds inspire,
 And lend me somewhat of a poet's fire.
 Yes, I will sing, although the hope be vain
 To tell their glories in a worthy strain,
 Whose holy fame in earliest life was won,
 Who toiled unresting till the task was done.
 Far as the distant seas all owned their sway,
 High as the Heaven none echeeked their lofty way.
 Constant in worship, prompt at Duty's call,
 Swift to reward the good, the bad appal,
 They gathered wealth, but gathered to bestow,
 And ruled their words that all their truth might know.
 In glory's quest they risked their noble lives,
 For love and children married gentle wives.
 On holy lore in childhood's days intent,
 In love and joy their youthful prime they spent ;
 As hermits mused in life's declining day,
 Then in Devotion dreamed their souls away.
 Come, hear my song, ye just, whose bosoms glow
 With Virtue's flame, and good from evil know :
 As fire assays the purity of gold,
 Judge ye the merit of these Chiefs of old.

First MANU reigned, revered by every sage,
 First, like the mystic word in Scripture's page.†
 From him DELÍPA traced his high descent,
 Of his pure race a purer ornament ;
 A peerless prince,—so, free from cloud and stain,
 Rose the bright moon from out the milky main.‡

* Válmíki, author of the *Rámáyan*, and others.

† The sacred syllable OM, prefacing the prayers and most of the writings of the Hindus.

‡ Alluding to the *churning of the ocean*, told in the *Mahábhharata*, when the moon and other buried treasures were recovered from the sea.

Tall and broad-shouldered, stout and strong of limb,
Valour incarnate fixed her throne in him.
Matchless in beauty and heroic might,
He towered like MĒRU* in his lofty height.
Meet for his godlike form, his noble mind
To worthy studies in his youth inclined :
Thence great designs inspired his generous soul,
And mighty deeds with glory crowned the whole.
With kingly virtues, gentle yet severe,
His subjects loved him, but they loved in fear :
We love the pearls that lie 'neath ocean's waves,
But dread the monsters in his gloomy eaves.
His loving people followed him, their guide,
Nor turned from MĀNU'S† Law one step aside ;
And well they knew the tax they gladly paid
For their advantage on the realm was laid.
The bounteous sun delights to drink the lakes,
But gives ten thousand-fold the wealth he takes.
Though troops in harness ranged before his gate
Kept watch and ward to swell his royal state,
Yet all success, each triumph o'er the foe,
Sprang from his wisdom or his ready bow.
Prudent and calm, no tell-tale look revealed
His secret thoughts from every eye concealed ;
As, in the present life, our joys and woes
Our former virtues and our crimes disclose,
So, crowned with full success, events alone
Proved his wise plans and made his counsels known.
He honoured prudence though he scorned to fear ;
Youthful and strong, his virtue was sincere.
He gathered riches, but he freely gave,
And Pleasure blessed him, but could ne'er enslave.
Contrasted virtues, ceasing to contest,
Reigned, like fond sisters, in the prince's breast ;

* The sacred mountain, in the centre of the seven continents.

† The Moses of the Hindus.

With silence, wise ; with might, to anger slow ;
 A lavish monarch, but averse from show.
 Skilled in all lore, unharmed by Pleasure's sway,
 He grew in years but felt no power decay ;
 His people's father, guardian, friend, and guide,
 Their sires were others : he was all beside.
 Thus, as he ruled his kingdom to maintain,
 And married wives a father's joy to gain,
 No selfish aims his noble spirit knew,
 For Virtue formed his Gain and Pleasure too.
 To gladden Heaven with gifts the earth he drained ;
 On earth, in answer, gracious INDRA* rained :
 And thus to each a glorious boast was given,
 That INDRA fostered earth, DILÍPA Heaven.
 What other prince this lofty praise could claim,
 That theft was only, in his realm, a name ?
 He honoured merit, though it graced a foe,
 As siek men medicine's healing influence know ;
 While worthless friends were banished from his sight,
 Like fingers poisoned by a serpent's bite.
 The good Creator made, for all to share,
 The earth and water, ether, fire and air :
 Thus too he formed DILÍPA, sent to bless,
 And find his own in others' happiness.
 He ruled the earth, from rival sceptre free,
 Like one vast city girdled by the sea.
 His queen was daughter of the royal race
 Of MAGADH, lovely both in mind and face,
 And, if his love was shared by girls besides,
 She and dear Fortune were his only brides.
 One boon was wanting to the monarch's joy ;
 His were all blessings save that best, a boy.
 Oh, how he longed, that childless king, to see
 A royal infant smiling on her knee,

* The Hindu Jupiter.—“ Oblations offered in fire ascend to the sun, from the sun rain is produced, from rain corn, and thence spring mankind.” Wilson's Rig Veda, vol. i. p. 248 n.

With his dear mother's eyes and face divine,
A second self to ornament his line !

One hope is left, to seek the hermit's cell,
And to his holy guide VASISITHA, tell
The longing of his soul : his ancient friend
May give some counsel that his grief may end.

To chosen ministers he trusts the weight
Of all his royal sway, and cares of state.
To God, the great Creator, first he pays
His humble worship, and for offspring prays,
Then with the queen ascends his ear, that tells
His coming with the music of its bells.
Have ye ne'er seen an elephant on high
Borne on his cloudy chariot through the sky ?
Have ye ne'er seen the flashing lightning ride,
In sportive beauty, by the monster's side ?
So seemed it now : so tall and strong was he ;
So bright, so dazzling in her beauty, she.
Few are their guards : a thousand trampling feet
Would mar the quiet of the Saint's retreat ;
But yet a circling host seems ever there,
For such divinity doth hedge that pair.
Fresh on their cheeks the soft wind gently comes,
Wafting the perfume of a thousand gums,
And, heavy with the pollen of bright flowers,
Waves the young branches of the Mango bowers.
They hear the peacock's joyous cry ; his head
Lifted in wonder at the coursers' tread.
They watch the cranes in jubilant armies fly,
Crowning, like flowers, the portals of the sky.
From shady coverts by the way the deer
Throw startled glances when the ear is near,
Then, as they gaze, the king with pride compares
His soft-eyed lady's tender look with theirs.

A friendly wind attends them on their way,
And augurs fortune ere the close of day :
No dust may fall upon the lady's dress,
Stain her soft cheek, or dim one shining tress,

While, like her breath, sweet odours, fresh and cool,
Steal from the lilies on the ruffled pool.

Shining in beauty, robed in purest white,
Like spring's best planet, and the Lord of Night,
Through towns they pass, and many a hamlet fair,
Founded and cherished by their royal care ;
While white-robed priests attend, a holy train,
Bless their beloved prince, nor bless in vain.

Nor do they scorn the gifts that shepherds bring,
Curds and new milk, their tribute to the King ;
But kindly bid the happy peasants say
What trees are those whose branches shade the way.
With eager eyes he shows the wondering Queen
The varied beauties of each woodland scene.
Lost in delight they reach the hermit's eot,
The journey's ended, but they mark it not.
Evening is come, and weary of the road
The horses rest before the Saint's abode,
Crowded with hermits from the forests near,
Seeking their grass and fruit and fuel here.
There playful fawns their daily rice await,
Thronging like children round the cottage gate,
And, in the garden, hermits' daughters o'er
Each young tree's thirsty roots fresh water pour,
Then stand aside, that timid birds may drink
Their share, in quiet, ere the stream can sink.
Quick from the car the King and Queen descend,
And turn, impatient, towards their saintly friend.
The hermits welcome him with honours due,
And kindly greet the royal lady too ;
Then lead them on where sits the ancient sage
With the Great Matron, in the hermitage.
Welcomed with gentle looks and words most sweet
The royal pair embrace their sacred feet.
And then VASISHTHA, after food and rest,
Asks of his kingdom's weal his honoured guest.
Cheered by his kindness, thus replies the King,
The best of speakers, to his questioning :

“ Safe in thy love, I dread no living foe ;
 Thy friendship, sage, protects from every woe ;
 Vain are my arrows, vain all earthly arms,
 For thou hast blest me with thy mystic charms.
 Heaven hears thy voice ; thou bid'st the flame arise,
 To call down water from obedient skies ;
 My people thrive, from grief and sickness free,
 And all these blessings, Saint, we owe to thee.

“ With thee, great lord, to counsel and befriend,
 The bliss thou sendest surely ne'er should end ;
 But Mother Earth, whom tears nor prayers have won,
 Is still ungracious and denies a son ;
 She teems with jewels, and can yet withhold
 One treasure lovelier than gems and gold.

“ The spirits of my fathers pine to see
 No hope of funeral offerings after me,
 And, if they taste the drink my care supplies,
 They taste it heated with unceasing sighs.
 As LOKÁLOKA'S chain,* with one side bright,
 The other buried in eternal night,
 Pure is my soul through sacrifice and prayer,
 But all the rest is dark without an heir.
 Thou knowest in the world to come our bliss
 Springs from our Penance and good works in this ;
 But he to whom a saviour son is given
 Finds peace on earth and endless joy in Heaven.

“ Dear guide and guardian, thou would'st grieve to see
 No golden blossoms on the favourite tree
 Thou hast so often watered ; and, when I,
 Thy friend, am childless, wilt thou check the sigh ?
 Oh, aid me in my woe : 'tis ever thine
 To bring good succour to our ancient line !”

He spake. One instant, ere the sage replies,
 He fixes, in deep thought, his searching eyes ;
 Still as some lake at summer's noon, when deep
 In sunless caverns lie the fish asleep.

* A mountainous belt, surrounding the outermost of the seven seas, and bounding the world.

He saw the cause with more than human ken,
 And thus the sage addressed the King of men :
 " Dost thou remember when, supremely blest,
 INDRA in Heaven received thee as his guest ?
 Thence as thou camest on thy homeward way
 The holy Cow beneath the shadow lay
 Of the Celestial Tree : thy thoughts were far
 Far absent, as the thoughts of lovers are,
 When absent from their loves ; thy heedless eye
 Saw not, or marked not, as thou camest by.
 Then thus she cursed thee—' As thine impious pride
 The reverence Kings should pay me has denied ;
 Now shall no offspring bless thy royal line,
 Till thou hast paid all honours due to mine.'
 The curse she uttered failed to reach thine ear,
 So loud the voice of GANGÁ foaming near,
 Celestial GANGÁ, boiling o'er with spray,
 Dashed up by heavenly elephants at play.
 For this dishonour to the holy Cow,
 Unhonoured, childless, thou art suffering now.
 Woe and misfortune ever are their fate
 Who pay not reverence to the good and great.
 Now in the under-world she dwells to aid
 The dreary vow that old PRACHETAS* made ;
 Then, in her stead, this Cow, her offspring, take,
 And pay her honour for her mother's sake.
 Win, with all care, her love, for she can pour
 All blessings on thee from her boundless store."
 The hermit ceased. Quick from the grove she came,
 Young NANDINI, the Cow that blessed the flame
 Of sacrificial worship. Dusky red
 Was her fair body ; on her sacred head
 A crescent lock of curling silvery hair
 Shone like the young moon in the evening air.
 As, with maternal love, her calf she viewed,
 Full streams of holy milk the ground bedewed,
 While the dust, raised beneath her sacred feet,
 Fell on the monarch's head with influence sweet.

* [For this sacrifice of Prachetas or Varuna, see Mahábh. vol. i p. 32—EDS.]

“ Rejoice,” the hermit cried, “ thy bliss is near :
Her name searee uttered, see ! the Cow is here !
Now feed on fruit, and what the wood supplies,
And watch her every step with careful eyes :
By constant toil is sacred lore attained,
So shall her love by ceaseless care be gained,
Watch all her movements, be her actions thine ;
Walk when she walks, and, when she rests, reeline ;
And let thy lady, at the break of day,
Far as the sacred grove protect her way.
Then go, and prosper ! Blessed shalt thou be,
And among fathers none shall equal thee.”
The King and Queen before the hermit bent,
And to his bidding gave a glad consent.
Then sought the leafy lodging, where they found
Their bed of sweet grass heaped upon the ground.

Far be the thought that hermit had not won
Full power to grant that childless King a son ;
'Twas in obedience to the Law he bade
The royal suppliant seek the forest shade.
Ere yet with early dawn the sky was red,
The anxious couple left their humble bed.
She culled fresh garlands for the holy Cow,
And poured sweet perfumes o'er her sacred brow.
Then in her steps that royal matron trod,
As the Law follows close the Word of God.
Far as the forest's darksome edge she went,
Then left her husband on his charge intent.
Not less his care than if that Cow had been
Earth with her teeming oceans, Earth the queen.
No servants followed ; for their own strong arm
Guards MANU'S children from all seathe and harm.
Close to the Cow, he kept the flies away,
Fed her with grass and many a tender spray.
To win her love he gently stroked her head,
Checked not her steps, but followed where she led.
With her he stood, with her he sought repose,
Drank when she drank, and, when she moved, arose.

When from his brow no tell-tale oozings flow,
 The forest elephant's wild heat to show,
 Ye mark his fury as he rushes by
 In the red lightning of his troubled eye.
 Thus when his kingly state was laid aside,
 His royal robes and ornaments of pride,
 Ye could not see DILÍPA, but to swear
 A king indeed, a glorious king, was there.

As he moved onwards, beautiful and strong,
 The glad birds hailed him with their gayest song,
 And, shaken by the breeze, young creepers shed
 A coronet of flowers upon his head ;
 From shady coverts, as he passed, the deer
 Gazed on the gentle king, and knew no fear ;
 While, as the breezes filled the tuneful reeds,
 He heard the Wood-Sylphs laud his glorious deeds.
 When faint and sinking 'neath the glare of day,
 A gentle zephyr round his head would play,
 And, stealing dew-drops from the mountain springs,
 Waft cooling odours on its balmy wings.

Peace reigned around him as the monarch came ;
 Unquenched by showers, the forest ceased to flame ;
 The trees glowed brighter with their fruits of gold,
 The lion slew not, and the fawn was bold.

When evening came, the Cow and glowing sun
 Turned to their rest, their daily wandering done.
 Now o'er the woods the shades of evening fell :
 The herds of boars forsook the marshy dell ;
 His leafy home the weary peacock eyed,
 And trooping deer to grassy coverts hied.
 Then faint with watching for her lord, the dame
 Forth from the hermitage to meet him came,
 And feasted on his face with eyes that ne'er
 Could quench their growing thirst with gazing there.
 In fairest beauty stood the Cow between
 The splendid monarch and the gentle queen,
 As the soft glory of the evening's light
 With purest lustre parts the day and night.

With reverent steps the lady round her passed
 And from a bowl parehed grain in worship east ;
 Then paid due honour to her spaciou brow,
 That door to lead the lady to her vow.
 Though yearning for her young, the Cow stood still
 Delighted with the worship, while a thrill
 Of hopeful joy ran through each royal breast :
 Such marks of favour show their vow is blest.

The King, with hands whose might no foe could meet,
 Gently embraced his ancient Teacher's feet,
 Performed the evening rites, and turned to pay
 The holy Cow fresh homage where she lay.
 His thoughtful care her every want supplied ;
 He placed a lamp and fodder by her side,
 And, when she lay upon her grassy bed,
 He on his lady's breast reposed his head ;
 When the Cow slept, he bade his eyelids close ;
 When she had risen, from his couch arose.
 Thus toiling still upon his vow intent,
 Thrice seven long days the anxious monarch spent.

There was a grass-hid eavern, dark and deep,
 Where GANGÁ thunders down HIMÁLAYA's steep ;
 The Cow had entered, but her guardian still
 Looked, lost in wonder, on the glorious hill,
 Nor feared for her : no beast would dare to spring,
 Even in thought, on so divine a thing.

Suddenly; lurking in the eavern's shade,
 A lion seized her, and her eries for aid
 Drew the King's wondering eyes. With grief and awe
 The monster standing o'er the Cow he saw,
 Like a red Lodhra tree whose limbs surround
 The ore-rich summit of a lofty mound.
 He seized an arrow, and his bright nails shed
 O'er its white feathers gleams of rosy red.
 Why doth he linger ? What resistless charm
 Checks his bold hand, and binds his eager arm ?
 He stood as in a picture, and his bow
 Availed him nothing though so near the foe ;

High rose his fury, but he raged in vain
Like a mad snake that magic herbs restrain.

A greater marvel, when, with voice of man,
The lion, holding still his prey, began :
“ Cease to contend ! Thine arrow, launched at me,
Though erring never, now in vain would be.
The tree may fall beneath the tempest’s force,
But the firm-rooted hill resists its course.

“ For know, the servant of the Lord Most High
Who wears at will eight various forms,* am I,
And, when his dusky Bull he deigns to ride,
He sets his foot upon my honoured side.
Look yonder, King ! Before thee stands a Pine,
Loved like a daughter by my Lord divine ;
In its first youth ’twas gentle U'MÁ’S joy
To nurse it even as she nursed her boy :
And, when an elephant once hurt her tree,
She mourned for it as she would mourn to see
Her own young War-God wounded by the bows
Of Heaven’s fierce enemies, his demon foes.
Since then, obedient to my Lord’s command,
In lion’s form to guard this tree I stand ;
To scare wild elephants, and feed on deer
That, tempted by the herbage, wander near.
Now, sweet, as to the Gods’ tremendous foe†
The streams of Amrit from the Moon that flow,
In her appointed hour, my destined prey,
This Cow has come to be my feast to-day ;
Return, O King, return ! The Saint can claim
No further duty from thee : feel no shame :
For loss of treasures that no might can save
Stains not the glory of the good and brave.”
The King no more his humbled power disdained,
For S’IVA’S might, he knew, his arm restrained,

* S’iva. His eight forms are earth, water, fire, air, ether, the Sun, the Moon, and the Priest who drinks the Soma-juice.

† The monster *Ráhu*, who by attempting to swallow the Moon causes its eclipses.

His conquering arm : for ne'er had mortal foe
 Staid the fierce tempest of his vengeful bow ;
 And even INDRA, with his hand raised high
 To launch his bolt, was checked by SIVA'S eye.
 " Foolish," he said, " my words may seem to be,
 Yet will I speak, for minds are known to thee.
 That God is ever by my soul adored,
 Maker, Preserver and Destroying Lord ;
 But how can I, unblamed, my charge neglect,
 This helpless creature whom the saints respect ?
 Hear, King of Beasts, my prayer, and, if thou wilt,
 Feed on my blood, but let not her's be spilt !
 Her calf will mourn her at the hour of eve,
 Then take my life ; the Cow uninjured leave !"
 The lion with a smile his answer gave,
 His bright teeth flashing through the murky cave :
 " Ay, mad I deem thee, monarch, to resign
 Thy youth, thy life, and that fair form of thine,
 And universal empire ; these to give,
 All these for ever, that a cow may live.
 Dost thou love creatures ? While thy death, O King,
 To this one cow a longer life will bring,
 Blest by thy reign a thousand homes would be,
 For all thy people look to only thee !
 Live and be happy ! Power and might bestow
 Joy like a God's, and make a Heaven below !
 But if thou tremblest at thy master's ire,
 And fearest anger that consumes like fire,
 Instead of her ten thousand others give
 With teeming udders, that thy soul may live."

The lion ceased. The mountain's hollow side
 Echoed his counsel ere the Prince replied :
 " What ! shall a King forsake—unkingly deed—
 The helpless suppliant in her hour of need ?
 Shall I disgrace a monarch's proudest name,
 And barter glory for a life of shame ?
 How can the gift of other cows assuage
 The just resentment of the holy Sage ?

For she is daughter of a race divine,
 Subdued by S'IVA'S power, and not by thine.
 Then for her life let mine a ransom be :
 Feed on my flesh, but let the Cow go free.
 Still, King of Beasts, thy hunger will be staid,
 Still will the Saint enjoy her holy aid.
 And thou, another's thrall, dost surely know—
 E'en as thy care of this young pine may show—
 That servants heedless of their duty must
 Bow down their heads in shame for broken trust.
 Then oh, have mercy, and mine honour spare !
 A hero's body claims no hero's care.
 Have we not parleyed in the wood to-day ?
 And friendship springs from parley, sages say ;
 Again I pray thee, thrall of S'IVA, take
 This my one offer for our friendship's sake !"

The lion yielded, and DILÍPA cast
 His arms upon the earth : the spell at last
 Had left him free : then, fixing on the ground
 His ealm eyes, waited for the monster's bound.
 But suddenly there came a rain of flowers,
 Poured down upon him by the Heavenly Powers ;
 And, sweet as Amrit, came a voice that said,
 " Arise, dear son !" He raised, in joy, his head,
 And saw no lion, but that Cow as mild
 As a fond mother bending o'er her child.
 " Now have I proved thy love," she cried, " dear son !
 That lion was a phantom : thou hast done
 Thy duty nobly ; for thou didst not know
 That Death himself can never work me woe.
 Now choose a boon, for I have boundless power
 On those I love all precious gifts to shower."

He raised his hands, those warlike hands whose might
 Had won a hero's fame in many a fight,
 And begged a son, to propagate his line,
 A son, whose glory should for ever shine.
 " Thy prayer is granted ;" said the Cow, " but drain
 My milky store, and drink, thy wish to gain."

“Nay, when that store has fed thy calf,” he cried,
 “And all that’s needed for the rites supplied,
 Then, at the Saint’s command, I’ll drink the rest,
 And deem the draught among all draughts the best.”

Pleased with his words, nor with her wanderings faint,
 She turned and reached the dwelling of the Saint ;
 To him *DILÍPA*, with o’erflowing heart,
 The joyful tidings hastened to impart ;
 And, though the Queen had read his looks aright,
 He told her all again with new delight.
 Then, at the bidding of the Saint, he quaffed
 Of *NANDINI*’s pure milk a precious draught,
 As though, with thirst that rises from the soul,
 He drank eternal glory from the bowl.

With many a blessing, at the dawn of day
 The guests were sped upon their homeward way,
 After due honour to the holy flame
 To old *VAS’ISHITHA* and his gentle dame.
 Swift towards their home the eager horses bound ;
 The ear makes music o’er the grassy ground ;
 They reach the city, where the people wait,
 Longing to meet their monarch, at the gate.
 Dim are his eyes, his cheek is pale, his brow
 Still bears deep traces of his weary vow.

As on the pale new moon we bend our eyes,
 Again appearing in the evening skies,
 So gazed the crowds, and could not gaze their fill,
 On him so worn, so thin, so lovely still,
 With loud huzzas their honoured King they greet,
 While flags by thousands wave in every street.
 He comes, he comes ! Now will his arm again
 The mighty burden of the world sustain,
 Strong as the King of Serpents that upholds
 Earth resting firmly on his endless folds.

Not mine to tell how hopeful months flew by,
 While day by day *DILÍPA*’s joy grew high.
 No tongue may say how lovely flowers of earth
 At nature’s bidding gently spring to birth.

Blest was the hour, and all the world was gay,
 When the sweet infant saw the light of day ;
 A rosy glow filled all the brightening sky,
 A pleasant breeze came breathing softly by ;
 High in the heavens five brilliant planets shone,
 Blessing the child they looked so kindly on ;
 And joyful nature promised endless bliss,
 For the world triumphs in a babe like this.

There was a glory round the infant's head,
 That poured strange lustre o'er his mother's bed ;
 And e'en the unlit torches seemed to shine,
 As in a picture, with that light divine.
 What worthy guerdon shall the maiden claim,
 Who hailed DILÍPA by a father's name ?
 Save but the royal emblems, she may take
 All he possesses for her tidings' sake.
 He fed upon the infant's face with eyes
 Still as a lotus when no winds arise,
 Nor could he, gazing on his child, control
 The tide of rapture, that o'erflowed his soul,
 As Ocean ne'er can check his billows' swell
 When shines the full moon whom he loves so well.*

Though bright the jewel in the parent hill,
 The workman's art adds lustre brighter still.
 Fair was that child, but, when all rites were done,
 Still greater glory clothed DILÍPA's son.
 Through the wide palace of the joyful King
 Fair girls are dancing, song and music ring ;
 While in the skies the Gods the rapture share,
 And the glad music sounds in concert there.

No captive wept within the King's domains,
 Or that auspicious day had loosed his chains ;
 Freed is he only ; doomed no more to pine
 'Neath the great debt he owed his fathers' line.
 Like some young God's, that baby's face was fair ;
 And happy as the Gods, that mortal pair.

* The Moon, having been produced at the churning of the Ocean, is viewed by it with parental fondness.

S'ACHI and INDRA, in their home above,
 Were not more blest in their JAYANTA's love.
 Not UMÁ, when her new-born darling smiled ;
 Not S'IVA, joying in his warrior-child.
 True as the Love-birds, in whose faithful breasts,
 Save of their partners, not a thought e'er rests,
 Thus had they lived ; and now this infant came
 To share their love, and yet increase the flame.
 What joy thrilled through him when the father heard
 His dear boy lisping forth his earliest word ;
 And, held and guided by the nurse's hand,
 Saw him salute his sire and try to stand !
 And, when he clasped his baby to his breast,
 And trembling kisses on his lips impressed,
 He learnt at length that inexpressive joy
 None but a father knows who clasps his own dear boy.

Now time flew by ; he wore the sacred cord,
 And holy men his mind with wisdom stored,
 Till, as the Sun-God in his ear on high
 Races his storm-fleet coursers through the sky,
 He passed triumphant through the four-fold lore,
 That mighty sea, from shore to distant shore.

In early manhood's prime, his father's care
 Gained him the hands of maidens young and fair,
 Then fairer far than ever, each dear grace
 Stealing new beauty from their lover's face ;
 Like DAKSHI's daughters,* whom the Lord of Night
 Dowers with a portion of his own sweet light.

Soon as DILÍPA saw his heir was fit,
 In sense and learning, by his side to sit,
 He made him partner of his royal throne,
 And shared the weight he long had borne alone.

As Beauty seeks the opening lotus-bud,
 And quits the flower that long has decked the flood ;
 So Fortune left the father for the son,
 And lived his consort by his virtues won.

* *Dakshā* had sixty daughters, of whom twenty-seven are the nymphs who form the lunar asterisms, and wives of the moon.

Who can resist the conquering flame's career,
Whirled by the Wind, his eager charioteer ?
Check the wild elephant with maddened eye,
Or the Sun's glory in a cloudless sky ?
And where the monarch that will dare to fight
When such a son assists his father's might ?
In glory thus DILĪPA's days flew by ;
Till, longing only for his home on high,
Mindful of duties by the Scriptures taught,
From worldly cares he drew his every thought ;
Resigned the white umbrella to his heir
And all the signs of sovereign rule, to bear ;
Then sought a tranquil dwelling, with his Queen,
Where Hermits live beneath their leafy screen :
For such, through ages, in their life's decline,
Is the good custom of the Sun-born line.

Report on the Shalka, Futtehpore, Pegu, Assam, and Segowlee, Meteorites sent from the Asiatic Society of Bengal, (Calcutta) to the Imperial Museum of Vienna, by Dr. W. HAIDINGER, Director of the Imperial Geological Institute, (Vienna).

(Read before the Imperial Academy of Vienna, July 19th, 1860.)

Before I transmitted these meteorites to the Imperial Museum, to be incorporated there into the general collection of meteoric stones and irons, I took care to have them cut for the better examination of their intimate structure, and to take from each of them small fragments which were entrusted to Mr. Ch. de Hauer for chemical analysis. As far as my information goes, no larger European collection possesses a specimen of any of the meteorites in question, and even their existence is scarcely mentioned in any scientific publication in Europe. They are, however, the more instructive as they exhibit within a small number of specimens, nearly all of the most important characters hitherto observed in stony meteorites. The order adopted here for their individual discussion is the same as established in Baron Reichenbach's "Anordnung und Eintheilung der Meteoriten" (*Poggendorff's Annalen*, 1859. No. 5, Vol. CVII. p. 155.) This disposition is founded on the affinities which the late PARTSCH established, and for which the late Ch. de Schneibers* has proposed the denomination of "Families" (*Sippschaften*) previously used by him in his report on the meteoric fall of Stannern. (*Gilbert's Chem.* 1808). Baron Reichenbach admits two degrees of division, "Families" and "Groups" for systematic arrangement of 99 stony and 60 iron-meteorites submitted by him to scrupulous examination, and comparison, without, however, using a special nomenclature for these divisions and subdivisions. Professor Shepard† has given denomination to his classes, orders, sections, sub-sections, and localities, but as he applied his principles of division in way of exemplification only to 9 American and 4 extra-American localities, his classification may be considered as inadequate to our present state of knowledge about meteorites.

The *Shalka* meteorite (as described by me at the meeting of the Imperial Academy, June 8th 1860) may rank undoubtedly among

* Beiträge zur Geschichte und Kenntniss meteorischen Stein und Metall massen, und der Erscheinungen, &c. &c. Vienna, 1820, fol. p. 4.

† Silliman's American Journal, 1816, II. Ser. Vol. 2, p. 390.

Baron Reichenbach's Family 1, Group I,—Langues (Chapigny,) Bishopville, Tonsae—corresponding to Professor Shepard's Chladnito—trachytic meteorites.

Here follow the four new meteorites, ready for incorporation with the Imperial Museum of mineralogy.

I.—FUTTEHPORE, (November 30th, 1822).

The first report on this fall was given to the Calcutta Medical Society by *Dr. Tytler*,* as at Rourpore in the jurisdiction of Futtehpore 70 miles N. E. from Allahabad. Under this last locality, this meteorite is mentioned in the Proceedings of the Asiatic Society of Bengal (June 1859). Neither these Proceedings, nor *Dr. Tytler* himself mentions a more precise date than “end of November.” Professor *Shepard* has noted the date “November 30th” on the specimen in his collection. The Calcutta Museum possesses 3 specimens of 4 lb. 3 oz. ; 3 lb. 8½ oz. and 1 lb. 4½ oz. weight ; the last has been transmitted to the Vienna Imperial Museum. It arrived with a weight of 1 lb. ⅝ ounces Vienna weight. Another specimen in the Calcutta Museum of 12½ ounces weight, labelled, Bithour and Shapur, 75 miles N. W. of Allahabad, November 30, 1822., is certainly not identical with the Futtehpore specimen, although I could not make out whether the same meteoric fall spread fragments at a distance of 100 miles, or whether the whole statement rests on a typographical error.† In fact, a real meteoric shower took place. Doctor Tytler states the stone, whose fall he witnessed, and which he gathered still hot, to have weighed 1 lb. 6 ounces. The observation of the fall had been complete : shortly before sunset a luminous body surrounded by a red globe of moon-like aspect seemed to come down the air near Futtehpore spreading sparks as it went on ; and a thunder-like noise was heard. Near Hazaribagh 250 miles E. of Allahabad, the light of the globe was visible through a veil of clouds covering the sky. Professor C. M. *Shepard*, gave notice of the phenomenon, and the stone of Futtehpore to the Meeting of the

* Edinburgh Journal of Science, No. 15, p. 171, 1828. Kämtz und Schweigger. Seidel's Jahrbuch der Ph. Ch. und Physik Vol. XXIII. (LIII.) p. 471—Pogendorff's Annal : 1830, Vol. XVIII. p. 179.

† [There seems to be some error in our records, which cannot now be rectified. The Futtehpore, near which lies Rourpore, is 70 miles N. W. of Allahabad, while Bithour and Shapur are near another Futtehpore about 130 miles N. W. of Allahabad.—EDS.]

American Association for the advancement of Science (New Haven, August, 1850). The fall took place at $25^{\circ} 57'$ North Latitude, and $80^{\circ} 50'$ E. Long. One of the stones had a weight of 22 lb. Professor Shepard saw in 1849, a stone of 2 lb. in possession of Mr. Thomas MacPherson Grant of Edinburgh, from whom he obtained a fragment of it. The learned Professor describes it, as being fine-grained, trachytoid, and resembling the meteorites of Poltawa (March 12th, 1811) and of Cashin in Maine (May 20th, 1848), (See *Silliman's American Journal*, 11 Ser. Vol. XI. p. 367.—*Edinburgh Phil. Journal*, Vol. VIII. October, 1852, p. 245. *Poggendorff's Annalen*; *Boguslawsky's Zehenter Nachtrage &c.*, Supplement Vol. IV. p. 22, 1854).

The fundamental substance of the Futchpore meteorite is of a light-ash grey, fine-grained, with dispersed yellowish brown rust-like spots on the broken surfaces. Lamellæ of iron pyrites run through the substance like as many miniature veins; some of them being made visible by fracture; they are reddish, brass yellow like magnetic iron pyrites. When ground and polished, the surface shews numerous particles of metallic iron of different sizes; the largest of them being $1\frac{1}{2}''$ in length and $1''$ in breadth. Crevices or fissures now filled up with solid matter; intersecting each other under distinct angles, run through the substance in various directions; some capillary fissures are filled with the dark-coloured substance of the crust; others of equal tenuity probably with metallic iron or magnetic pyrites. These fissures run on the whole surface laid bare by cutting the stone through a length of above 2 inches; and through the whole thickness of the stone. They shew intersections, junctions, derangements, just as metalliferous veins shew on an infinitely larger scale. Metallic particles have occasionally a section of $3''$ in length. The abovementioned rust-like spots appear on the sections, in an isolated situation, generally spreading along the sections of fissures or surrounding metallic particles. The substance in itself soft and friable, includes in some places larger or smaller globules made visible by section. One of these globules, about $1\frac{1}{2}''$ in diameter, greyish white, compact, includes laterally a small quantity of iron, surrounded with a yellowish brown spot, not continuing into the surrounding soft substance, which, however, shews plenty of similar spots. Other globules, opaque when cut through, seem to be

softer than the surrounding substance, and the iron within them is distributed in a different way. Several globules have darker grey tints; one of them $1\frac{1}{2}$ ''' in diameter is positively dark-grey. Several of these included corpuscles are of angular, not rounded, section, occasionally with plate-like bright planes indicative of crystalline structure.

The crust is brownish-black, opaque, with here and there isolated or grouped, roundish shallow depressions not referable to the figure of the stone, as they appear only in a fragment. Short fissures cut the cortical surface into angular irregular tablets of $\frac{1}{2}$ to $\frac{1}{4}$ of an inch in diameter. On the surface of fusion, some fissures or included globules of the inner substance are perceivable by aid of lens.

The crust, less than $\frac{1}{4}$ of an inch in thickness, includes, occasionally particles of metallic iron—I found the specific weight = 3.526 at a temperature of 17° R. Dr. Tytler in his accurate description gives 3.352—4.281, a difference depending on the unequal distribution of metallic particles.

The Futtchpore stone ranks undoubtedly among Dr. Reichenbach's Family 11, group 1 (whitish meteorites without included distinct globules of darker colour) together with the series of 22 meteorites from Nashville to Asco comprising those of Manerkirchen, Milena, Wold-cottage, &c. A fragment of the Zaborzika meteorite, preserved in the Imperial Museum of Vienna is scarcely distinguishable as to its exterior aspects from the Futtchpore meteorite.

The specimen most kindly transmitted by the Asiatic Society Calcutta, has been cut into two, to gain a better knowledge of its internal constitution. The crust spreads over about $\frac{1}{2}$ of the stone, the rest being laid bare by fracture. One piece weighs $13\frac{5}{8}$ ounces, the other $2\frac{1}{2}$ ounces.

II.—PEGU, (December 27th, 1857).

The substance of this meteorite is light-grey, with a bluish tint, consisting entirely of isolated round globules, or granules, easily separable and as it were, imbedded into white sand, the whole being of a nearly friable consistence, and so easily broken that any section would have been impracticable, without a previous immersion into a hot solution of Silicate of Potash (*Fuchs's wasserglas*) and subsequent desiccation as used at Vienna since 1846, for frangible and

delicate fossil-remains. The polished section shews the whole substance to be a nearly homogenous compound of single granules very different in form, some of circular, others of angular section, varying in colour from dark smoke-grey, to nearly greyish white: the largest among them not above $\frac{1}{12}$ inch in diameter. Metallic iron, and a yellowish sulphuret of iron, in atoms too minute to admit of specific determination, are distributed in very minute particles and rather inconstant proportion through the whole substance. A stratum of magnetic pyrites, of the colour characteristic of this mineral species, runs vein-like through the whole of the fine-grained loose substance; it forms a lamina of about 2 inches in length $\frac{3}{4}$ inch in breadth, and about $\frac{1}{24}$ inch thick, growing gradually thinner towards both ends. The presence of such a lamella of heterogenous substance offers a strong argument in favour of its formation having taken place amidst a larger mass (as it were, a massive rock), while the whole incorporated into a larger body went through several stages of evolution, and especially a pressure took place perpendicularly to the fissure, while the now filled in crevice was in course of formation; the whole mass simultaneously contracting itself in a direction perpendicular to the place of the laminae, and so causing a separation of particles, and consequently a vacuum, subsequently filled with crystalline magnetic pyrites.

The crust is opaque, greyish-black, with a brownish tint. The specimen in question shews more of the interior than of the cortical substance, being probably a fragment of a larger meteorite of perhaps above 20 lbs. in weight. The thickness of the crust is not above $\frac{1}{8}$ of an inch.

Specific weight 3.737.

The Pegu meteorite may well find its appropriate place in *Baron Reichenbach's* group 2. (Meteorites with dark globules interspersed with others of lighter colour) next to the meteorites of Lucé, Nanjemoy, Aussun, Benares, Tipperary, Cereseto, Weston, &c.

The original weight of the fragment kindly transmitted by Mr. Oldham, was 1 lb. $\frac{3}{8}$ ounces. Friable and creviced as it was, a cutting into two pieces became unavoidable, the smaller fragments being reserved for chemical analysis. Three fragments of $9\frac{3}{4}$, $4\frac{7}{16}$ and $\frac{6}{19}$ ounces in weight, are ready for delivery to the Imperial Museum;

the two first of them with natural fracture, and crust: the third with a polished surface of about a square inch.*

III.—ASSAM (Found 1846).

The only notice concerning this meteorite is to be found in the Journal of the Asiatic Society of Bengal (Vol. XV. Proceedings June, 1846, p. 46, and 76, and Vol. XXVIII. Proceedings June, 1859.) The place of its fall is still unknown. The late Mr. Piddington found it, in September 1846, among the collections of the Coal and Iron Committee, containing but few specimens other than those collected in Assam, and he inferred from this circumstance that the meteorite had actually fallen in that country. Three fragments of 1 lb. $8\frac{3}{4}$ ounces, and $7\frac{1}{2}$ ounces, were found; two of them evidently fragments of the same stone; the third similar in composition but certainly once a part of a different stone. According to Mr. Piddington, one of the fragments is richer in cobalt and poorer in nickel while in the other the latter metal prevails. Mr. Piddington most adequately described the Assam meteorite as being "beautifully marbled." It is remarkably firm and compact, taking a fine polish like the meteorites of Seres, Barbotan, Mezö-Madaras, Chantonnay, and other compact and firm meteorites of *Bn. Reichenbach's* III. Family. Baron Reichenbach has placed the stones of Chantonnay, and Mayence in his VI. Family on account of their larger brown spots, nevertheless Partsch's description (*Die Meteoriten* 1843 p. 38,) and the original specimen in the Imperial Museum bear a striking resemblance to the Assam meteorite. The term marbled is used in Partsch's, as in Piddington's description. The fundamental substance is of a light grey. It includes lighter grey fragments of irregularly rounded outlines of about $\frac{1}{2}$ square inch; then numerous more or less spherical (to judge by their section) particles, others smaller and quite black together with light ash-grey particles of various size. The included light grey fragments include again smaller brown particles, and others, yellow and white, of metallic nature; all of them of a fragmentary aspect.

Atoms of metallic iron, (here and there larger granules of $\frac{1}{8}$ of an inch in diameter) and magnetic pyrites, both in nearly equal

* Much more detailed particulars as communicated by Mr. Oldham to Dr. Haidinger, were given to the Imperial Academy of Vienna in November.

proportion, are spread through the darker and lighter stony substances. As in other meteorites of the same category, iron particles accumulate occasionally around the included globules, as in some amygdaloid rocks, green earth (decomposed angite) accumulates around the included minerals, or in the cavities left after their decomposition. It may be inferred from this remarkable fact, that during the gradual solidification of the meteorite when the globules were already included in the fundamental substance, the iron particles, dispersed in it, underwent a change of place. Similar phenomena observable in our terrestrial rocks may be conveniently explained by supposing the existence of subterranean solvents, either water, or compounds of chlorine, fluor, and sulphur, assisted in greater depths by the increasing internal heat. With reference to meteorites, it may be sufficient here to state this curious fact, recommending it earnestly to further investigation.

The crust is dark greyish-black, in some places with a slight indication of beginning brightness; and very thin. No indication of the direction followed by the stone in its flight, or its downfall is to be found on it, as we have before us but a fragment, although probably the most considerable, of an entire stone. The portions, however, probably answering to the anterior and posterior sides of the stone, bear rounded shallow impressions. Specific weight at a temperature of 17° R. = 3.792.

The specimen kindly transmitted by the Asiatic Society of Bengal has been cut into two pieces of 4 oz. and $1\frac{3}{8}$ oz., ready to be delivered to the Imperial Museum. Both these specimens shew more of the crust than of the interior substance, and are perfectly polished on a surface of about two square inches.

IV.—SEGOWLEE (*March 6th, 1853*).

No specimens of this meteorite have hitherto found their way to Europe, nor is it mentioned, either in Mr. *Greg's* accurate essay, (with MSS. supplements from the author to June 1859) nor in Prof. Shepard's index, (continued in MS. to November 1859) nor in Dr. O. Buchover's book on igneous meteors 1859, nor in any other European book or periodical. The only notices at present known, exist in the Journal of the Asiatic Society of Bengal (Vol. XXIII. p. 736, 1354—Vol. XXIV. p. 247, 1855—and Vol. XXV. p. 169, 1856.) The

first specimen of this meteorite shower, a fragment of $7\frac{1}{2}$ ounces was sent (November 24th, 1854,) to the Society from Patna by Capt. W. S. Sherwill, Rev. Survey; who had received it from Mr. F. A. Glover, C. S., Joint Magistrate of Chumparun, together with the first notice about the fall, on March 4th, (March 6th, according to later reports) about noon. A man and a boy had heard next to their stand a heavy body falling to the ground, without any other extraordinary noise. They gathered up several of the fallen stones, and brought them to their small village, some few miles S. of Segowlee, where they soon came into the hands of some irregular sowars stationed there. The Adjutant of the corps, Lieut. Macdougall, presented Mr. Glover with a large stone. This gentleman subsequently obtained two other small specimens, and saw about thirty of them gathered in a short time on the surface of one square mile. The second specimen of 1 lb. $2\frac{1}{2}$ oz. was also presented to the Society by Mr. Glover.

Segowlee, (also written "Soojowlee") is on the Katmandoo road seventeen miles east of Bettiah. In February, 1856, a specimen of 14 lbs. presented by Mr. A. Grote, was exhibited to the Society, and it is from this that the Imperial Museum has obtained, by the kindness of the Society, a fragment weighing 2 lbs. 3 oz. and a plaster cast of the very remarkable external configuration of the whole stone. Dr. Evan MacDonnell had acquired this specimen, immediately after the fall. As the Doctor reported, three officers of Irregular Cavalry had heard in their station a peculiar rumbling noise quite different from thunder. The same noise was heard, at Bettiah, by an Italian clergyman and many natives; also by another Italian missionary six miles N. W. of Bettiah; and it spread considerable terror. It was compared to the rumbling of carriages on a paved road, and lasted about forty seconds, the sky being meantime cloudless; the sun shining brightly, wind W. Ther. by day 44° F. (4° R.) All the stones are of nearly pyramidal form, their weight varying between $\frac{1}{2}$ and 4 lbs.: only one weighed 14 lbs.

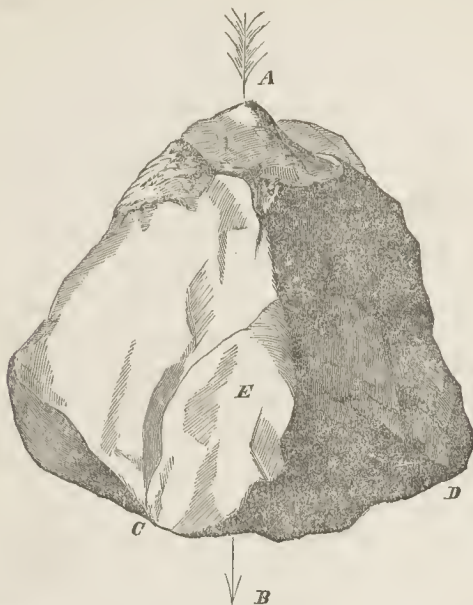
The Segowlee stone now in Vienna bears no resemblance to any meteorite preserved in our collections. Its colour like that of the Mayence meteorite is throughout a reddish-brown. The Mayence specimen discovered by Dr. Gergens, and subsequently analysed by

F. Seelheim (Jahrbueher des Vereinz für Naturkunde im Herzog : Nassau, 1857, Vol. 2, p. 405,) was presented by the discoverer to Dr. Haidinger who incorporated it with the Imperial Museum. Baron Reichenbaeh very properly remarks, that the brown colour as described by M. M. Gergens and Seelheim can in no way be the result of subsequent terrestrial decomposition. The stone, however, had been found underground, without any notice about a fall having recently taken place in the environs of Mayence, and its external surface had in fact suffered from beginning decomposition. The Segowlee meteorite had been taken up immediately after its fall. The brown substance although very solid, is anything but homogeneous. As in other meteorites, it includes portions of circular or angular transverse section, of darker or lighter tints, greater or less hardness interspersed throughout with minute particles of metallic iron and magnetic pyrites; here and there of somewhat larger size. The largest granule of magnetic pyrites is about $\frac{1}{8}$ inch in length and $\frac{1}{12}$ inch in breadth: the largest iron granule is about $\frac{1}{4}$ of this size. The substance is intersected by numerous fissures, not running straight as genuine crevices, and like those of the Futtehpoore meteorite, but bearing rather the character of solutions of continuity, surrounding more coherent nodular portions. Where a corner of the large 14 lbs. meteorite is struck away, the plane of fracture is coarse, grossly nodular, like rusty iron and resembles as Baron Reichenbaeh very justly remarks, "a lump of poor brown iron ore." The hardest among the globules are prominent above the surfaces laid bare by real fracture.

The crust is very thin, nowhere above $\frac{1}{8}$ of an inch; dark reddish-brown generally opaque with a darker blackish tint, and some little lustre on the plainer portions of the surface, and on the rounded edges, as it may be supposed to be in a substance refractory to fusion.

The form of the large Segowlee specimen, as shewn in the east which we owe to the kindness of our respected friends, deserves particular attention. It indicates clearly that the meteorite moved in the direction A. B. (see wood cut), the centre of gravity lying visibly within the thicker portion. Waves of shallow rounded depressions are particularly to be recognized on the posterior pointed and lighter extre-

mity A The inferior, or basal surface is remarkable for its evenness. Compared with an exactly straight line, its section, on a length of 4



inches deviates only for $\frac{1}{8}$ inch, and in a direction perpendicular to the first for only $\frac{1}{24}$ inch. The fragment sent to Vienna has been separated along the line C. D. A cut has been made parallel to the plane E, and a smaller portion has been so separated; the area of the polished surface is 6 square inches on the larger fragment (1 lb. $3\frac{1}{2}$ oz.) and 4 inches on the smaller one ($3\frac{3}{8}$ oz.).

I must now conclude with expressing my warmest thanks to the Societies and gentlemen of Calcutta, who have so kindly accepted and put into execution my project of exchange. Director Hörnes of the Imperial Museum is now ready to prepare the objects to be sent to Calcutta in exchange.

The investigations on the iron found on the top of the Kurruk-poor hills are still to be brought to a conclusion. Mr. Chas. de Hauer is preparing the report of his chemical investigations, to be reported at the reopening of the Academy in October.



Note on Budhagupta.—By FITZ-EDWARD HALL, Esq., D. C. L.

My paper on the inscriptions at Eran,* printed in the last number of this Journal, was put together and sent to the press while I was travelling on official duty. The present supplement, or, at least, the bulk of it, the marginal citations excepted, might have accompanied the substantive article, if, when previously writing, the work had been by me, on certain passages of which I am about to make a few comments.†

In the paper adverted to I have said: “It is, therefore, all but demonstrably certain that Budhagupta was reigning on Thursday, the seventh of June, in the year of our Lord one hundred and eight,

* Can this be one of the places to which Junaid despatched an expedition of filibusters? Two of those places, Arín and Mália, are supposed, by M. Reinaud, to be Ujjayiní and Málava; and a third looks as if it were Maṇḍala. But all is here exceedingly uncertain. According to Beládorí, the Arabs, in order to reach Mália, had to pass through Arín. To take a circuitous route was, perhaps, a dictate of prudence. If the second vowel of Arín got shifted, by accident, to the front of the first consonant, we may have Eran. See Sir Henry M. Elliot's *Appendix to the Arabs in Sind*, pp. 205, 206.

† If I had had access, at the time, to a respectable Sanskrit dictionary, I should not have called *pitaram anujátasya* a ‘hoary solecism.’ Messrs. Böhtlingk and Roth, in their *Sanskrit-wörterbuch*, refer, under *anujáta*, to the ensuing couplets of the *Panchatantra*:

जातः पुत्रोऽनुजातस्य अतिजातस्तथैव च ।
 अपजातस्य लोकेऽस्मिन् भन्तव्याः शास्त्रवेदिभिः ॥
 मादृतुल्यगुणो जातस्त्वनुजातः पितुः समः ।
 अतिजातोऽधिकस्तस्मादपजातोऽधमाधमः ॥

‘By those who are acquainted with the scriptures a son is to be understood, among men, to be *játa*, *anujáta*, *atijáta*, or *apajáta*.

‘He whose qualities are similar to his mother's is a *játa*; an *anujáta* resembles, in qualities, his father; an *atijáta* surpasses him in the same respect; and an *apajáta* is, in comparison, utterly base.’

Messrs. B. and R. render *játa*, as it occurs above, by *schlechtweg nur geborner*. Professor Benfey gives *geburt*, in his translation of the *Panchatantra*, Vol. II., p. 113.

Anujáta appears to be a synonyme of *manojvasa* and *pitrisannibha*, which Professor Wilson erroneously defines by “fatherly.” Kshira Swámin's explanation is *pitava samyak vibhátí*.

new style. Toramáya must have flourished shortly after him ; with something of likelihood, indeed, as his next successor. To Budhagupta's registration, relatively to the other Guptas, we have not the smallest trustworthy clue.* When pronouncing thus confidently, I was quite aware that wholly different conclusions had been come to, by Professor Lassen, as to every item of what has just been quoted. The grounds on which that learned orientalist has built those conclusions will now be examined.

On the first occasion where he treats of the Gupta monarchs, in 1852, he expresses himself to the following effect :

" A safer basis for fixing the time of the Guptas is furnished by their own inscriptions. In that of Budhagupta—on a pillar at Eran, near Saugor, in Málava—mention is made of the one hundred and sixty-fifth year of an unspecified era. * * * Judged by the style of the writing, that inscription is of a period, in his dynasty, more modern than that of Samudragupta and Skandagupta. Scarcely can the era in question be any other than that spoken of, by Albirúni, as having begun in the year three hundred and nineteen after Christ ; †

* *Vide supra*, p. 15, foot note.

† And so concludes Col. Cunningham, says the Professor, in a foot-note. The passage which he has in view is as follows, from this Journal, for 1848, pp. 487, 488 :

" In his mention of *Ma-kiei-tho* or *Magadha*, Hwáng Thsáng gives the names of five kings who reigned there previous to his visit. Their names are :

<i>So-kia-lo-a-yi-to</i>	or <i>S'amkaráditya.</i>
<i>Fo-tho-kiu-to</i>	<i>Budhagupta.</i>
<i>Tha-ka-ta-kiu-to</i>	<i>Takatagupta.</i>
<i>Pho-lo-a-ye-to</i>	<i>Báláditya.</i>
<i>Fa-che-lo</i>	<i>Vajra.</i>

" Of the second, fourth, and fifth of those princes there are coins still existing to testify to the truth of the pilgrim's narration. But we have yet more explicit evidence of his accuracy in the date of Budhagupta's inscription on the Eran pillar. This date is 165 of the Gupta era, which, as we learn from Abú Rihán, commenced in A. D. 319. The date on the pillar is, therefore, equivalent to A. D. 484. Supposing that Budhagupta reigned until A. D. 500, and that the three following princes occupied the throne during the 6th century, we have the date of A. D. 600 as the earliest limit of the period of Hwáng Thsáng's visit."

Some of the Sanskrit names here proposed as answering to those in the Chinese, show themselves in an altered shape in Col. Cunningham's *Bhilsa Topes*. The changes will be seen in a coming note.

and it is perfectly obvious that he has confounded this later dynasty, whose realms were confined to the north of the Vindhya, with the ancient one, that of Suráshtra, which preceded the kings of Balabhi. This view derives corroboration from an unpublished inscription* of the Guptas, by which it appears that their domination subsisted from the second century to the fifth.”†

Five years elapse, when, having reached the point where the subject in hand, agreeably to his chronological speculations, demands a detailed consideration, the Professor returns to it. After complaining of the poverty of materials available for constructing a history of what are called, by him, the ‘later Guptas,’ he goes on to say, pre-
fatorily :

“ Only a single inscription of any potentate of their dynasty has as yet come to light ; that of Buddhagupta, which is dated in his hundred and sixty-fifth dynastic year, or A. D. 484. The more is this to be lamented, as it is certain that there exist, in India, inscriptions of rulers belonging to this family, which lasted from the second down to the fifth century.”‡

The next extract to be made completes almost all that our author has to say, bearing directly on the topic under discussion, which it

* The authority for the matter of this sentence consists in those words, from a letter of the late Major Kittoe to Colonel Sykes :

“ I have had four valuable copper-plates, from Nagode, in Bundulkund, of Sri Hastina, a cotemporary of Samudra Gupta ; for he is named, by the latter, in the Allahabad Inscription (see J. A. S. B.), translated by Mill. These plates fix the number of years passed of the Gupta Dynasty at that time, viz., 163. This will prove the correctness of the *Vans'ávalí*, as given on the pillar, and will prove, I think, that the Guptas reigned from the second to the fifth century A. D.” Journal of the Royal Asiatic Society, Vol. XII., p. 12, foot-note.

For the actual contents of Hastin's land-grants, see my paper on them, pp. 1—13, *supra*. There is not a shadow of proof that Hastin was one with the Hastiyarman of the Allahabad pillar ; the plates—now that we know from what event the Gupta era is to be counted—show, unanswerably, that the former came long after Samudragupta ; and the Major's inference, adopted so readily by Professor Lassen, that the Guptas enjoyed power to the fifth century, has no foundation whatever in his data.

† *Indische Alterthumskunde*, Vol. II. p. 751.

‡ *Ibid.*, Vol. III., p. 652.

seems necessary to reproduce. Premising the name of S'akrāditya, he remarks :

“ His son Buddhagupta succeeded. * * * None but very meagre indications relative to his reign are to be drawn from the inscription where he is commemorated, which bears date in the year 165 of the Gupta era, corresponding to A. D. 484. From this date the time of his rule may be gathered with some certainty. If we suppose that he ascended the throne in 460, and that Chandrapriya* had been king till about 435, the interval from this year to 460 is adequately supplied by the reign of S'akrāditya. The [other Eran] inscription states that Dhanyavishṇu, brother of the late king Mātrivishṇu, son of Harivishṇu, and greatgrandson of Indravishṇu, consecrated a temple to Nārāyaṇa in his aprine epiphany. This was in the first year of the sovereignty of Tārapāni, † on the tenth day of the month of Phālguna, or on the twenty-fifth of February. That Tārapāni is designated as paramount king of the king is, indubitably, to be set to the account of adulation on the part of his vassal ; and Tārapāni turns out to have been only Buddhagupta's viceroy in Bhopal, or Eastern Málava. The monumental column was erected by Vaidalavishṇu, a younger brother of Maitráyaṇa ; ‡ and the cost of the whole undertaking was defrayed by Dhanyavishṇu. This was on the thirteenth day of the month of A'shāḍha, or at the end of June, in

* It is a sheer guess, and a wrong one, that Chandrapriya was predecessor of S'akrāditya. He was wanted as a link : and nothing more need be said of him. The name, according to Professor Lassen, can be only another form of the more usual Chandragupta. *Indische Alterthumskunde*, Vol. III., p. 655.

† I remarked, at p. 15, *supra*, that the fact of the Eran column's reading Toramāṇa, not Tārapāni, “ if my memory does not fail me, was detected by Mr. Thomas.” It did fail me. Colonel Cunningham it was that discovered the right word. See his *Bhilsa Topes*, p. 164.

‡ In justification of this, we are told, designedly as corrective of Mr. Prinsep : ‘ In place of *Maitráyaṇa-kṛipabhāsyā* must be read *Maitráyaṇa-kulajāsyā*, i. e., born in the family of Mitra.’ But Maitra would stand between Maitráyaṇa and Mitra ; and, besides, Mr. Prinsep has *Maitráyaṇāya*. As shown at pp. 18 and 19, *supra*, the column exhibits *Maitráyaṇīya-nṛipabhāsyā*. This I hastily rendered ‘ of the illustrious Maitráyaṇīya monarchs.’ As a substitute should, no doubt, be put ‘ star of the Maitráyaṇīya monarchs ;’ and all but the first two sentences of my appended annotations is to be cancelled.

Also see the end of the fourth note forward.

the one hundred and sixty-fifth year of the eminent king Buddha-gupta," &c. &c.*

Before I proceed to criticize the foregoing statements and deductions, a reference must be made to Hiouen-Thsang, the energetic Buddhist pilgrim who traversed India in the first half of the seventh century. Descanting on a division of Hindusthán, no doubt Magadha, he enumerates several Buddhist kings that once governed it, of whom the first appeared 'soon after the *nirvána* of Buddha.'† These, in the sequence of their descent, were S'akráditya, Buddhagupta, Tathá-gata, Báláditya, and Vajra.‡ Their inferential antiquity I shall investigate further on.

It is the second of those kings, Buddhagupta, whom Professor Lassen identifies with the Budhagupta of the Eran monument. The latter, as may be seen above, is called by his correct appellation where the Professor first names him. Everywhere subsequently, however, he changes Budhagupta into Buddhagupta, and that without so much as hinting the transformation.§ That Budhagupta is read at Eran, I possess the evidenee of my own eyes, with Captain

* *Indische Alterthumskunde*, Vol. III., pp. 659, 660.

† Peu de temps après le *Nirvána* du Bouddha.

‡ *Voyages des Pèlerins Bouddhistes*, Vol. I., pp. 149, 150; Vol. III., pp 41-44.

§ Was this bold metamorphosis unconscious on the part of the Professor? For, in speaking of the sovereign of the Eran column, he says, in the *Indische Alterthumskunde*, Vol. III., p. 661: 'As concerns the religion of that mighty monarch, credit must be given to Hiouen-Thsang, who makes him to have been warmly devoted to the creed of S'ákyamuni; as, in truth, is argued by his name, 'the Protected of Buddha.' This does not, however, hinder him from manifesting due consideration for the Hindu subjects of his vast territory. His viceroy Tárápáni he invests with plenary political control. Tárápáni, and so his predecessor, who sprang from the unknown Rajput family of Maitráyaṇa, appear as zealous worshippers of Vishṇu.'

From the very look of the word, Professor Lassen ought to have discerned that Maitráyaṇa could not be the proper name of any one who was living in the days which produced the inscription. Incontestably, it is of Vaidika origin and of the Vaidika age. In the Veda, Maitráyaṇíya denotes a *charaṇa*, not a *gotra*. At Eran it may denominate a family, without defining its scriptural school. But, if so, that family was, by overwhelming likelihood, not of the martial tribe, but Bráhmanical.

Burt's lithographed facsimile to second it. In fact, only the Professor's unconfessed guess is adverse. A Buddhist Budhagupta is a high improbability, on the one hand; just as, on the other hand, would be a Hindu Buddhagupta.* At the gentlest touch, therefore, the Professor's theory falls to the ground.

But, independently of the orthographical difficulty fatal to his assumed identification, it is not without resort, at every stage, to measures of more or less violence, that he introduces seeming harmony among invincible incongruities.

The implication that the paleography of the Eran column† marks an age posterior to that of the monuments which record the names of Sumudragupta and Skandagupta, cannot be admitted. The letters of Hastin's grants, when compared with those employed on the monolith of Samudragupta, are seen to be, in some particulars, apparently of a more antique confirmation. At the same time, Hastin was, unquestionably, later than Samudragupta by a good number of generations.‡ But the case is widely different as concerns the symbols found on the Eran column; and I expressly challenge the instancing, from it, of a single character of an aspect more modern than what the same character wears on the monument of Samudragupta. As for Skandagupta, inasmuch as he was one of Samudragupta's successors, and, especially, since the memorialist who eulogizes his power lived a hundred and forty-one years after the extinction of his kingdom, to dwell here on the writing of the second inscription adduced by Professor Lassen would be altogether superfluous.

When Mātrivishṇu and Dhanyavishṇu, elder and younger brothers, set up the Eran column, their liege was Budhagupta. Some years after, Mātrivishṇu having died in the meanwhile, Dhanyavishṇu erected a temple to Nārāyaṇa. In the inscription on its chief idol, he makes mention of Toramāna, and in terms which, equally with those

* Of the two coins which Mr. Thomas assigns to Budhagupta, one seems to leave very little scope for hesitation. See the *Journal of the Royal Asiatic Society*, Vol. XII., pp. 70, 71, and Plate II., figure 55; also this *Journal*, for 1855, p. 512.

† Mr. Thomas says that the *ś* is symbolized in one way in one of the Eran inscriptions, and in another way in the other. The difference he contends for I am unable to perceive. See this *Journal*, for 1855, p. 517.

‡ *Vide supra*, p. 5.

that the column applies to Budhagupta, attest acknowledgment of him as sovereign lord. But this, unreservedly asserts the Professor, was mere flattery; for Toramāna was but Budhagupta's lieutenant.* Were Toramāna allowed to have sat on Budhagupta's throne, of course it would be impossible to provide kingship for Buddhagupta's son Tathágata.

Of Toramāna's having been a paramount king there is, moreover, pretty conclusive proof, apart from the testimony of the Eran boar. By the kings of all ages the minting of money has been jealously reserved as a royalty; and Toramāna is known to have coined copper. This fact having been made public upwards of a year before Professor Lassen thought fit to unceremoniously crown Toramāna, it is somewhat singular that it did not meet his eye in time for a note.†

We have been told of Dhanyavishṇu's obsequiousness. And, if Dhanyavishṇu must adulate, to stay up a theory, no less must Albirūnī opportunely go astray for the same end. To him only one race of Gupta kings was known; and their line came to a close, he

* "We learn from the inscription on the colossal *Tārāha Avatār*, at Eran, that the paramount sovereign Toramāna possessed all the country about Bhupál and southern Bundelkhand, not many years after the elevation of Budhagupta's pillar; for the pillar was erected by Vaidalavishṇu, at the expense of his cousin Dhanyavishṇu; while the colossal Boar was set up by Dhanyavishṇu himself. The death of Budhagupta, and the accession of Toramāna, therefore both took place during the life-time of Dhanyavishṇu. But there must have been an interval of some years between the two events; as Dhanya's elder brother, Mátṛivishṇu, who is not even mentioned in the pillar inscription, had since assumed the title of Mahárāja, and was then dead. Dhanya himself then became regent, apparently to the young prince, Toramāna; for, in another inscription, from the Fort of Gwalior, I find Toramāna described as the son of Mátṛidása and the grandson of Mátṛikula, who is probably the same as Mátṛivishṇu. As the celebrated hill of Udayagiri is mentioned in the Gwalior inscription, there can be little doubt of the identity of the two Toramānas, and of the consequent extension of the principality of Eran to the banks of the Junna." Col. Cunningham's *Bhilsa Topes*, p. 164.

Much of this would be very plausible, provided Mr. Prinsep's translations were not incorrect. Professor Lassen, with all his tampering, is not half so specious. The inscription from the Gwalior fort ought to be put in print.

† See this Journal, for 1855, pp. 514—517. Colonel Cunningham's rectification of Tárápáni to Toramāna was before the world two years sooner; but Professor Lassen passes it unnoticed.

alleges, in A. D. 319. The Professor does not venture to deny, though he might do so safely, that Albirúni had heard of his 'later Guptas;' but he charges the Arabian, implicitly, with having fused the two dynasties into one. On this view, we have presented to us the curious phenomenon of one dynasty dating its edicts from the overthrow of another, out of which it had arisen, and which bore the same name with itself.* A far more probable opinion, as for Albirúni, is, that he was totally unacquainted with the 'later Guptas;' and it is not surprising that it was so. If they lived on the hither side of the 'elder Guptas,' what has become of all their specie? But it is needless to dilate. Incredible as it may sound, if Professor Lassen had read, in Hiouen-Tsang, less than two pages after that in which

* Of his 'later Guptas' Professor Lassen writes: 'The founder of their power must have appertained to the family of which the last representative known to us is Mahendragupta. He reigned till about A. D. 280.' *Indische Alterthums-kunde*, Vol. III., p. 652.

Mahendragupta, as differing from Kumáragupta, is still to be proved not a nonentity. Is not the word *mahendra*, found on some of Kumáragupta's coins, a substituto for *mahárája*?

It will prove useful here to tabulate the Gupta kings, consonantly to the views of two writers who have made them a subject of special study.

Col. Cunuingham.	A. D.	Professor Lassen.	Cir. A. D.
<i>Continuous series.</i>		<i>'Elder Guptas.'</i>	
I.—Gupta. ..	319	I.—Gupta. ..	160
II.—Ghaṭotkacha. ..	340	II.—Ghaṭotkacha. ..	168
III.—Chandragupta I. ..	360	III.—Chandragupta I. ..	195
IV.—Samudragupta, <i>Parákrama.</i>	380	IV.—Samudragupta. ..	230
V.—Chandragupta II., <i>Vikra-</i>		V.—Chandragupta II. ..	240
<i>máditya.</i> ..	400	VI.—Skandagupta or Kumára-	
VI.—Kumáragupta, <i>Mahendra.</i>	430	<i>gupta.</i> ..	270
VII.—Skandagupta, <i>Kramáditya.</i>	440	VII.—Mahendragupta and Nára-	
VIII.—————— <i>Lagráditya</i>		<i>yanagupta.</i> ..	280
or <i>Lokáditya.</i> ..	452	<i>'Later Guptas.'</i>	
IX.—Buddhagupta. ..	480	I.—Devagupta. ..	400
X.—Taktagupta. ..	510	II.—Chandrapriya... ..	435
XI.—Naragupta, <i>Báláditya.</i>	540	III.—S'akráditya. ..	460
XII.—Vajra. ..	570	IV.—Buddhagupta. ..	490
		V.—Tathágatagupta. ..	505
		VI.—Báláditya. ..	530
		VII.—Vajra. ..	540

See the *Bhilsa Topes*, p. 141; and the *Indische Alterthums-kunde*, Vol. I., Appendix, p. xxx., and Vol. II., pp. 1161, 1162.

Mr. Thomas gives the Guptas thus: I. Gupta. II. Ghaṭotkacha. III. Chandragupta I. IV. Samudragupta. V. Chandragupta II. VI. Kumáragupta. VII. Skandagupta. VIII. Budhagupta. He appends no dates. See his edition of Mr. J. Prinsep's *Essays on Indian Antiquities*, Vol. I., p. 276.

Budhagupta is genealogized, he would have seen reason for relegating that pious prince, on the faith of the Chinese traveller, to a hundred years, at the very least, prior to the beginning of the Christian era: and he has determined him to A. D. 490.* That the Buddhist Gupta kings once had existence, we are warranted, on the faith of Hiouen-Tsang, in believing; but, until fresh information emerges, we shall be sufficiently secure in regarding them as a race of provincial rulers, whom, memorable, or immemorable, Indian tradition has long consigned to oblivion.

For amendment of most of the minor errors, not already noticed, into which Professor Lassen has fallen, the reader may turn to the paper which these pages serve to complete. The Eran column is dated on the twelfth† of the month, not on the thirteenth: we owe it to Mātrivishṇu and Dhanyavishṇu, not to the ideal Vaidalavishṇu: Eran is not in Málava, and probably never was; nor is it near Saugor, but about fifty miles distant, on the river Vená, now Bíná. In all these instances, it is just to observe, the Professor was misled by Mr. Prinsep.

But, parenthetically, the writer would earnestly deprecate the result, from the strictures here recorded, of a sweeping undervaluation of the volumes in which he has here and there espied a blemish. A most favourable judgment has been passed, by Professor Max Müller, on the *Indische Alterthumskunde*, of which he says: "Professor Lassen, in his work on Indian Antiquities, now in course of publication, is giving a resumé of the combined labours of Indian philo-

* Hiouen-Tsang first specifies five kings, of whom the second is Budhagupta. After a lapse of some time was a sixth, who built a monastery, which, with five others, he combined into a grand whole. Of this establishment the pilgrim says: "Depuis sept cents ans que ce couvent existe, nul homme n'a jamais enfreint les règles de la discipline." *Voyages des Pèlerins Bouddhistes*, Vol. I., pp. 150—152. But there is nothing of this duration in Vol. III., where one would naturally look for additions.

Now, Hiouen-Tsang was in India from A. D. 629 to 645. To reach Budhagupta we are, then, to recede seven centuries and at least four generations.

A short distance after the extract just quoted, at p. 154, is an interesting passage about an attempt made by one S'rigupta on the life of Buddha or S'ákya-muni. Also see Vol. III., p. 18.

† Mr. Prinsep has "thirteenth" in his translation, and "fourteenth" in his summary of it.

logists during the last seventy years, sifted critically and arranged scientifically by a man of the most extensive learning, and of the soundest principles of criticism. His work may, indeed, be considered as bringing to its conclusion an important period of Sanskrit philology, which had taken its beginning with Sir W. Jones's translation of *Sákuntala*.* Elsewhere, however, the same admirable scholar punishes, with a severity only too suitable to their deserts, certain unnamed projectors who have schemed about the things of this country. His words are: "Not only have general conclusions been drawn from the most scanty materials; but the most questionable and spurious authorities have been employed without the least historical investigation, or the exercise of that critical sifting which, from its peculiar character, Indian literature requires more than any other."†

Unsatisfactory indeed is it, after so much destructive criticism, to have little of instantly helpful truth to substitute in the room of what has been swept away. I have previously cast in my mite, in solving the real age of *Budhagupta*; and, on twofold grounds, it is no longer defensible to postpone him, as in the theories of Mr. Thomas and Colonel Cunningham, to *Skandagupta*, with whom, to all appearance, the glory of the *Guptas* set for ever. Still, it would be unadvised to innovate to the length of banishing him from that family; and, not thus innovating, if we would assign him a place, we are driven, for the present, to conjecture. That, at one period, there were two sets of *Guptas* ruling simultaneously, may prove, by and bye, to be a not unreasonable suggestion. At all events, nothing hitherto made public is irreconcilable with it. *Budhagupta*, by possibility, may have been the first sovereign of a tentative independent branch which almost certainly ended with himself; for *Toramána*, his proximate, if not immediate, successor, was not a *Gupta*, and very likely was a usurper.‡

* *History of Ancient Sanskrit Literature*, &c., pp. 2, 3, foot-note.

† *Ibid*, p. 6.

‡ See what has been cited from Colonel Cunningham, in another note, on the ancestry of a *Toramána*.

If there was a *Mahendragupta*, not identifiable with *Kumáragupta*, who knows but he was of the hypothetical gentile offshoot to which I propose to refer *Budhagupta*?

A few words on the vexed subject of the Gupta era will conclude all that I now have to offer. According to Albirúni, it was computed from the extermination of the Guptas; and he synchronizes it with the era of Balabhi. We are left, then, to infer that the denomination of the latter era was designed to recal to remembrance the event of Balabhi's accession; and the foundation of one dynasty must be taken to have ensued at once on the extinction of the other. Such is the legitimate inference to which the language of Albirúni compels us. In speaking of the succession of Balabhi to the Guptas, he only says, however, that, apparently, he came just after them; and the implied confession of incertitude may well awaken doubt. M. Reinaud's first version of the passage from Albirúni is here accepted in preference to his second, in which, most paradoxically, he represents Balabhi to have been the last of the Guptas.*

Not a single inscription, containing a full and intelligible date, professedly to be reckoned in the Gupta era, has as yet been published. Is it impossible that it was chronologically distinct from the Balabhi era? Some years ago, while journeying through the valley of the Nerbudda, I came upon two inscriptions,† of which the time, all but the era, is specified with as much completeness as could be desired. From their object-matter it was evident that they were dated neither from the epoch of Vikramáditya, nor from that of S'aliváhana. At my request, my accurate and obliging friend, Pandit Bápú Deva S'ástrin, whose valuable aid I have before acknowledged, undertook to ascertain from what era their dates could be counted; whether from A. D. 319,‡ or from within a latitude of fifty years an-

* For the two versions, see Mr. Thomas's edition of Mr. J. Prinsep's *Essays on Indian Antiquities*, Vol. I., pp. 269 and 271.

† I have translated and disserted on them in the *Journal of the American Oriental Society*, Vol. VI., pp. 499—536.

‡ It was first made known by Colonel Tod that the Balabhi era then began. See his *Annals of Rajasthan*, Vol. I., p. 801.

My paper on the land-grants of Hastin, and that on the Eran inscriptions, as I did not see the proof-sheets, abound in errors of the press, to say nothing of other faults. The more important will here be rectified, and a few comments interspersed. For safety, I romanize.

Page 2, foot-notes, line 1. Read *shashottare*: l. 16, *bri*: l. 20, *sheta*, 856 and 863.

terior. The result—and nothing in the inscriptions conflicts with it—is A. D. 278. May it not be, I would ask, that we have, in that year, the starting-point of the era of the Guptas? It would not surprise me to learn eventually that others shall have seen cause to answer this question, propounded in a more positive form, in the affirmative.

Saugor, April 30, 1861.

Page 3, foot-notes, l. 2. Erase the two *anuswáras* : l. 30, read *bhukta*.

Page 4, foot-notes, l. 3. Read *bhukti* : l. 37, *varshe*.

Page 6, l. 7. Read *naika*—, and cancel part of the foot-note.

Page 7, l. 1. Read *gartáh* : l. 12, *áchchhettá* : foot-notes, l. 11, *bhukte*.

Page 8, l. 1. Read 'sprung from the house of King Parivrájaka,' as more probably correct.

Page 10, foot-notes, l. 9. Read *parichchheda*, and add *atisrishṭa*, *avadhyána*, and *áchchhetri*.

Page 11, l. 10. Read—*grámakasya*.

Page 12, foot notes, l. 2. In my MS. were *putrena* and *suryyadatena*. I was pointing out blunders.

Page 13, foot notes, l. 2. Read *parichchheda*. L. 8. Supply 8 in the Sanskrit.

Page 16, foot-notes, l. 7. The inscriptions are right in having *purogábhyaḥ*; and I should have translated their common valediction as follows : 'May happiness attend all the subjects, *to-wit*, the kine, the Bráhmans, and so forth.'

Page 17, l. 2. Read *s'anka*.

Page 18, l. 2. It ought to have been remarked, that what I read as *sansu-rabhu* is doubtful in its penultimate syllable, and very doubtful in its final. If right, render 'in which is the good land of the gods.' In the inscription, the adjacent word *kálinḍi* is quite clear. See the Journal of the Royal Asiatic Society, Vol. XII., p. 71, foot-note.

Page 18, l. 3. *Suras'michandre*, being followed by a *cha*, appears very like the name of a man. Formerly I read *mahárudra*—, but by supplying *dra* conjecturally. To *r* the stroko which sometimes expresses *u* is, however, often affixed gratuitously. If we read *mahárája*—, the sense will be 'and when Suras'michandra possessed, throughout the world, the lustre of a great king.' Ho may have been only a local magnate.

Page 18, foot-notes, l. 10. Read 'Suráshṭra.'

Page 21, foot-notes, l. 1. Read *tenaiva (sa) há'vibhakta-punya-kriyena*, 'whose righteous deeds are not dissociated from his.' The metaphor is legal. Dhanya-vishṇu goes on contributing his good works to the fund which he and Mátri-vishṇu once accumulated as partners.

Page 22, l. 4. Read 'the supreme refuge of the world.'



Gyges' ring in Plato and Nizámi.—By E. B. COWELL; M. A.

There is a well known legend in the second book of Plato's Republic, which Glaucon relates to support his hypothesis, that injustice would be superior to justice, if the perpetrator could be always sure of impunity,—we refer to the curious story of Gyges and his ring. Herodotus in his history of the rise of the Lydian dynasty of the Mermnadæ follows a very different account, both being probably merely popular legends, such as so constantly spring up in an unhistorical age, to supply a plausible explanation of past events, the true character of which has been unobserved or forgotten. Different ancient authors follow one or the other account as best may suit their purpose, but the many subsequent repetitions of Gyges' history are no doubt all to be traced to the two original sources as we find them in Herodotus and Plato; and the proverbial "Gyges' ring" plainly proves which of the two versions laid the deeper hold on the popular imagination.

In the second part of Nizámi's *Sikandar-námah** (frequently called the *Sikandar Námah-i Bahri*), there occurs a curious account of a council held in the court of the young Sikandar by the principal philosophers of Greece, where time and space are set at nought as triumphantly as by Goethe's Faust, when he marries Trojan Helen—Hermes, Plato, Socrates, Aristotle and Porphyry,† being all represented as fellow citizens and contemporaries. Each tells his tale or gives his moral advice, but, except in the case of Plato, we find nothing personally appropriate in the speeches attributed. It might indeed be an interesting question, how far the orientals have any real knowledge of Greek philosophers beside Plato and Aristotle,—for certainly although they often quote Pythagoras and others, the quotations are generally mere commonplace moralities which are only fathered on venerable names to secure to them a spurious weight

* Pp. 55-58, in Dr. Sprenger's edition in the Bibliotheca Indica.

† The other two who make up the 'seven sages,' are Wálís (واليس) (Thales?) and Balínás (بليناس). There are some interesting remarks on the latter name (also written فليدنوس) in Sir W. Ouseley's Travels, Vol. I. p. 62. De Saey identifies him with Apollonius of Tyana. Jámí in his *Khirdnámah* adds instead Pythagoras and Galen to the five mentioned in the text.

from the pretended authority under which they come.* In Nizámí, it is only in Plato's discourse that we find anything like personal identity—and it is singular that he is represented as telling this very legend of Gyges and his ring, and that in such a detailed manner that it can be nothing but a direct translation from the Republic itself.

To prove this identity of the two accounts, we subjoin a literal translation of each.

The Persian episode commences with an account of a dispute for supremacy between Plato and Aristotle, which is at length settled by the former inventing a peculiar kind of musical instrument, which the latter is completely baffled to explain.

When the next day the world-illumining morning
Triumphantly turned night to day,
The rose of the sun's flaming fountain burst forth,
And night plunged into the sea like a fish.
The crown-bearing king sat on a throne of gold,
With a jewel-laden girdle round his waist,
All the wise men sat beneath the throne,
And Aflátún's seat was higher than all.
The king, since the sage had learned that magic strain,
Wondered more and more how he had learned it ;
And he asked him, " Oh thou world-experienced old man,
Who hast brought from thy soul secrets of the unseen world,
The key to the lock of knowledge thou,
Knowledge comes forth from thy counsel.
Say, hast thou read, of all the wise of earth
Has there ever been one whose hand reached higher than thine ?
Has any invention ever risen from this workshop,
To which thy genius could not find the way ?"
Aflátún first uttered the full voice of praise,
And then said, " Yonder turquoise eirele
Can weave in better wise its enchantments
Than that human wit can detect the way thereto.

* Even the so-called extracts from Plato in the Akhláki Jaláli are only commonplace moral observations, with no trace of anything Platonic to characterize them.

Of all the achievements of those of ancient time,
Of all that they did in magic and illusion,
I will tell thee one,—but one of an hundred such,
None in this world knows this secret of the Master.
If the king command me, I will tell a little thereof,
Not one of ten, but one of an hundred.”
Permission was granted by that lord of just rulers,
That the sago should declare the history.
Then the world-experienced sage, enlightened of heart,
Thus uttered the tale, ‘ Oh thou monarch of happy throne,
Of the days and revolutions of ancient time
I have heard this memorial from my teacher.
I have heard, that once a hot vapour came rushing on
And split the ground with a sudden rent,
And the plain threw up the dried earth from the chasm,
And a talisman came to light from under the ground,
A molten image of tin and copper,
A statue cast in the likeness of a horse ;
And in the side of the lofty steed was seen
An opening like the bed of a water channel.
When the sun shone into that hole,
A hidden picture flashed forth to view.
A shepherd by chance passed by that deep ravine,
He beheld an empty chasm in the bare plain,
And when he entered into that ravine’s depth,
Lo he saw in it a gleaming talisman,
A copper steed, and in the body
A huge fissure proportioned to the statue.
He looked in the hole by the light of the sun
And it stretched from the horse’s head to its launch ;
And he saw an old man asleep therein,
Not one of his gray hairs moved from its place,
And in his hand a ring of gold
With a signet shining like the planet Jupiter.
Towards it he hastily stretched his hand
And he drew the ring from off the finger,
And when he saw the ring in his grasp,
He placed it at once on his own finger.

No other royal treasure found he there,
The statue let him depart, and he hastened from the place.
He led his flock and he gladly went his way
Waiting patient till morning came.
When from the banner of the azure sky
The sun lifted his blazing ball,
The shepherd went to his master,
The flock left scattered on mountain and plain,
That he might place that ring before him
And learn its value, great or small.
When the master beheld the shepherd come
He opened his speech with words of kind greeting.
He asked of him the state of sheep and lambs,
And the other listened and gave him a true reply.
But lo! in the midst of this question and answer
The shepherd from time to time vanished from sight,
And from time to time he re-appeared,
And at last the master of the flock exclaimed,
“Why dost thou continually become invisible,
And again as suddenly come forth to light?
Tell me what spell hast thou learned
That thou hast woven such a subtil veil to hide thee?”
The shepherd stood astonished at the charge,
And he sought help in his trouble from his motherwit,
And lo the truth was this,—the ring-worshipping swain
Had played with the ring on his hand, as he talked,
Sometimes quickly and sometimes slowly,
Now he placed it up and now down;
And when the seal was above on his finger
The shepherd was visible to the by-stander,
But when it was turned to the palm of his hand
The shepherd was at once hidden from his sight.
The shepherd when he learned this secret
Turned his face towards the mountain and desert,
And when he came to play his magic tricks,
Playing with his ring as the rolling heavens,
Wheresoever he wished to remain concealed,
There he kept the signet close in his palm,

But where he wished to appear before men,
There he placed the seal in its proper place.
He wandered through the city, now seen, now concealed,
And he gained all that his heart desired.
And one day he rose in secret,
He turned the signet downward to his palm,
With a naked Indian sword in his hand,
He went to the palace and sat him down in secret,
And when the council chamber was empty of the nobles,
He suddenly revealed himself to the king.
Fear seized the heart of the king when he saw him,
And he hastened to submit himself to his will.
"Take heed," he cried, "what is thy desire,
And who sent thee into this place?"
The shepherd answered, "I am a prophet,
Commit thyself to me and be content with thy fortune.
When I will that none should see me,
This miracle is at once at my command."
The king in fear believed his words
And the people of the city beyond all number;
And the shepherd grew so great and exalted
That at length the kingdom passed into his hand."

Aflátún concludes his story with some commonplace remarks on the inscrutable wisdom of the architect, who could contrive such a wonderful piece of workmanship,—but we will rather turn to the real Plato, and hear his version of the legend.

"They say that Gyges, the ancestor of the Lydian Croesus, was once a shepherd in the employ of the then king of Lydia, and that one day there was a great shower and earthquake and a part of the ground was rent open and a great chasm appeared in the place where he tended his flock. He was on the spot and saw it, and being much astonished went down into the ravine, and there he saw many other marvels such as storytellers romance about, and among others a hollow horse of brass, having windows in it, through which he peeped, and lo! inside was a dead man, taller as it seemed than human size. The body had nothing remarkable except a golden ring on its hand, which he took off and then went out. It chanced that the shepherds met together as they were wont to do, that they

might send monthly tidings of the flocks to the king, and he too came with the rest, wearing his ring. As he was sitting with the others, he happened to turn the bezel* of the ring inside towards the palm of his hand, when he immediately became invisible to those who sat near, and they began to talk of him as gone away. He of course wondered at this, and began again to twist the ring and turn the bezel outwards, and when he turned it, he became visible. Having observed this incident, he made experiments with the ring whether it really had this power, and he found it always happen so, —if he turned the bezel inwards, he became invisible, but he was visible again, if he turned it outwards. Having made this discovery, he next contrived to become one of the messengers to the king. On his arrival, he corrupted the queen, and plotting with her attacked the king and killed him and seized his throne."

There can be no doubt that Nizámí derived his story from the Republic,—the only question is, by what channel did it come to him? It is well known that Honain and his sons (towards the end of the ninth century) were the chief translators of Greek authors into Arabic. Dr. Schmölders says,† "On trouve cités assez fréquemment dans les auteurs arabes plusieurs dialogues de Platon, notamment le *Cratyle* et le *Phædon*, mais aucun de ces livres n'est mieux connu d'eux que son grand ouvrage sur *les lois*." Some of Honain's translations seem still extant, and Casiri in his *Bibliotheca Arabico-Hispanica* quotes from an Arabic author a list of the translations of Honain and Jahia ben Adi, and among them is "*Politicorum Liber ab Honaino Isaaci filio Arabicè conversus*" (vol. I. p. 302).

In this way Nizámí most probably gained his knowledge of Gyges, and he has appropriately put the fable into Plato's own mouth. If, however, he had really read the Republic even in the baldest translation, he is inexcusable for not having attempted some faint approach to dramatic propriety when he introduced Soerates also into the assembly. The character, whose 'photograph' has been preserved to us with such marvellous distinctness in the page of Plato, retains not even an outline resemblance in that of Nizámí, and one can hardly believe that the Persian poet ever read more than the second

* *Σφενδόνη*, Cicero (De Off. iii.) translates it 'pala annuli.'

† *Essai sur les écoles philosophiques chez les Arabes*, p. 93.

book of the Republic, as he certainly has utterly failed to reproduce a single feature of the central figure of the piece.*

NOTICES OF NEW WORKS RELATING TO SANSKRIT LITERATURE.

Les Avadanas ou Contes et Apologues Indiens inconnus jusqu' à ce jour suivis de fables et de poesies Chinoises, traduction de M. Stanislas Julien, 3 vols. Paris, 1860.

M. Julien has given us a collection of 112 Indian Apologues, from various Chinese Buddhist works. They profess to be originally derived from Sanskrit authors, and in fact many of the stories in their scenery and proper names evidently betray their Indian origin. It is, however, not a little remarkable that nearly all these stories seem at present unknown to us in the extant Sanskrit literature.

We have been able to recognize very few among the one hundred and twelve as old acquaintances. Thus the 5th story of the enmity between the crows and the owls seems taken from the 3rd book of the Panchatantra, and the 14th gives us the well known story of the geese flying up with their friend the tortoise, which is found in the Hitopadésa.† In the 74th we have the Vrihat Kathá legend of the founding of Pátáliputra and the magic coffer, stick, and shoes; and the 91st gives us the well known ass in the lion's skin.

It is somewhat singular that Nos. 32 and 53 give us two versions of an allegory of human life, which we have never seen in any Sanskrit author, but which is found in several Persian poets, especially Jaláluddín,‡—we refer to the apologue of the man leaping into the well to escape a mad elephant and clinging to a plant which grew on the side, when he suddenly perceives that its roots are being gnawed by two rats, one white and the other black, representing our

* I may add that in a former chapter of the Sikandar-námah (p. 25) Nizámí tells the classic story of Midas' ears and the reeds,—only it is absurdly attributed to Sikandar, as one of the various ways of accounting for his title *zú' l karnáin*.

† Jámí treats it very poetically in his *Tuhfat ul Ahrár*; his lines might half remind us of Will Waterproof's cock and the head waiter,

—He by farmstead, thorpe and spire
And followed with acclaims,
A sign to many a staring shire,
Came crowing over Thames.

‡ See von Hammer's *Schönen Redekunste Persiens*, p. 183.

life gradually consumed by day and night. In the 8th we have the Persian story of the company of blind men, each of whom feels one part of an elephant, and their different inferences of the whole animal when they all compare notes together.

Some of these stories are only expansions of a proverb, thus the 69th only embodies in a narrative the common enough idea which Catullus has made proverbial,

In vento et rapidâ scribere oportet aquâ.

Surely none but a Chinese would ever have wanted a definite instance of such penmanship before he accepted the truth of the aphorism!*

As a specimen of the stories, we subjoin the ninety-seventh,—though we cannot help fancying that we have seen it before in some other guise. We are informed that it is not unknown in Bengal to the present day.

“Once on a time in the kingdom of Gândhâra, there was a company of comedians, who, in an hour of distress, went to seek their fortune in another country and crossed the mountain of Balaséna. Now that mountain had always been famed as the haunt of cruel demons who devoured travellers. Our poor comedians had to pass the night on its summit. As an icy wind swept across the mountain, they lit a fire and lay down to sleep. Among the players was one who suffered much from the cold, and to warm himself he put on the dress of his part, which was that of a Rákshasa. He approached the fire and sat down. It happened at the moment that some of his companions awoke and seeing a Rákshasa near the fire, without a moment’s further examination, they at once took to their heels and fled. The movement soon spread to the others, and the whole company was off in a moment! The one in the Rákshasa costume, not liking to be left alone, followed them with the utmost rapidity. The others, seeing him so close behind, imagined that he was coming to devour them, and in their terror they scaled a mountain and crossed a river and plunged into the bogs. Their bodies were flayed, their limbs were bruised, and they sank down at last exhausted with fatigue. At length morning came and lo! it was no Rákshasa at all!”

E. B. C.

* The Chinese story literally carries out Æschylus’ idea, κατ’ ἔχρον πλατᾶν ἀφαντον (Agam. 696.)

PROCEEDINGS
OF THE
ASIATIC SOCIETY OF BENGAL,
FOR MARCH, 1861.

The monthly general meeting of the Asiatic Society was held on the 6th instant—

A. Grote, Esq., President, in the chair.

The proceedings of the last meeting were read and confirmed.

Presentations were received:—

1. From Captain J. C. Harris, two ancient copper coins supposed to be Bactrian, found near Tankpance in the Pooree district.

2. From J. Avdall, Esq., a copy of a work entitled “Selections from the Dewan of the Great Mystic Poet of Persia, Jelaluddin Rumi.”

3. From the president, A. Grote, Esq., various specimens, including a fine example of the long-tailed Lizard (*Tachydromus 6-lineatus*), a Snake, &c. &c.

4. From W. H. Foston, Esq., Penang, through Captain F. Laycock, of the surveying brig *Krishna*, a young Crocodile, in spirit,—also, from Captain Laycock, an example of *Scolopendra morsitans*, taken on board his vessel.

5. From the Barraekpore Park menagerie, a dead Sárás (*Grus antigone*).

6. From Babu Rajendra Mállicka, various dead animals, including a small Orang-utan, the Sárás and Common Cranes, Indian Pelican, and an unimpregnated egg of the Long-billed Cockatoo (*Licmetis nasicus*.)

7. From S. J. Paynton, Esq., a freshly killed *Felis cclidogaster*.

8. From Babu Gourdoos Bysack, a Snake (*Bungarus annularis*).

The following gentlemen duly proposed at the last meeting, were balloted for, and elected ordinary members:—

N. T. Davey, Esq.; Hon'ble Samuel Laing; C. Boulnois, Esq.; Charles Barnes, Esq.; Hon'ble H. B. Devereux; J. J. Gray, Esq., (re-elected.)

The following gentlemen were named for ballot at the next meeting:—

Rev. T. H. Burn, proposed by Rev. F. F. Mazzuchelli, and seconded by Mr. Cowell.

Major P. S. Lumsden, Assistant Quarter Master General of the Army, proposed by Major Thuillier, and seconded by Colonel Sir A. S. Waugh.

REPORT FROM THE COUNCIL.

The Council beg to recommend that the following works be published in the New Series of the *Bib. Indica*.

1. Pandit Moheschandra Nyáyaratna proposes to edit from three MSS., an edition of the *S'ankara Dig Vijaya* by Mádhava Áchárya. This work is one of the authorities for a little known but deeply interesting period in Hindu history. We have already printed* Mádhava

* Some doubts have been expressed as to the identity of the Mádhava, the author of the *S'ankara-dig-vijaya*, with the celebrated vaidic and philosophic scholiast of the 14th century. The style is undoubtedly different to that of Mádhaváchárya's other works, but the following facts seem to establish the identity of the two authors.

1. In the opening line of the *Digvijaya*, the author addresses the supreme Being, whom he identifies with his guru *Vidyáírtha*,

प्रथम्य परमात्मानं श्रीविद्यातीर्थरूपिणं ।
प्राचीनशङ्करजये सारः सङ्गृह्यते स्फुटं ॥

This couplet throws light upon the opening lines of Mádhaváchárya's commentary on the *Rig* and *Taittiríya Sanhitás*.

यस्य निःश्वसितं वेदा यो वेदेभ्योऽखिलं जगत् ।
निर्ममे तमहं वन्दे विद्यातीर्थमहेश्वरं ॥

(Mádhava-Sáyana seems to have had many gurus, as his *Sarva-dars'ana san-graha* is dedicated to *Vishnu Sarvajna*, while in the *Panchadas'í* he calls his guru *S'ankaránanda*. *Vidyáírtha*, however, is mentioned in the *Nyáya-mála-vistara*).

2. There is in the library of the Schore School a copy of a commentary on the *Mádhavíya Digvijaya*, written by one Dhanapati Mis'ra, in the samvat year 1855. By the kindness of F. E. Hall, Esq. we have received a copy of the opening pages. The following is the beginning of his commentary on the first words quoted above, where he expressly attributes the work to Mádhaváchárya.

Acharya's *Sarva Dars'ana Sangraha*, and the present work, which would fill about three Fasc., would be a valuable supplement for the history of Hindu philosophy. It will be edited under the superintendence of Pandit Jaya Náráyana Tarkapanchánana, Professor of Philosophy in the Sanserit College of Calcutta.

2. Pandit Premchandra, the Rhetoric Professor of the Sanserit College, proposes to edit the *Kávyádars'a* of S'rí Dañdí, the oldest Rhetorical work of the Hindus. It would only fill an ordinary number or so. A few extracts from one of the Native commentaries would be added.

3. Mr. Cowell has prepared an edition of the rare and ancient *Kaushítaki Upanishad* with S'ankaránanda's commentary. The scholars of Germany have repeatedly asked for an edition of this work, as there is no complete MS. of it in Europe. Four MSS. at least have been available for this edition, which, with a translation, will occupy about two Fasciuli.

4. The *Nakhat ul Fikr* to be edited by Captain Lees. This work, which will fill one Fasc., was originally accepted by the Society in 1855, and the Council recommend that it be now published in the old series as a work already commenced, and therefore fairly falling within the terms of the letter of the late Court of Directors.

The recommendations were adopted.

Communications were received:—

1. From Mr. H. B. Medlicott through Professor T. Oldham, a paper "On the Sub-Himalayan rocks between the Ganges and the Jumna."

2. From Lieutenant-Colonel H. Bruce, the following note concerning the oscillation of the water in a tank at Ballygunge:—

निखिलानर्थपूर्वकपरमानन्दाविर्भावलक्षणपरमपुरुषार्थानन्यसाध-
नाद् द्वैतज्ञानविजयपर्यवसन्नं श्रीमच्छङ्कराचार्यविजयमाविष्कृतं
ग्रन्थमारभमाणः श्रीमन्माधवाचार्यस्तस्य निर्विघ्नपरिसमाप्त्यादिसिद्ध-
येऽविगीतशिष्टाचारानुमितिश्रुतिप्रमितिकर्तव्यताकं विषयप्रयोजनसू-
चकं मङ्गलमाचरन् चिकीर्षितं प्रतिजानीते ।

Dr. Aufrecht writes from Europe, "I am glad that you purpose to print the *Mádhaviya Digvijaya* in the *Bibliotheca*, as it contains some very fine legends and a number of genuine poetical passages."—EDS.

“On Saturday evening, 16th February, 1861, Pakhoo Syee, in the service of Alexander Walker, Esq., went to a tank in the compound to wash his face. He observed the water receding from the masonry steps of the tank, and upon watching it for a few seconds perceived it to rise again until it stood above his ankles. He then ran and gave information to the other servants.

“We proceeded to the spot at about 7½ P. M., and observed the water as described by the syee. It rose and fell at least six inches at intervals of from 23 to 30 seconds.

“We then took observations from the other end of the tank in order to ascertain whether the whole body of water rose and fell, or whether it was surging backwards and forwards. There was neither wave nor ripple on the surface.

“The result of the observation was that when the water stood highest at one end, it was lowest at the other end, and the oscillation was to and fro from East to West.

“It was remarked by the natives that the water was at a higher temperature than usual, but no thermometer being procurable, we were unable to determine this point.

“Persons were then sent to all the neighbouring tanks to ascertain if they were perturbed also, but the water in them was quite stationary; the night was still.

“When the oscillation was at its greatest, the water must have risen and fallen at least 8 inches; that is, if we may judge from the marks on the parapet wall of the masonry steps; but when we measured it at ½-past 7 o'clock it appeared to be rather over than under 6 inches, and it went on gradually diminishing until at about 11 o'clock P. M. there was a rise and fall of only about one inch.

“We observed that the fish in the tank jumped a good deal, and the little crabs came to the edges as if endeavouring to get out.”

The Secretary stated that he had received another communication from Mr. Masters of the College at Krishnagur, giving an account of a similar disturbance having occurred at the same time in some of the tanks in that neighbourhood.

The following extracts from Mr. Masters' letter were read:—

“I see that the papers have begun to notice a very remarkable phenomenon in the rivers and tanks, which occurred on Saturday the 16th ultimo, at 7 P. M., and have called upon the Asiatic Society to take it into consideration.

“The phenomenon in question was brought to my notice on Monday morning, the 18th ultimo, by some of the students in the highest class of the Krishnagur College, who sought for an explanation.

“They stated that at 7 P. M. nearly, of the 16th ultimo, a report reached them that the large tank adjoining the Rajbarry (as large as Tank Square in Calcutta) was extraordinarily agitated. The horns were sounded as is usual on very extraordinary occurrences, and they ran to the spot to witness the “troubled waters,” and five or six declared that they were eye-witnesses of the fact. They observed the water rise about a foot above its level and then recede, that it did not rise and fall vertically, but when it rose one foot on one side of the tank it left bare a foot on the opposite side and *vice versâ*; that these two sides lay nearly East and West and that mid-way of the other two sides, there was a line running North and South where the water maintained a constant level—an axis of oscillation:—so much detail was elicited by question and answer with the first student of the class, who said that he was curious to know whether there was any difference on opposite sides, and he stationed one on one side while he went on the other and agreed with him upon certain signals: that the oscillation appeared to be about once in four or five seconds, and that this agitation went on lessening for the quarter of an hour that he was there, after which it ceased.

“First there was an impression in my mind that some large animal, an elephant, might have been bathing and plunging on the opposite side, no compliment to my friend’s powers of observation! but no elephant was seen; next, that it might have been an alligator, or it might have been a sudden flow of water into the river which communicating with the tank by a direct channel, caused a rise and fall: if the communication were by percolation through the strata, the oscillation would be vertical and very slow.

“A day or two after, I learnt that a similar phenomenon was witnessed at the following places on the same day and at the same hour very nearly.

“At Madhubpur, about 8 miles N. E. from Krishnagur, in a *jheel*, where at one time the river ran; here the water rose in waves.

“At Nuddea, where a man taking water from the river felt the water suddenly rise above his feet and wet his clothes, and where an unusually high ‘tide’ was observed by the boatmen.

“ At Panch Beyria near Cutwa, in a tank about three miles from the river.

“ At Oolooah, 12 miles S. E. from Krishnagur, towards Ránághát.

“ The water of the Jellinghee off Krishnagur was also disturbed.

“ Uniting these notices with those sent to the *Hurkaru* from Balasore, Beerbhoom and the Goorai river, I of course dismiss the elephant and alligator, as free of all blame.

“ An earthquake appears to be the only efficient cause, but it is strange that, although the phenomenon of ‘troubled waters’ is noised abroad, no one has given notice of an earthquake.”

The Ven’ble Archdeacon Pratt remarked that there could be no doubt that the disturbance was caused by a slight earthquake, and in this view the members present concurred.

3. From Captain T. G. Montgomerie, Bengal Engineers, through Major H. L. Thuillier, a paper “ On the extension of Survey operations in Kashmir, Ladak, &c. and the conquest of Gilgit.”

Captain Montgomerie made some observations with reference to his map of the Jamoo territories, and chart of the Kashmir Series Triangulation.

He remarked that the map reduced from the original to a scale of $\frac{1}{4}$ inch to the mile, represents an area of about 24,000 square miles, and being on this reduced scale, it shows, at a glance, the position of Kashmir, with reference to the surrounding mountains. The country represented embraces all the territories of the Jamoo, or Kashmir Maharaja that lie on the Hindustan side of the great Himalayan range; that is, from the Ravee to the Jhelum, and from the plains of the Punjab to the glaciers of the Nanga Parbat, 26,630 feet above the sea.

The Chart, on the same scale, shows that the triangulation covers no less than 56,000 square miles, or an area greater than that of England.

A general description of the geographical features of the valley was then given, dwelling upon the advantages its scenery derives, from the number and variety of lakes and tarns, which are wanting in almost all other parts of the Himalayas.

An examination of the map shewed the great number and gigantic size of the glaciers now existing in that part of the Himalayas, and the traces of ancient glaciers prove that they must then have formerly

been from 20 to 30 miles in length. Their present size, so much exceeding those that have been found in more easterly parts of the Himalayas, is no doubt due, in some measure, to the increase of latitude, as well as to the great height of the peaks, which are absolutely higher than any others west of Nipal.

Captain Montgomerie pointed out that the highest peaks had generally been found on the spurs, at some distance from the watershed lines.

After a description of the rope-bridges used in the country, he explained that the heights of the Kashmir series depended upon those of the N. W. Himalaya series, and those heights had been tested by trigonometrical levelling, carried round Colonel Waugh's great geodetical quadrilateral, viz., from Kurrachee to Sirouj, Sirouj to Dehra Dhoon, thence to Attock, and back again to the original starting point. This circuit of no less than 2,500 miles, closed with a discrepancy of only $\frac{3}{4}$ of a foot by one set of levels, and of $1\frac{1}{2}$ feet by another.

The Kashmir series consequently may be said to have started, with as accurate heights as nature would admit. The heights of the series itself have been tested in a similar way, the effects of attraction are known to be cancelled, in some measure, in the Kashmir series, as Captain Montgomerie's latitude observations shew that there is in the mountains a strong Southerly as well as Northerly attraction.

Every care has been taken to diminish the uncertainties of the refraction, which, in the lower hills, was about 1-16th, and in the higher ground, as little as 1-25th, of the contained arc.

Sir Andrew Waugh's system of trigonometrical levelling was explained, the main features being the taking of vertical observations at the time of minimum refraction, between 2 to 3 P. M., repetitions of observations on different days, and strict adherence to the same apparent time for reciprocal observations. This system makes the trigonometrical levelling a rival to the spirit levelling, more especially in hilly ground.

For instance, the trigonometrical levelling from Kurrachee made a point near Attock 1014 feet 6 inches, and the spirit levelling made the same 1012 feet 3 inches, being a difference of little over 2 feet in 830 miles. The spirit levelling was carried out with the best modern instruments of the largest size, and with every possible precaution to

ensure accuracy. The trigonometrical levelling, had moreover, had its own tests, and had stood them well, after traversing unprecedentedly great distances; thus, starting from the sea at Calcutta, the trigonometrical levelling closed at Bombay, with a discrepancy of only $6\frac{3}{4}$ feet in a circuit of 2127 miles, similarly from Calcutta to Kurrachee, 2082 miles, there was a discrepancy of $16\frac{1}{2}$ feet.

The result of the comparison of these two systems over such a very long line was highly gratifying, and shewed the great value of the trigonometrical levelling, which, in the infancy of geodesy, was neglected, or at any rate, not made full use of, in Europe and other places.

The Kashmir series observations afforded ample proof of the reliability of the heights of inaccessible peaks, for, many as high as 20,000 feet, which were at first computed as inaccessible points, have subsequently been visited as principal stations, and their new values as accessible stations, have agreed very closely with those determined before the station was visited. No greater difference, in fact, was found than could be easily accounted for, by the difference in depth of the snow at different periods, &c.

A short account was then given of the Kashmir series triangulation, which is connected with the triangulation of India, and has been carried over three snowy ranges, and across the great Himalayan range in two places by stations built on its peaks.

The observations of the principal series were invariably taken to luminous signals, viz., heliotropes and lamps.

Great difficulty was experienced in building the masonry pillars and platforms on the snowy peaks. The highest part of the snow was not always over the highest part of the rock. Several shafts had to be sunk in the snow before the rock could be found; when found, sufficient snow had to be cleared to supply building material for the platform. The snow had to be melted to slake the lime. A description of an encampment on the snow was given, referring to the difficulties necessarily encountered by the Surveyors during a residence of at least three or four days on each peak.

The mountainous nature of the country enabled orders to be transmitted at great distances by means of heliotrope signals.

The reverberatory lamps saved great delay, for if the clouds interfered with the work during the day, they generally fell to a lower

level during the night, and observations could then be taken over the clouds. The views seen from stations above the level of the clouds were at times very startling. The general level of the clouds looking like a vast sea, the higher ranges and peaks standing out from it like peninsulas and islands, and the waves of clouds surging backwards and forwards across the connecting ridges.

In the outer ranges the lightning and electricity generally was very troublesome; a portable lightning conductor had to be carried for the protection of the instrument. Many curious phenomena in connection with the electricity at high elevations were recorded. The effect on a steel-framed umbrella, and other metal articles were more especially peculiar on the frozen snow in a thunder-storm, the metal making an unpleasant loud crackling noise.

Captain Montgomerie then read a portion of a memorandum referring to the progress of the Kashmir series during the last season, which will be printed hereafter in the Society's Journal.

Captain Montgomerie pointed out that Messrs. Johnson and Beverley had observed from points 20,000 feet above the sea, and that a well determined trigonometrical station had been built on a point 21,480 feet above the sea.

During the season a large area had been mapped in Little Thibet, including at least 300 square miles of glaciers. The glaciers of the Mustagh and Karakoram ranges have in fact proved to be even larger than those surveyed near the Himalayan range.

After referring to the late conquest of Gilgit by the Maharaja of Kashmir, and the results likely to ensue therefrom, Captain Montgomerie concluded by saying that if the late war made the Chinese officials civil, the gap between Russia and the triangulation of the Kashmir series, now little over five degrees of latitude (say 350 miles), might be triangulated, and the project of the former Surveyor General, Colonel Everest, might be carried out by measuring the arc between Cape Comorin and Nova Zembla, an arc of nearly 70 degrees of the earth's surface. At any rate, if the Chinese are now more civil than formerly, the Surveyors may hereafter succeed in fixing accurately the geographical position of some of the towns of Central Asia.

The cordial thanks of the meeting were given to Captain Montgomerie for his very interesting observations and also to Sir A. S. Waugh, under whose superintendence the valuable survey maps have been got up.

The officiating Librarian submitted the monthly report for February last.

LIBRARY.

The library has received the following accessions since the meeting in February last.

Presented.

Auswahl aus den Diwanen des Mewlana Dschelaleddin Rumis.—By MR. J. AVDALL.

Magnetical and Meteorological Observations made at the Government Observatory, Bombay, 1859.—By THE GOVT. OF BOMBAY.

Die Vedischen Nachrichten von den Naxatra, von A. Weber.—By THE AUTHOR.

Statistical and Geographical Report of the Moorshedabad District.—By THE BENGAL GOVT.

Papers connected with a Report by Assistant Surgeon J. Lalor on the Hill districts to the south-west of Mehur in Sind.—By THE DIRECTOR OF PUBLIC INSTRUCTION, BOMBAY.

Memorandum on the District of Bussahir and the pacification of the Disaffected portion of its Inhabitants.—By THE PUNJAB GOVT.

The Oriental Christian Spectator for January, 1861.—By THE EDITOR.

Proceedings of the Royal Geographical Society of London, Vol. IV. No. 5.—By THE SOCIETY.

Proceedings of the Royal Society, Vols. 10 and 11.—By THE SOCIETY.

Journal Asiatique, Vol. XV. No. 60 and Vol. XVI. Nos. 61, 62.—By THE ASIATIC SOCIETY OF PARIS.

Calcutta Review for December, 1860.—By THE EDITORS.

Exchanged.

The Athenæum for November and December, 1860.

The Philosophical Magazine, Nos. 135, 136 and 137.

Purchased.

The Westminster Review for January, 1861.

Sur les Sources de La Cosmogne De Sanchoniathon, Par M. Le Baron D'Eckstein.

Indische Alterthumskunde von Chr. Lassen, Vierten Bandes.

Revue des Deux Mondes for November 15th, December 1st and 15th, 1860, and January 1st, 1861.

The Literary Gazette, Nos. 125 to 133.

Comptes Rendus, Nos. 19 to 26 of Tome LI.

Journal des Savants for November, 1860.

Conchologia Iconica, by Mr. Lovell Reeve—containing figures and descriptions of *Cymbium*, *Anatina* and *Melania*.

Annales des Sciences Naturelles, Tome XIII.—Zoologie No. 5,—Botanique No. 2.

The Natural History Review for January, 1861.

Revue De Zoologie, Nos. 11 and 12 of 1860.

The Annals and Magazine of Natural History, Vol. 6, No. 36 and Vol. 7, No. 37.

History of Infusoria, by Andrew Pritchard, Esq. M. R. I. 4th edition.

Goldstuecker's *Mánava Kalpa Sutras*.

LALGOPAL DUTT,

Offg. Assist. Secy. and Librarian.

FOR APRIL, 1861.

The monthly general meeting of the Asiatic Society of Bengal, was held on the 3rd instant—

A. Grote, Esq., President, in the chair.

The proceedings of the last meeting were read and confirmed.

Presentations were received—

1. From Captain F. P. Layard, 33 coins.

The following is an extract from a letter from Bábu Rájendralál Mitra, to whom the coins had been submitted for examination:—

“The collection includes several specimens that are new to the Society’s cabinet. Among them may be reckoned 1 of Ilyias Shah, 1 of Sekandar Shah, 1 of Ghiás-ud-dín, 3 of Ala-uddin Hossein Shah, and 2 of Nasrat Shah of Bengal. With two exceptions, they are in a good state of preservation, and one of them seems to be of an undescribed type. There are, besides these, a Turkish grosh, and a four-anna piece of Juddha Vikrama of Nepal, which deserve mention.

“The following is a list of the coins from Captain Layard.

No. 5. Ilyias Shah of Bengal, A. H. 747-760.

No. 4. Sekandar Shah, son of Ilyias Shah, A. H. 761 to 769.

No. 7. Ghiás-ud-dín Azim Shah Bin Sekandar, A. H. 769 to 775.

Nos. 1, 2, and 11. Ala-ud-dín Hossein Shah. (The last No. from a different die) A. H. 904.

Nos. 3 and 12. Nasrat Shah Bin Hossein. (No. 12 very much defaced.)

No. 6. A grosh or piastre of 40 paraahs, of Abdul Hamid Bin Ahmed of Turkey. The weight is 293 grains, which is short of the highest limit of the grosh by 17 grains; A. H. 1198. *Locale* of mintage, Kustuntunia or Constantinople.

Nos. 8, 9, and 10. Rupee of Mohammad Shah of Delhi, A. H. 1152.

No. 13. Shah Alum's gold 2-anna piece.

No. 14. A silver penny of George III., dated 1800.

Nos. 15 and 16, Silver one and two-anna pieces of Shah Alum.

No. 17. A paisa of Mohammad Shah. (From Captain H. Forbes, Bhagulpore).

No. 18. A siki or 4-anna piece of Girvan Juddha Vikrama of Nepal, Samvat, 1721, (never get figured).

No. 19. A Nepal silver one-anna piece (date and name unknown).

Nos. 20 to 24. 3 four-, 1 two-, and 1 one-anna pieces of Shah Alum.

No. 25. Arcot two-anna piece of Shah Alum.

No. 26. Ten cent piece.

Nos. 27 to 33. Modern Indian four, two, and 3 one-anna silver pieces; names undecipherable.

2. From M. Garcin de Tassy, a copy of a pamphlet containing his lecture on the Hindustani language and literature, delivered at the Ecole des Langues Orientales Vivantes, on the opening of the Session of 1861.

3. From the Government of Bengal, a copy of the Report on the Land Revenue Administration of the Lower Provinces for 1859-60.

4. From Doctor E. Röer, a manuscript text and commentary of the Taittiriya Sanhita in the Tailinga character. This is the very valuable MS. which has formed the basis of the edition, which is in progress of publication in the Society's Bibl. Indica.

Read a letter from Mr. F. Fisk Williams, announcing his withdrawal from the Society.

The following gentlemen duly proposed at the last meeting, were balloted for, and elected ordinary members.

Rev. T. H. Burn and Major P. S. Lumsden.

The following gentlemen were named for ballot at the next meeting :—

T. Anderson, Esq., M. D., F. L. S., Officiating Superintendent of the Government Botanic Gardens, proposed by Mr. Atkinson, seconded by Dr. Thomson.

Major J. T. Walker, Bombay Engineers, Superintendent of the Great Trigonometrical Survey of India, proposed by Major Thuillier, seconded by Mr. Atkinson.

Captain E. L. Earle, Bengal Artillery, Department Public Works, Kurnal, proposed by Captain Montgomerie, seconded by Major Thuillier.

The Council reported that they had appointed the Hon'ble Mr. Laing and Mr. H. F. Blanford, members of their body, in the room of Dr. T. Thomson and Captain W. N. Lees, and that Mr. Oldham had been made Vice-President in the place of Dr. Thomson. They further announced that Mr. J. Obbard's name had been added to the Sub-Committee for Meteorology and Physical Science.

Communications were received :—

1. From T. Oldham, Esq., a note on an inscription on a stone found at Sahebgunj.

The following is an extract from the note :—

“I send herewith a rubbing copy of an inscription found on a stone dug out of the ruins of the old buildings at Sahebgunj, one of the stations on the East Indian Railway. It is situated to the North of the Rajmahal Hills, on the banks of the Ganges, and a short distance to the East of the well known Teleagarhi Fort.

“In removing masses of these old ruins for *material* for the several buildings, &c., required for the railway, Mr. Anley, the Engineer in charge of the works, was very particular in reserving any which were of interest as being carved or sculptured, and among others the stone from which this rubbing was taken. When I visited the place it was in the compound of his bungalow safely preserved, and by his kind aid, I obtained the copy. This was the only stone among the thousands he had raised on which there was any lettering or inscription whatever.

“I submitted the rubbing to Bábu Rájendralál Mitra, and I quote his opinion :—

“The inscription from Sahebganj is not of much interest. It is inscribed in the Tirhoot character of the 16th century, and records the name of a royal priest—Rája Guru Sri Uttanga Sherh. The

compound consonant nga is doubtful, and the tt peculiar, but the other letters bear a close resemblance to the modern Bengali."

2. From Captain L. Pelly, late Secretary of Legation in Persia, through Sir H. Bartle Frere, a paper containing a narrative of his recent journey from Trebizond to Kurrachee.

Captain Pelly was introduced to the meeting, and gave an interesting account of his journey.

His route after leaving the shores of the Black Sea, lay through Turkish Armenia by Erzeroum and Byazeed, and thence to Khoee, Tabriz and the Koof-lan-koh to Teheran.

Captain Pelly briefly alluded to the fact of a series of earthquakes at Erzeroum in 1859, and mentioned some remarkable caves and inscriptions at Anee. He gave also some statistical information relative to the trade and revenues of the province of Azerbayjan.

From Teheran the route lay along the Southern side of the Elburz range to Meshed; thence through the hill track lying along the Turcoman frontier, to Khaff, and thence across the desert of Ghorian to Herat.

From Herat he moved by Sebzver, and Anardhurra; and thence by the borders of Laush and Seistan to Hurnah, rejoining the main road to Candahar at Shahguz; whence he proceeded along the plain of Buckwah, crossing the Khashrood into Washeer, and thence diverging Northward to the Helmund at Seah Guz.

From this point he again struck into the Candahar road near Ghirishk, and so reached the former town by Kooshkinakoot.

Reference was made to a Hill Fort not before visited by an European, overlooking the plain of Seistan called Sipeh-pot or Killah Roostum; also to three partially submerged towns on the Eastern shore of the lake of Seistan, named severally Nadali, Khér-Kookh, and Goolsepegah.

Captain Pelly alluded also to three tuppahs or islands with the ruins of towns on them situate in the Seistan Lake, and never visited in modern times. The island visited by Captain Conolly is to the South of the Lake, and is called Khoorja. A sketch of Dr. Forbes' murder was given as detailed by the eldest son of the chief who murdered him.

From Candahar the road taken was through the Kuzzuck Pass, across the valley of Pesheen and so to Quetta or Shawlkote. From

this point the route lay near the head of the Bolan Pass to Mustonog; thence to Khelat itself; and so by Bhagwan and Khozdar down Beloochistan to the Indian Ocean where Captain Pelly crossed the frontier into British territory within a few miles of the Port of Kurrachee.

The lecturer bore testimony to the general correctness of General Ferrier's work, and spoke of the admiration evinced by the Afghans at the truthfulness and impartiality of Mr. Kaye's history.

At the close of the lecture, Sir Bartle Frere remarked that this was the first journey made by an English officer across Afghanistan since the period of the war, and that it was remarkable that on this occasion it had been made by an officer unarmed, and riding in his uniform.

A vote of thanks was passed to Captain Pelly for his interesting communication.

The Officiating Librarian submitted his report for March last.

LIBRARY.

The following accessions have been made since the last meeting.

Presented.

Cours D'Hindoustani à l'E'cole impériale et spéciale des Langues Orientales Vivantes.—BY M. GARCIN DE TASSY.

Contributions to a knowledge of the Reptiles of the Himalaya mountains. (From the Proceedings of the Zoological Society of London, February 28th, 1860).—BY MESSRS. SCHLAGINTWEIT.

The Calcutta Literary Gazette for 1833.—BY DR. E. RÖER.

S. Jesu Christi Evangelii Latina Interpretatio, quam ad Græci idiomatis rationem expendebat Ben. Arias Montanos Hispalensis.—BY THE SAME.

Justini Philosophi and Martyris Apologiæ Duæ et Dialogus cum Tryphone Judæo.—BY THE SAME.

A Manuscript Commentary of the Taittirîya Sanhitâ in the Tailinga character.—BY THE SAME.

Report on the Land Revenue Administration of the Lower Provinces for 1859-60.—BY THE GOVT. OF BENGAL.

Report on the Results of the Administration of the Salt Department during the year 1859-60.—BY THE SAME.

Selections from the Records of the Bengal Government, No. XXXIV.—BY THE SAME.

The Calcutta Christian Observer for February and March, 1861.—BY THE EDITOR.

The Oriental Baptist for Feb. and March, 1861.—BY THE EDITOR.

The Oriental Christian Spectator for February, 1861.—BY THE EDITOR.

Report of Progress on the Lahore and Peshawur Road.—BY THE PANJAB GOVT.

Müller's History of Ancient Sanskrit Literature.—BY THE GOVT. OF BENGAL.

Purchased.

A Manuscript Text of the Taittirīya Saṁhitā in Devanāgarī character:

The Literary Gazette, Vol. VI. New Series, Nos. 134 to 137.

Journal Des Savants for Dec. 1860 and January, 1861.

Comptes Rendus, Tome 52, Nos. 1 to 5.

The Annals and Magazine of Natural History, Third Series, Vol. 7, No. 38.

Annales des Sciences Naturelles, 4 Série, Tome XIII.

LALGOPAL DUTT,

Offg. Asst. Secy. and Librarian.

FOR MAY, 1861.

The monthly general Meeting of the Asiatic Society of Bengal was held on the 1st instant.

A. Grote, Esq., President, in the chair.

The proceedings of the last Meeting were read and confirmed.

Presentations were received—

1. From Mr. G. D. Westropp, Rawul Pindee, a figure of a female head sculptured in relief, found on the borders of the Hazara country between the villages, Dheree Shahan and Oosman Khatur.

2. From the Secretary to the Royal Geographical Society, London, the thirtieth Vol. of the Journal of the Society.

3. From Captain T. C. Anderson, several copies of a pamphlet containing "Hints for the formation of a Geographical Garden, &c."

4. From Bábu Rájendralál Mitra a copy of his Bengali work entitled S'ilpika Darsana and another containing life of Sevaji.

5. From J. Muir, Esq., D. C. L., a copy of his work "on the Sanserit Texts on the origin and history of the people of India," Part III. with a book of Index to Parts I. and II. of that work.

6. From Mr. A. R. Blond, two very large Oyster shells found at a depth of 12 feet in the Drainage works excavations in Chowringhee road.

7. From M. Stanislas Julien a copy of his work entitled "Méthode pour Déchiffrer et Transcrire Les Noms Sanscrits Dans les Livres Chinois."

A letter was read announcing the withdrawal of Lieutenant H. Sconce from the Society.

The following gentlemen duly proposed at the last meeting were balloted for, and elected ordinary members :—

T. Anderson, Esq., M. D., F. L. S.

Major J. T. Walker, Bombay Engineers.

Captain E. L. Earle, Bengal Artillery.

The following gentlemen were named for ballot at the next meeting :—

J. D. Tremlett, Esq. C. S., proposed by Mr. Cowell, seconded by Mr. Atkinson.

Maharájá Mán Singh Báhádur, of Oude, proposed by Mr. Atkinson, seconded by Dr. Fayrer.

His Excellency Sir William Denison, K. C. B., Governor of Madras, proposed by Mr. Atkinson, seconded by the President.

Capt. L. Pelly, Bombay Army, proposed by Sir Bartle Frere, seconded by the President.

Communications were received—

1. From Lieut.-Col. H. Yule, the following note of an account of a printing press discovered in the Fortress of Agra when it surrendered to the British Army under Lord Lake in 1803.

Calcutta, April 26th, 1861.

MY DEAR ATKINSON,—Among some old papers, I lately found the note which I copy and enclose, thinking it may be worth printing in the Society's Journal.

I am not aware whether there is any other information existing as to the attempted introduction of printing in India under the great kings of the 17th century.

The original note is in the handwriting of my father, the late Major William Yule of the Bengal Army. He was all his life a devoted student of Persian and Arabic literature, and left a large collection of Eastern MSS. which are now in the British Museum. At the date referred to, (1803) he was Asst. to Col. Scott, the Resident at Lucknow.

The sheet of the Koran to which the note refers is, I regret to say,

no longer attached to it, nor if it existed could it now probably be identified.

Your's sincerely,

(Sd.) H. YULE.

“The accompanying sheet containing six pages of the Koran, has a little history attached to it which seems to me worth preserving.

“On the surrender of the Fortress of Agra to the British Army under the command of Lord Lake in the year (1803), a good deal of treasure, and much valuable property, or rather what seemed at one time to have been such, (was found). This Fortress had long been the residence of the Sovereign of Hindustan, or Great Mogul as he is usually called, but which it ceased to be at the death of Shah Jehan, who had long been kept in restraint in it by his son Aurungzebe who assumed the government.

“Whatever property had been left in the place at the death of Shah Jehan, had remained, it was understood, undisturbed in it, until the British Army sat down before the place in (October 1803).

“On possession being obtained, the magazines and vaults which were supposed to contain the Royal property were pointed out by some of the old residents of the place, and the massive and iron-bound doors were soon made to give way to the efforts of the soldiery, who very soon emptied them of every thing which was portable. In the evening of the day which saw this scene of confusion, my friend Lieutenant Arnold Nisbett Mathews of the Bengal Artillery went to view the interior of the Fortress. Passing one of the vaults which had shortly before been plundered, he entered, and the first object which attracted his eye was a machine which to him appeared (to be) a European *mangle*. On closer inspection however, he discovered it to be (what he never previously had an opportunity of seeing) a *printing press* and what is more, having the types ready set for some Oriental production. My friend happening to write to me in the evening, mentioned the circumstance in a passing way, I was however anxious to learn what the work had been, which had thus been most probably the very first that had ever been attempted to be printed in Hindustan, and that too, under the auspices of the head of the Empire. I instantly therefore despatched a letter by express to my friend wherein (acting as Post master at Lucknow where I then was) I entreated him to ascertain what the work might

be, and to give me if possible a proof sheet of it. This was attempted under manifold disadvantages which I need not enumerate, and the sheet to which this is attached, is the result. The type is an excellent one, and none as far as I can judge, none exists in Europe or elsewhere equal to it.

“The press was pulled to pieces and the types scattered in an hour or two after this sheet had left the press.”

2. From Babu Radha Nath Sikdar, Abstracts of Meteorological Observations taken at the Surveyor General's office in the months of August and September last.

3. From Captain J. F. Stevenson through Professor Oldham, notes of an interesting account of his visit to the hot springs of Pai in Tenasserim.

4. From Lieutenant-Colonel H. Yule a paper entitled “A few notes on antiquities near Jubbulpore.”

Colonel Yule read his paper to the meeting and a vote of thanks was passed to him for his interesting communication.

Mr. Oldham laid before the meeting a small collection of fossils and rocks from the vicinity of Sydney, Australia, for which he stated that the Geological Survey were indebted to the kindness of his Excellency Sir William Denison. As these specimens presented several points of interest which might be new to the Members of the Asiatic Society, he had laid them on the table, and would say a very few words regarding them.

To those who had given any attention to the subject of Indian Geology, it was well known that the true Geological horizon, or age of the Coal-bearing rocks of this country was a disputed question. By some they had, without much consideration of the evidence on one side or the other, been unhesitatingly placed at the same level in the general scale as the coal-measures of Europe; by others they had almost as unhesitatingly been referred to a much more recent epoch. The latter seemed to be the more favorite, as it was the more modern notion. Thus Mr. Hislop, to whose admirable researches near Nagpore, Indian Geology owed much; Dr. Carter of Bombay, and several others, and to a very great extent following in their footsteps many European geologists also, had till very recently, admitted of no separation into distinct systems, or groups of different ages, of the immense thicknesses of rock which together

constituted the several rock-masses associated with Coal in this country. Subdivisions no doubt were introduced, but all were classed under the one great epoch—and all were unitedly set down as *Jurassic* or *Oolitic*.

This view was ably argued by the Reverend S. Hislop in several papers, some of which were published in the Journal of this Society, and others, in the Journal of the Geological Society of London—and such was the received opinion up to the publication by the Geological Survey of India of some of its researches. In 1856 for the first time, this enormous thickness and strange assemblage of rocks was broken up into its proper component parts by the separation of the Talchir group, of the Rajmahal series and recently of the Panchet series: all marked successive steps in reducing to some system and order, the enormous thickness of these sedimentary rocks and in defining more and more accurately the limits of that group, with which alone good beds of coal appeared to occur—the Damuda; until now, on the plainest and most convincing physical evidence alone, independently of organic remains, it had become necessary to subdivide into at least six distinct groups, many of which are separated by wide intervals, the whole series which up to this time had been considered one.

These subdivisions, established solely by the officers of the Survey, had since been to a great extent adopted by Mr. Hislop and others, but nevertheless, so far as any published data are available, they still seemed to maintain unshaken their opinion of the *Jurassic* age of the great series associated with coal or what the Geological Survey call the Damuda series.

This question had naturally engaged Mr. Oldham's attention from his earliest arrival in India, and he had recently in a paper published in the 2nd volume of the Memoirs of the Geological Survey of India, given a brief summary of the results of his investigations on the subject. In this paper he had endeavoured to shew that the whole weight of the evidence fairly considered, went to assign a much earlier date to these rocks than had been previously assigned to them. He had shewn that a group of beds, to which he had given the name of *Rajmahal*, was of the same age, or contained all the same fossils, as beds described in Cutch by Capt. Grant, as being unconformably covered by others containing in abundance

fossils acknowledged to be of the same age as the lower oolite of England: that these Rajmahal beds were therefore, certainly as old as, probably older than, the lower oolites, and that further these Rajmahal beds were separated by a very large interval from the Damuda beds, which latter would consequently be considerably lower. Other evidence, all tending to the same conclusions, was also given. Up to that time (February 1860) the only animal organic remains we had found, was as elsewhere noticed, a single elytron of a beetle. But while that paper was actually passing through the press, Mr. W. Blanford had made a most interesting and most important discovery of Reptilian remains, imbedded in rocks above all the true Coal measures of the Raniganj field, and separated from them by an unconformity. To this group of rocks he had subsequently given the name of Panchet. These remains afforded immense aid in determining the age of the beds. The uncertainty which hangs over fossil evidence depending only on vegetable remains is well known, and this uncertainty is increased a thousand-fold, when the fossil flora of one district is to be compared with that of another separated from it by half the surface of the globe.

When Mr. Blanford in February 1860, first announced this discovery, and gave him a brief description of the fossils, Mr. O. at once replied, requesting him to look carefully at them, for that his brief notice appeared to indicate that he had met with *Dicynodon* remains. Mr. O. left Calcutta shortly afterwards, before these fossils had been fully opened out, having only seen a few of them which did not prove to be *Dicynodont*, as he had anticipated, but *Labyrinthodont* amphibia. On his return, however, towards the close of the year he soon perceived on an examination of the whole collection, which had meanwhile been cleaned out, that his first speculations were correct, and that there were some well marked *Dicynodon* remains.

It was well known that this group of reptiles had never hitherto been found out of South Africa; and on a reference to the paper he had alluded to above, it would be seen that he had in it indicated the marked analogy which he believed to exist between these *Dicynodont* Strata of South Africa, and some of our beds in India; a belief, at that time, based solely on the character of the vegetable remains, but which was thus strongly, and most unexpectedly confirmed by this discovery of Reptilian remains of the same character also.

He had had the locality well searched again this season, and had added much to the collection, and he had submitted all to the examination of his friend Professor Huxley; and was gratified lately by hearing from him that the collection did contain true Dicynodont as well as Labyrinthodont reptilian remains.

Unfortunately however, even this discovery did not fix very exactly the true level of these beds, for the exact position of these South African strata was not fixed, but all would agree in thinking them either Triassic or Permian. And as a necessary consequence, the Damuda Series, which is below these, must be as old, if not older.

This important discovery gave an additional value to all such comparisons of Indian strata with those known to occur in other countries; and it was in this point of view that the present small collection of specimens from Australia presented several points of great interest.

That plants not only generically but specifically identical with those found in the Indian Damuda rocks were found also in the Sydney sandstones had long been known. These plants had been described by Morris and McCoy. The latter had on the strength of the evidence of these plants alone expressed his conviction that the group of beds to which they belonged was altogether and widely separated from that below, in which occurred numerous remains of Mollusca, corals, &c., which were acknowledged to represent a lower carboniferous era. The plant beds above were considered Oolitic. Those, however, who examined the rocks *in situ* did not support this conclusion, and did not recognise any break in the regular sequence of the two series. Certainly nothing of this kind was so markedly traceable as to lead to the idea that the interval which had elapsed was representative of the immense lapse of time between the lower carboniferous and the lower oolitic epochs of Europe.

The positive identity of some of the fossil plants with those found in India, was as he had said long known, and he was even aware of the striking resemblance in general lithological character of some of the finer sandstones and shaly beds in which these plants occurred in both countries. But he was not aware of the very marked and curiously persistent agreement in general aspect between the rocks of the two countries.

1st. The fine earthy sandstones of dove and greyish tints, in which most of the *Glossopteris* and *Phyllothea* remains are found, were so identical with the beds in several parts of India, in which similar remains occur, that the specimens on the table might readily be supposed to come from Indian localities. Of this character specially were some of the "Upper Damuda" beds in the vicinity of Jabalpur.

2nd. The Coal of Australia was identical in general character with that of India—the same peculiar laminated structure, with mineral charcoal in flakes marking the surfaces of the layers; and further, precisely the same curiously curved jointing, which here gives rise to that singular structure known as *Ball coal*, and regarding which much has been said and written. Without entering into any question as to the cause of this, the specimens on the table shewed the perfect identity of the structure in the Australian Coal with that in the Indian rocks.

3rd. These coincidences were peculiarly interesting, because the rocks which exhibit them were known to contain identical fossils. But there was still another which might be noticed. The beds which in Australia hold so abundantly the remains of Marine Mollusca, &c. (the Wollongong sandstones) were in mineral texture identical with the peculiar greenish coloured muddy and pebbly sandstones which in India are known now as *Talchir* rocks. And if this similarity in texture could only be further established by the discovery of similar remains in this country, the gain to Indian geology would indeed be great.

If then we are correct in assigning to the Damuda beds in India, a geological date, certainly as old as the upper Permian, and we admit the synchronism of the Australian rocks containing identical plants, there ceased to be such an unbridged interval between these and the Lower Carboniferous rocks which underlie them.

The evidence of a very close analogy between the two series of deposits being, therefore, very strong, it may, he thought, be confidently anticipated, that, while we had received a key to the elucidation of the fossiliferous deposits in India from Australia, we should be able, from a closer investigation of the rocks of this country, to throw back a reflected light on the series in Australia, which might tend to remove many of the present difficulties and apparent anoma-

lies. It would seem that we had in India series of beds much higher in the general scale than anything as yet found in Australia, for he was not aware of any group of rocks distinct from and above the Sydney sandstones, while it was possible that they had representatives of other groups lower in the scale than our Talchir rocks. In any case it was evident that much information could be gained from a careful comparison of the rocks in the two countries. For enabling this to be, in part at least, carried out we were indebted to the zealous aid of Sir Wm. Denison lately Governor of Sydney, now Governor of Madras.

Sir Wm. Denison remarked that the series now on the table was intended to form a complete representation of the section of the rocks near Sydney. The specimens were all carefully numbered and lettered, and this numbering referred to a carefully prepared section on which the corresponding numbers were given. This he regretted to say had been either mislaid or forgotten in the hurry of leaving Sydney. He would, however, write for a copy of it, and on its receipt it would be found that this collection contained specimens from each successive group of beds.

All along the East coast of Australia, the country rose with a regular scarp, the whole series of rocks in which appeared to him to present an unbroken succession of beds, rising one above the other step by step, marked by no break physically. But they presented a marked difference in their organic contents. Down to a certain point the fossils were chiefly of plants such as those on the table. Then came beds with coal, and under these the beds with large *Spirifers*, *Orthis*, *Pachydomus*, and true lower carboniferous fossils. He believed no coal was found below the commencement of these fossils in the Wollongong sandstones, and none above the plantbeds. A controversy was now going on between the Rev. Mr. Clark and Mr. McCoy, regarding the age of these beds which he believed turned chiefly on the peculiar characters of a fern.

He had been much interested in the few remarks made by Mr. Oldham, and so far as he could, would always have great pleasure in aiding the Society by procuring for them specimens or information.

The Officiating Librarian submitted his usual monthly report.

LIBRARY.

The library has received the following books since the meeting in April last.

Presented.

Méthode pour Déchiffrer et Transcrire les Noms Sanscrits Dans les Livres Chinois, Par M. Stanislas Julien.—BY THE AUTHOR.

Légende D'Ilvala et Valápi (épisode du Mahábhárata, Par M. Ph. E. Foucaux.—BY THE AUTHOR.

Journal of the Statistical Society of London, Vol. XXIV: Part 1, with a list of the Fellows, &c. of the Society (corrected to 31st December, 1860).—BY THE SOCIETY.

Journal Asiatique, Cinquième Série, Tome XVI. Nos. 63 and 64.—BY THE ASIATIC SOCIETY OF PARIS.

The American Journal of Science and Arts, Vol. XXXI. No. 91.—BY THE EDITORS.

The Quarterly Journal of the Geological Society of London, Vol. XVII. Part 1, No. 65.—BY THE SOCIETY.

The Annals of Indian Administration, Vol. 5, Part 1.—BY THE BENGAL GOVERNMENT.

The Oriental Christian Spectator for March, 1861.—BY THE EDITOR.

Sanscrit Texts on the origin and history of the people of India, Part 3, with a book of Index to Parts 1 and 2 of the work. By J. Muir, Esq. D. C. L.—BY THE AUTHOR.

The Oriental Baptist for April, 1861.—BY THE EDITOR.

The Calcutta Christian Observer for April, 1861.—BY THE EDITOR.

Selections from the Records of the Bombay Government, No. LX. New Series, containing Capt. Fife's Report on the Eastern Narra.—BY THE BOMBAY GOVT.

Bibidhartha Sangraha, Vol. 6, No. 72.—BY BABU RAJENDRALAL MITRA.

Life of Sevaji, Bengali Translation of.—BY THE SAME.

S'ílpika Darsana.—BY THE SAME.

Revue Orientale et Américaine. Troisième Année, Nos. 26, 27.—BY THE EDITOR.

Indische Alterthumskunde, Von Chr. Lassen, vierden Bandes, erste Hälfte.—BY THE AUTHOR.

Exchanged.

The Athenæum for January, 1861.

The Philosophical Magazine, Nos. 138, 139.

Purchased.

Die SSabier und Der SSabismus, von Dr. D. Chwolson, Bands 1 and 2 with a book of Index.

Sehir-Eddin's Geschichte von Tabaristan, Rujan und Masanderan, von Dr. Bernhard Dorn.

'Aly Ben Schems-Eddin's Chanisches Geschichtswerk oder Geschichte von Gîlân, von B. Dorn.

'Abdu 'L-Fattâh Fûmeny's Geschichte von Gîlân, von B. Dorn.

Auszüge aus Muhammedanischen Schriftstellern, von B. Dorn.

Diwan des Abu Nowas, von Wilhelm Ahlwardt, 1.—Die Weinlieder.

Geschichte der Stadt Medina, von Ferdinand Wüstenfeld.

Beiträge zur Geschichte Der Kaukasischen Länder und Völker aus Morgenländischen Quellen. II. Geschichte Schirwans unter den Statthaltern und Chanen von 1538—1820, von Bernhard Dorn.

Über Die Überreste der Altbabylonischen Literatur in Arabischen Übersetzungen, von D. Chwolson.

Roudh El-kartas, Par A. Beaumier.

Die Traditionelle Literatur der Parsen, von F. Spiegel.

Descriptio Al-Magribi, Par M. J. De Goeje.

Die Lieder des Hafis, Vol. 3, Part 2, von Hermann Brockhaus.

Beiträge Zur Kenntniss der Iranische Sprachen, 1. Theil,—von, B. Dorn und Mirsa Muhammed Schafy.

Neriosengh's Sanskrit-Uebersetzung des Yaçna, von F. Spiegel.

The Quarterly Review for January, 1861.

Catalogue Annuel de la Librairie Française, Vol. 3 of 1860.

Erörterungen über Pseudo-Wakidi's Geschichte der Eroberung Syriens, von D. B. Haneberg.

Revue et Magasin de Zoologie, No. I. of 1861.

The Annals and Magazine of Natural History, Third Series, Vol. 7, No. 39.

The Literary Gazette, Vol. VI. New Series, Nos. 138 to 141.

Journal des Savants for February, 1861.

Comptes Rendus, Tome 52, Nos. 6 to 8.

LALGOPAL DUTT,
Offg. Asst. Secy. and Librarian.

Report of the Curator, Zoological Department, July.

I have the pleasure to acknowledge the following presentations :—

1. From H. R. H. The Prince Consort. An exquisitely stuffed head with horns of the Scottish Red Deer. This having been a desideratum in the Society's museum, I wrote to Andrew Murray, Esq., of Edinburgh, requesting that he would endeavour to procure a fine specimen for our collection. In reply he remarked that—"The Red Deer head with the full complement of tines and a tolerable crown is not easy to get. It is called a 'Royal Stag,' and is usually preserved by the sportsman as a trophy. But I took the opportunity," he adds, "of being at Balmoral with the British Association to ask one for you, from Prince Albert through his factor or factotum, Dr. Robertson, who promised to bring my request before his Royal Highness." * * * The following is an extract from a letter from Dr. Robertson, Chamberlain to H. R. H., to A. Murray, Esq.—'I embraced an opportunity before H. R. H. the Prince Consort left Balmoral, to place your letter into his hands, and was much gratified to receive the commands of H. R. H. to forward to you for the object stated in your letter, the head of a 'Royal Stag' having the 'cup,' and the usual complement of tines. It is a fine specimen. I have seen larger; but it is remarkably regular and well developed. Perhaps it may add a little to its value, not only that it is presented by the Prince, but shot by H. R. H. The following is the history of the specimen, which I am directed to communicate. 'This Stag was killed by His Royal Highness, the Prince Consort, upon Lochnagar, the 8th September, 1859; weight, after being cleaned out, 16 stone 12lb' It would be very difficult to get the series, shewing the horns in their different years; the growth of the horn depending so much on pasture. If *fine*, the horns are developed quickly; if *poor* and precarious, as in our country, they are slower and uncertain in their growth. In parks where the food is rich, the full complement of tines is seen at three or four years. The received opinion with us is that the animal never shews a *royal* head under six or seven years.'

Unquestionably the CERVUS ELAPHUS is stunted in its development in the Scottish Highlands, for the reason assigned; as also on

the bleak moors of Devonshire, and in Ireland, where the species would appear to be fast verging on extirpation.* It attains a finer growth in Richmond Park, Surrey; though still not comparable, in the magnificent development of horn, to the specimens occasionally met with in the peat-bogs of the British Islands and other post-pliocene deposits of the west of Europe, or to the noble Stags which still exist in the great forests of Hungary and Transsylvania. *Vide* dimensions of the horns of a modern Stag, shot on the Buckowina in 1815, in *J. A. S. X.*, 749,—and figure of a Hungarian horn, p. 750, pl. f. 11; also figure of the noble pair of horns of an ancient Irish Stag in the *Natural History Review* for January, 1860, p. 61. At a meeting of the Geological Society of Dublin, (November 8th, 1843, as cited by the late W. Thompson of Belfast,) “a magnificent series of the horns of the Red Deer, from Balinderry Lake, County Westmeath,” were exhibited, among which was “one pair of gigantic proportions, having nineteen tines, possessed also of the unusual quality of being, in huntsman’s parlance, ‘doubly royal,’ or giving indication of a double palmation near their terminations; an occurrence of a rare kind, and the result of very advanced age in the animal.”† (The latter is a mistake.) *Vide* also Owen’s figure in his *British Fossil Mammals and Birds*. Many years ago, Professor Schinz of Zurich remarked to me, in the course of his correspondence, that the fossil specimens of *C. ELAPHUS* found in Switzerland are generally about one-fourth larger, in all their dimensions, than the common existing race of the same region.

It has occurred to me that the great Hungarian Stag might prove to be no other than the Asiatic race, which is known to extend to the eastern shore of the Euxine, from which region a pair are now

* *Vide* Thompson’s ‘Natural History of Ireland,’ IV, 31.

† Doubtless the identical specimen figured in the *Natural History Review* which numbers nineteen tines. The Red Deer of Norway are considerably smaller than those of the Scottish Highlands. Thus, Mr. L. Lloyd remarks, that on the island of “Hittern, which is situated within less than one hundred miles of Drontheim, the ancient capital of Norway, there are a good many Red Deer still remaining—several hundreds it is said—and more than one of my friends,” he adds, “have enjoyed tolerable sport with the rifle: * * * but every one agrees in stating that the Deer found on the island are remarkably small—one-third less, at the least, than those in the Highlands of Scotland. These again are inferior to the German Deer, so that it would seem that either a deficiency of proper food, or the severity of the climate, has caused the breed greatly to degenerate.” *Scandinavian Adventures* (1854), II, 219.

living in the London Zoological Gardens: but the figure of a Hungarian horn, before cited, does not bear out the supposition; it having more the character of the fossil Stag-horns of Western Europe. The Asiatic race is the *C. ELAPHUS* of Pallas's *Zoographia Rosso-Asiatica* (I, 216, *edit.* 1831).—"Europæos magnitudine excedere videtur. Caput elongatum, rostro producto versus frontem sub-compresso, extremo depressiusculo, rotundato. * * * Cornua masculorum, cum portione cranii ponderata 20 libras* æquabant. * * * In ipsa Rossia exulent,† nisi quandoque advenæ; in nemerosis ad Terec fluv. totoque Caucaso usque ad Cuman fluv. frequentissimi; denuo apparent magno numero in sylvis subaltaicis, et dehinc per totam Siberiam, circa Baicalem maxime lacum et ad Vitim et Lenam fluviis usque, non in maxime borealibus, nec in ultimo Siberiæ angulo. * * * Longitudo animalis a summo rostro ad anum 7', 8', 0''; altitudo ad scapulis 4', 5', 0''; ad lumbos 4', 6', 0''; longit. capitis 1', 6', 0''; caudæ 4', 2''." This is the Kashmirian Stag (*Hungal* or *Ilunglu* of Anglo-Indian sportsmen), which Mr. A. Leith Adams, Surgeon, 22nd Regiment, has noticed in *Proc. Zool. Soc.* 1858, p. 530, where he remarks that "the horns are large, and usually very massive, with from 10 to 15 or more points according to age. The largest pair of horns I have measured," he adds, "were 4 feet round the curves, with 6 and 7 points. In habits and general appearance," remarks this observer, "the Kashmirian Stag bears a striking resemblance to the Red Deer. Although it is seldom now-a-days that individuals of the latter species escape the hunter so long as to attain the size and magnitude of the Kashmirian animal, yet I think it will be found that the horns of those killed in the forests of Scotland in former years are equal to any at present met with in Kashmir." (The race, however, is different, as the superior magnitude of the Asiatic Stags, compared with the modern European, is conspicuous at all ages; and vigour and high feeding, rather than great age—when the horns successively decline,—produce the maximum of development during the animal's prime of life, as Mr. Adams would doubtless admit, and at least some individuals should attain the necessary age even now in the Scottish Highlands. "An adult

* 20 lbs. Russian = 18 lbs. avoirdupois.

† Mr. T. Wiltam Atkinson observed numerous Stags in the southern Oural (in the district of the gold-mines of Balbouch), which were doubtless of the Asiatic species.

[Kashmirian] Stag," continues Mr. Adams, "averages 13 hands in height" [!], *i. e.* $4\frac{3}{4}$ ft.; and Pallas's $4\frac{1}{2}$ ft. at croup is probably French measure, and therefore fully equal to the other. But an adult Wapiti (*C. CANADENSIS*), which I measured alive in London, with well developed horns, was only $4\frac{3}{4}$ feet high at the shoulder; though Lewis and Clarke measured one, which "on placing it in its natural erect position," measured $5\frac{1}{4}$ ft. from point of hoof to shoulder; and Mr. Catlin informed the late Secretary of the Zoological Society (Mr. D. W. Mitchell) that he had seen a pair of shed Wapiti-horns, at the foot of the Rocky Mountains, of such dimensions, that when set up on their points, and thus converted into an archway, the tallest man of his party could walk under without touching them.* Mr. Hodgson gives the height of his Tibetan *C. AFFINIS* as from $4\frac{1}{2}$ to 5 ft. at the shoulder (*J. A. S.* XX, 388); and it has been a disputed question whether this or the Kashmirian (*i. e.* the ordinary Asiatic) Stag should be referred to *C. WALLICHI*, Duvaucel (Fr. Cuvier, *Mamm. Lithog.* II, t. 104). The latter name was founded on a living pair formerly in the Barrackpore menagerie, which were brought from Muktinath, near the famous towering mountain-peak of Dwálgiri, but on the opposite or eastern side of the Gunduk river and lying north of the great Himalayan range. The male, as figured by M. Fr. Cuvier (from a drawing sent by M. Duvaucel), would appear to have then borne his second horns; and he measured, according to Hardwicke, $4\frac{1}{4}$ ft. high at the shoulder, and is figured with an expanse of white disk surrounding the tail similar to that of the Wapiti, but I suspect exceeding what is seen either in the *Hungal* or the *Show* (as observed alive), and therefore probably exaggerated. This animal died at Barrackpore, and we still possess what were evidently his horns (figured in *J. A. S.* X, 750, pl. f. 7). I have now compared them carefully with mature horns of both *Hungal* and *Show*; and though it is impossible to pronounce with confidence, I incline rather to assign them to the *former*, considering also the locality, and the dimensions of the young buck as given by Hardwicke.†

In this case, the name *CERVUS AFFINIS*, Hodgson, stands for the

* Guide to the Gardens of the Zoological Society of London (August, 1859), p. 48.

† Since writing the above, I have seen a most magnificent pair of horns of this species, procured at Ladakh.

great species of Eastern Tibet and doubtless of Mongolia; and *C. WALLICHI* holds precedence for the Asiatic *C. elaphus* of Pallas; a different conclusion from that to which I arrived in *J. A. S.* XXIII, 736.

From the splendid series of Stag-horns displayed at the meeting, it is sufficiently obvious that the North American *Wapiti* Stag (*CERVUS CANADENSIS*) is the largest of the four species exhibited; that the *Shou* (*C. AFFINIS*) is the next in size; that the *Hungal* (*C. WALLICHI*) follows; and finally the modern European Stag (*C. ELAPHUS*); next in succession (of species not exhibited) comes the Barbary Stag (*C. BARBARUS*), rather bulky in the body and low on the legs, the male with an enormously tumid larynx during the rutting season; and smallest of all, by far, the elegant little Stag of Japan, and probably of the north of China and of Mantehuria (*C. SIKA*, *vide p. 91 antea*).* *C. AFFINIS* is remarkable for never shewing, even in the finest horns (so far as hitherto seen), more than a simple bifurcating 'crown' or summit (*vide figures in J. A. S. X, 722; XX, 388*). *C. BARBARUS*, so far as I am aware, never shews the second basal tine (or bez-antler); but I have seen a horn of this species with a trifid crown; and it is probable that *C. SIKA* also never develops the second basal tine; but with the mature horn of the wild *C. SIKA* I am unacquainted. The imperfectly mature Stags of *C. ELAPHUS*, again, are very generally without the second basal tine, which actually does not occur in the series of horns of this species figured in Prof. Bell's 'History of British Quadrupeds.' But in horns of young *C. WALLICHI*, which I have seen, the second basal tine seems to be generally present (*vide J. A. S. X, p. 750, pl. fs. 7 and 10*).†

This is not unworthy of notice, and helps to indicate that *C. ELAPHUS* is a degree more nearly akin to *C. BARBARUS*. Again, I think it will be found that in both *C. AFFINIS* and *C. CANADENSIS*, as in *C. WALLICHI*, the second basal tine is very generally present in the animal's second pair of horns,—rarely, if ever, so in *C. ELAPHUS*! There appears also to be another marked difference between

* Distinct from *C. TAIOUNUS* of Formosa.

† It is not so, however, in Mr. Hodgson's figures of horns appertaining most assuredly to a young *C. WALLICHI*, *J. A. S. XX, 393*; his Nári or Stag of Western Tibet, *C. naryanus*, Hodgson.

the horns of *C. WALLICHII* on the one hand, and those of *C. ELAPHUS*, whether large or small, recent or fossil, on the other; consisting in the fact that the European animal has the pair conspicuously straighter in the beam, and less divergent apart; whereas in both *C. WALLICHII* and *C. AFFINIS*, the pair are considerably more divergent and bowed, and again converge at the crown (*vide J. A. S. XXIII, 735, pl. 6*). In *C. CANADENSIS* the pair are also more divergent, but do not generally tend to converge at the crown, which, in this species, consists mostly of successively diminishing tines on the same plane, thrown off and upward from the continuation of the beam that inclines backward (*vide J. A. S. X, pl. f. 6*).

As regards the development of *C. ELAPHUS* in Western Europe in former days, if not in the forests of Hungary at the present time,* as compared with the species as now existing in the British Islands, I exhibit a pair of magnificent *Sambur* horns from the Coromandel coast, which as far transcend what are ordinarily considered first-rate *Sambur*, as the ancient British Stag-horns excel in dimensions and development of crown, those of the modern Stag of Western Europe.

The range of *C. AFFINIS* extends, in all probability, to the mountains of the north of China and Mantchuria, where Mr. Swinhoe has information of "a great Stag with large branching horns." The Stags of Mongolia, abounding in the mountainous region of the Kalka country (which extends from near the Russian frontier-station of Kiakhta to the great elevated desert of Gobi, and from which the river Onon takes its rise), are in all probability of the Shou species. Thus the Mantchu, Touleschin, as quoted by Timkowski, mentions that he shot "a very large Stag on the Khanola," which is north of the Khingan, on the left bank of the river Tola. The productions of that region are generally Tibetan, and tame Yaks abound (which are habitually miscalled "Buffaloes" by Timkowski).† The Stags of the Gobi, also, repeatedly mentioned by Timkowski and others, are doubtlessly Shous; and

* The Roe is stated to be much larger in Austria than in the British Islands.

† In his description of "Eastern Turkistan, a country better known in Europe by the name of Little Bueharia," (as he remarks, drawn up chiefly from information obtained in China,) he states, "The wild Oxen are here very strong and fierce. If the hunter does not kill them with the first shot, he is in danger of being torn to pieces." Lloyd's English translation (1827), I, 406. Wild Yaks are of course intended. M. Hue also refers to wild Yaks simply as wild cattle.

the species probably extends onward to the mountains of China proper and of Mantchuria.* Mr. T. Witlam Atkinson, in his volume of travels in Southern Siberia, &c., seems to indicate that more than one species fell under his observation. In the well wooded valley of the Houchan, surrounded by high mountains, towards the western extremity of the true Altai, he remarks that "Deer [C. WALLICHII] are numerous in this region; while higher up the mountains, the Alain [C. AFFINIS?], a Stag of a large size, may be met with." He went in quest of these Alain, and succeeded in killing "a splendid buck in fine condition," but gives no further information respecting it. Elsewhere he notices "the Stags on the mountains and the Deer on the hills" of the Altai; and of a remarkable scene in the Alain mountains in Tehungaria—"thus these grand and wild scenes are closed to man; and the Tiger remains undisturbed in his lair, the Bear in his den, and the Maral and wild Deer range the wooded parts unmolested." Maral is the name which C. WALLICHII bears in Persia; from which country a pair of these animals were taken to England by Sir John McNeill, of which I have the most vivid recollection, and they certainly did not exhibit the Wapiti-like expanse of white caudal disk, as figured by M. Fr. Cuvier. Their general hue was remarkably pallid. In a coloured drawing of a Kashmirian Stag, in summer vesture, taken from a tame animal in Kashmir, by my friend G. T. Vigne, Esq., the *pelage* is represented as bright pale rufous-chesnut. Mr. A. Leith Adams, however, states that—"The colour of the coat varies but little in the sexes, or with the seasons of the year; dark liver-colour, with reddish patches on the inner sides of the hips; belly and lower-parts white, or a dirty white. The male has the hair on the lower surface of the neck long and shaggy (wanting in the female)." Analogy with C. ELAPHUS and C. CANADENSIS would indicate that the summer coat worn at the time that the horns are in 'the velvet,' would be a bright rufous, as Mr. Vigne has represented it in his drawing.

It may be, after all, that the Alain of Mr. Atkinson refers merely

* "In Mongolia," remarks M. Timkowski, "the name of 'Gobi' is given to every steppe destitute of water and vegetation, as they designate by the name of 'Khangai,' every place where the mountains are covered with wood and where the valleys abound in grass and water." Such places in the vast elevated region of the Great Gobi are doubtless the true haunts of the Stag referred to.

to the fully developed Stag of C. WALLICHII; but the contrary seems more probable.*

2. From J. F. Galiffe, Esq. Two living specimens of the *Tokki* or *Toktu* (PLATYDACTYLUS GECKO), captured near Calcutta.†

3. From Babu S. S. Ghose. A large Medusa (or 'Blubber-fish' of seamen), east ashore at Diamond Harbour, apparently of the genus CEPHIA of Peron, as figured by M. Lesson (*Voyage de la Coquille*); but the appendages mutilated of all but their peduncles.

4. From Bábu Rajendra Mallika. Various addled eggs, laid in his aviaries, of which some specimens of interest have been cleaned and prepared. Among these are examples of the eggs of the Razor-billed and of Yarrell's Curassow, PAVO MUTICUS, P. CRISTATUS, (*albus*), and hybrid P. CRISTATUS cum P. MUTICO, also of hybrid Fowl and Guinea-fowl,—one of the latter remarkably large, measuring $2\frac{1}{2}$ in. \times $1\frac{7}{8}$ in.

Also, for exhibition to the meeting, the mounted skin of CASUA-

* The known species of Stag (restricted CERVUS), or *Elaphine* type of Deer, may be thus enumerated.

1. C. CANADENSIS, Brisson; *C. stronglyloceros*, Schreber; *C. occidentalis*, C. Ham. Smith; *C. major*, Ord. The Wapiti; or miscalled Elk of N. America.

2. C. AFFINIS, Hodgson. The Shou. E. Tibet, Mongolia? N. China? Mantchuria?

3. C. WALLICHII, Cuvier; *C. elaphus* of Asia apud Pallas; *C. caspianus*, Falconer; *C. naryanus*, Hodgson. Tartary and Siberia, Ural, Caucasus, Persia, Kashmir, valley of the Oxus. N. B. The Stags in the parks attached to the Emperor's summer palace near Peking would appear to be C. WALLICHII.

4. C. ELAPHUS, L. S. Europe only. (The "Corsican Stag" of Buffon being probably only a stunted variety.)

5. C. BARBARUS, Bennett. Africa, N. of the Atlas, especially Tunis.

6. C. SIKKA, Schlegel: Japan.

7. C. TAIOUANUS, Swinhoe, Blyth, *J. A. S.* XXIX, 90; *C. axis* apud Cantor, *Ann. Mag. N. W.* IX (1842), note to p. 274; probably distinct from C. PSEUD-AXIS of the Philippines, *Zool. Bouite*, p. 14, Schinz, *Syn. Mamm.* II, 386.

(N. B. Mr. Selater is wrong in identifying the Japanese and Formosan species. *P. Z. S.* Nov. 13th, 1860, and *Ann. M. N.* II, Feb. 1861, p. 143.)

The whole of the species appear to be exceedingly well distinguished.

In p. 24 *antea*, the "*Bara singha* or Elk" is noticed as inhabiting the Kashmirian mountains: C. WALLICHII being of course intended,—not the true *Bara singha* of the plains of India which is C. DUVAUCELII.

Among the numerous local names collected by Pallas, there is not one that approximates the word *Alain*: but he gives "*Baarsingah*, i. e. *Bara-singa*, *Indis*; ad *Irtin Maral*; *Calmuccis* mas *Buga*, *cerva Maaril*; ad *Baicalem Isubr*:" now *Isubrissin* is applied by Strahlenberg to the ordinary Stag of Siberia, as distinguished from his *Irbisch* or great Stag, noticing also the Elk, Rein Deer, and Roe; and there can be little doubt that this *Irbisch* (if not also the *Alain*), and likewise the great Stag of Mantchuria and the mountainous regions of the north of China, are one and the same with C. AFFINIS of the forest region of E. Tibet.

† These have since arrived in good health in the zoological gardens, Regent's Park, London.

RIUS UNAPPENDICULATUS, nobis, *antea*, p. 112; the bird probably about half-grown. It entirely resembles *C. GALEATUS* of the same age in general structure; but the colouring of plumage is that of the small young of *C. GALEATUS*, or with considerably less admixture of black than is seen in an ordinary Cassowary of the same size; the only marked distinction consisting in the very different arrangement and predominating yellow of the bright colours of the neck, and in the single small yellow caruncle in front of the neck, in place of the two larger and bright red caruncles of the common species. Again, the nude skin of the lower part of the neck is smooth or comparatively tense, and not tumous and wrinkled as in the other. I remark, also, in the stuffed specimen, along the medial third of the back, a nude line about $\frac{3}{8}$ in. broad, parting the feathers which flow on either side. Unfortunately, the body was thrown away, the sex even not ascertained; but the sexes in this genus hardly differ in appearance: nor is the bird so skilfully set up as could be wished. The habitat of this species of Cassowary remains to be ascertained. (*Vide* note to p. 92, *antea*).*

E. BLYTH.

* Here it may be remarked, that, during a recent visit to British Burmá, I found—what certainly is not generally known—that the *CERVUS* (*PANOLIA*) *ELDI*, Guthrie, (*frontalis*, McClelland,—*lyratus*, Schinz,—*dimorphe*, Hodgson,) is common in the valley of the Irawádi; its venison being often brought to the Rangoon provision-bazar, together with that of the Samur, Hog Deer, and Muntjac or Barking Deer. On one occasion, I saw portions of the carcasses of all four species together, frightfully hacked as usual, without even a preliminary skinning. These are the only Deer of Burmá, until southward, in the provinces of Tavoy and Mergui, we come more emphatically on the Malayan *Fauna* and *Flora*, when the little Chevrotain, *TRAGULUS KANOHLI*, occurs, together with the Malayan Tapir, and in Mergui the *GALOPITHECUS*, *ARGUS GIGANTEUS*, *EUPLOCOMUS VIELLOTTI*, *ROLLULUS CRISTATUS*, *CALOPERDIX OCELLATUS*, and other Malayan peninsula and Sumatran species. At Moulmein I saw, with Major Tiekell, a young buck of *C. ELDI* alive, in its rufous summer coat,—exceedingly resembling the Indian *Bára Singha* (*C. DUVAUCELII*) in corresponding vesture, except that it is rather smaller, with differently shaped horns. I am now satisfied that the *C. dimorphe*, Hodgson (*J. A. S. XII*, 897), is no other than *C. ELDI*, with horns imperfectly developed in a state of captivity, however the individual may have been conveyed to Nepál from doubtless the left side of the Bráhmaputra; for I believe that it is no more an inhabitant of the sub-Himalayan sál-forest than is the *Shou* of Eastern Tibet, or *C. AFFINIS*, Hodgson. The range of *C. ELDI* extends into the Malayan peninsula; and this species represents, on the eastern side of the Bay of Bengal, the *C. DUVAUCLEI* of India, with similar habits, being more gregarious, and affecting more open country, than the other Deer of these regions.

The most important fact in zoology which I have ascertained, during this trip, is the identification of the two-horned Rhinoceros of the Tenasserim provinces with *Rh. Crossii*, Gray, *P. Z. S.* 1854, p. 250. At the same time,

comparison of a stuffed head in our museum with the figure in *Phil. Trans.*, LXXXIII (1793), *tab.* II, convinces me that the species must be referred to RH. SUMATRANUS, auctorum; which attains a development of horn hitherto unsuspected. The skull of a one-horned Rhinoceros shot by my friend Dr. Hook near Tavoy Point (where there is a small isolated colony of the species), and presented by Col. Fytche to the Society, is that of INDICUS and not SONDAICUS; of which last we have two fine skulls in the museum: but there is said to be a third Tenasserim species on the Siamese frontier, known as the 'fire-eater,' from its propensity to attack the night-fires of travellers, stated to be of a paler colour than the others, and to have its skin studded with small tubercles. Dr. Masou leaps to the conclusion that this is RH. SONDAICUS; but it remains to be proved, especially as I can find no account of RH. SONDAICUS evincing the fire-attacking propensity in Java and Borneo, although the same has been stated of the ordinary Black Rhinoceros of S. Africa.—Since writing the above, Prof. Oldham has assured me that his fire was attacked by a Rhinoceros, which he shot, and recovered the skull three days afterwards. It was 2-horned, and evidently RH. SUMATRANUS, with moderately developed horns. This militates against the supposition that the 'fire-eater' is a particular species. Fine horns of this Asiatic two-horned Rhinoceros are most difficult to procure, as they are bought up at extravagant prices by the China-men.

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A Donative Inscription of the Tenth Century; the Sanskrit Original and its Substance in English: with Remarks on the Later Kings of Dhárá in Málava. By Fitz-Edward Hall, Esquire, D. C. L.

To our present stock of information respecting the rulers of Málava during the middle ages, the inscription now published furnishes, directly, nothing additional. At the same time, the researches which the record has suggested have discovered to me, that the conclusions, as regards those rulers, which have recently been put forth by the most highly accredited of living Indian archæologists, are, as a whole, very far from being reliable.*

* A note philological may seem to be not exactly opportune here, if excursive beyond Oriental limits. But, again, on the very score of irrelevance, it may detain the desultory glance of some who would instinctively treat in summary sort all aridity about the Kings of Dhárá, unutterable of name, as they must be to the uninitiated, and not at all calculated to verify the adage of *ignotum pro mirifico*. We,—by which is meant the members of our Society,—as persons who feel any interest in, or other than a perfunctory toleration of, the subjects of Asiatic languages, literatures, and antiquities, have dwindled to a most modest minority. And small is the blame; if, indeed, the idea of blame be not altogether gratuitous. As for our noble English tongue, however, our pride in it is a common sentiment; and indifference thereto is not to be anticipated. Leaving, then, for the public good, Sanskrit and all such repulsive mysteries a thousand leagues in the rear, I purpose to discuss the legitimacy of the much aggrieved quadrasyllable from which these observations took their departure.

An impressiou has got abroad, not among the unthinking, but among those who at least tacitly claim to think, that there is a kind of linguistic high-treason in lending countenance to the word 'reliable' and its conjugates; as if, to entire satisfaction, they were demonstrated of kin to the "socialless" of Madame D'Arblay, and such like monsters, now happily extinct. Proof to this effect might be adduced in copious abundance: but the witnesses presently to be summoned will no doubt suffice.

The late Mr. De Quincey shall enjoy the distinction of appearing first. "Alcibiades," he says, "was too unsteady and—according to Mr. Coleridge's

It is to the kindness of Col. Sir Richmond Shakespear, C. B., that I owe the communication of the relic whose contents are about to be abstracted. So little corroded by time are the two copper tablets, on which the document is engraved, that scarcely any difficulty attended the decipherment of it to the last character. The tablets were exhumed, I am told, not far from Indore.

The donor specified in the inscription is King Vákpatirája, whose alternative name was Amoghavarsha. Among the epithets given to him are those of Favourite of the Earth and Favourite of

coinage—‘unreliable;’ or, perhaps, in more correct English too ‘*unrelyuponable*.’” *Selections Grace and Gay*, Vol. XI., p. 244. The *Literary Churchman* for 1860, p. 3, in reviewing the Bampton Lectures for 1859, remarks; “Mr. Rawlinsou has sometimes allowed this ungrammatical Americauism,—pp. 48, 49,—which is sadly forcing its way into our language. *Rely-on-ablo* is too gross; but *reliable* is absurd. *Trustworthy* is English.” Again, at p. 442, we read of some one as being “more trustworthy, or—as our dreadful cockneys say—‘reliable;’” the word having undergone naturalization, at least in the vicinity of Bow bells, within the short space of eleven months. Strange to say, intermediately, at p. 390, an original critique is admitted, which speaks of “reliable conclusions.” To turn to the *Saturday Review*, in No. 283, for the 30th of last March, it wishes that “Mr. Shirley would not write such Jupiter English as ‘reliable evidence.’” Yet, only fourteen pages back, a leading article of the same issue discourses of “reliable labour;” and in old numbers of the paper, and also in the very latest, the obnoxious adjective intrudes again and again. The Dictionary of Dr. Worcester, by far the best of our language, an American work which came out in 1860, supplies the next and last quotation: “*Reliable*—together with its derivatives, *reliability* and *reliableness*—is a very modern word, recently often met with; and it has the sanction of some highly respectable authorities. But it is ill formed, and it cannot properly have the signification in which it is always used. Potential passive adjectives in *able* ** are derived from active verbs, as *allow*, *allowable*; but adjectives derived from neuter verbs do not admit of this passive sense, as *perish*, *perishable*. In order to form a passive adjective from *rely*, we must annex *on* or *upon*, and give it the ludicrous form *reliable* or *reliuponable*, which would properly signify, ‘that may be relied on or upon.’ The adjective *uncomeatable*, found in the Tatler, and inserted by Johnson in his Dictionary, is formed on the same principle; and Johnson properly styles it ‘a low, corrupt word.’ But *uncomeable*, if there were such a word, would not admit of the sense, ‘not to be come at.’”

Now, ‘accountable’ is that which may be accounted for. ‘Available,’ in one of its acceptations, is that which one may avail oneself of. ‘Demurrable,’ which we find in Hallan, is that which may be demurred to. Pope’s ‘dependable’ is that which may be depended upon. ‘Dispensable’—less common than ‘indispensable,’ which follows the same rule—is that which may be dispensed with. ‘Disposable’ is that which may be disposed of. ‘Laughable’ may fairly be added to the list; and so may ‘self-confident,’ ‘self-denying,’ &c. &c.

‘Reliable’ has, thus, analogies; not very many, it is true, and yet enough to prove that it keeps commendable company. But, even if it were in violation of all analogy, being vitally engrafted upon our language, any attempt to dislodge it will be nugatory, not to say illaudable withal, when we take into account, that it does not precisely signify ‘trustworthy,’ any more than ‘reliance’ precisely signifies ‘trust.’ No one, in our days, scruples at ‘starvation,’ or at ‘truism;’ and much more can be said for ‘reliable,’ than for either of them, that ought to relieve the qualms of an ultra-purist.

Fortune. He was successor to Síyaka, who followed Vairisinha, and he, Kṛishnarája.* In the year of Vikramáditya 1031, corresponding to A. D. 974, in the month Bhádrapada, on the fourteenth day of its light fortnight, Vákpatirája, at the instance of Kanhapaika, probably his chief counsellor, affixed, at Ujjayiní, his signature to the grant which forms the subject of the inscription. But the object of grant, the *vaḍára*† of Píppariká, is unintelligible. Píppariká was situated in, and appertained to, the *bhoga* of Gardabhapaníya, which skirted the Narmadá. Its boundaries were as follows: on the east, Agáraváhalá; on the north, Chikhilliká; on the west, the Gardabha streamlet; and, on the south, Pisáchadeva, a place of religious resort. The donee, who, it should seem, had immigrated from Ahichehatra,‡ was Vasanta Áehárya, son of

* An inscription very like that I am now dealing with, naming the same kings, emanating likewise from Vákpatirája, and dated only four years later, in A. V. 1036, has appeared in this Journal, for 1850, pp. 475—480. Another inscription, from Nagpoor, which speaks of Vairisinha and of Síyaka—misread Bhímaka,—will be found in the Journal of the Bombay Branch of the Royal Asiatic Society, No. VI., pp. 259—286. It has since been deciphered and translated anew by Professor Lassen, and, no doubt, with much greater fidelity than was observed by the dilettante who first published it.

† Or—as the original does not graphically characterize *v* from *b*—*baḍára*, possibly. And yet this does not help us to a meaning, on the supposition that the word is Sanskrit. It occurs in our instrument thrice. Though apparently denoting some division of land, grammar is against referring it to the etymon *vand*, *dividere*.

Equally strange is the word *bhoga*, presumably cognate, in import, with *vaḍára*.

Píppariká is derived, unquestionably, from *pippala*, the holy fig-tree. Analogously, many villages are, to this day, called Bamorí, from *bamúr*, corrupted from *barbura*, the acacia-tree; Bánsá and Báusí, from *vans'a*, the bamboo; Chirolá, from *chirol*, a tree missed by our botanists and lexicographers; Imaliyá, from *ámliká*, the tamarind-tree; Kanjiyá, from *kanjí*, a tree in the same predicament with the *chirol*; Khajúriyá, from *kharjúrí*, the wild-date; &c. &c. For Maua, vulgarly written Mow, see this Journal, for 1858, p. 228, foot-note.

Píppariyá, the modernized form of Píppariká, still denominates scores of places throughout Central India. A story goes, that, not many generations ago, a native prince in this quarter of the country gave a mendicant, on his asking, a warrant for a rupee, addressed to the head-man of Píppariyá. The holy rogue levied his imposition from Píppariyá No. I., and so on to and including Píppariyá No. CL.; for Píppariyás, what with towns, villages, and hamlets, so called, turned out to be scattered to that extent over his royal master's dominions.

‡ A region of this name is placed in the north of India by the scholiast on the *Haima-koś'a*, IV., 28. Also see the *Indische Alterthumskunde*, Vol. I., p. 602, first foot-note; and *Voyages des Pèlerins Bouddhistes*, *passim*. Professor Wilson—in his Translation of the *Vishnu-purána*, p. 187, twentieth foot-note—says, that “ Ahichehatra [read Ahichehatrá] seems to have been applied to more than one city;” but he does not give his grounds for so thinking. Vasanta's country only is named. It was, probably, one with what is called, in a manuscript connected with the *Atharva-veda*, Ahichatra; which, as is inferrible from the con-

Dhanika Pandit.*

A translation of the verses which embellish the grant is added to the Sanskrit near the end of this paper. Some of them are not quite destitute of merit; and more than one of the number has repeatedly been misinterpreted.

I proceed to add a few words on the later among what are erroneously called, by Professor Lassen, the kings of Udayapura;† whom he determines and arranges in three divisions, as follows:‡

I.

1. Udayáditya. About A. D. 613.
2. Devas'akti, son of U.
3. Vináyarája,§ son of D.

text, may have been not far from the Viudhyas. See Professor Weber's Catalogue of the Berlin Manuscripts, p. 93.

Many is the pious Maráthá who never submits himself to the hands of his barber without repeating these lines :

आनर्ताऽद्विच्छन्नः पाटलिपुत्रोऽदितिर्दितिः श्रीशः ।
 चौरैस्स्रणादेषां दोषा नश्यन्ति निःशेषाः ॥

“By the recollection, on shaving, of Anarta, Ahichelhatra, Pátaliputra, Aditi, Diti, and S'ris'a, the evils incident to the operation are all obviated.”

Without conscious sin,—but never uneffaceable by penance,—there are times when a Hindu cannot legally rid himself of his beard for five months current. The expiation, as has been seen, is not very burthensome. The razor being always an implement of bad omen, it is considered as unsafe to trust to one without ritual precaution against mishaps, however auspicious the day or the hour.

Professor Wilson—Translation of the *Vishnu-purána*, p. 190, seventy-fifth foot-note—unenquiringly calls the Anartas, “foresters and barbarians in general.” Anarta is now known to have been a part of Gujerat, with Kus'asthalí for its capital.

* One Dhanika was author of the only exposition of the *Das'a-rúpa* that has come down to us, the *Avaloka*. There is some reason for believing that he may have flourished as early as the days of our inscription. He is twice cited in the *S'árngadhara-paddhati*.

Vasanta is a name unknown to literature, at least so far as my explorations have extended. Different is Vasantarája Bhaṭṭa, the zoomantist; for his father was S'ivarája Bhaṭṭa.

† Professor Lassen mistakes as to the locality of this place. It is not in Bhopal, but in Gwalior, and lies about thirty miles to the north-east of Bhelsá. At present it is very thinly inhabited; but it was evidently, at one time, a considerable town. Of its past history nothing is known. See the *Indische Alterthumskunde*, Vol. III., pp. 822, 823, foot notes.

‡ *Indische Alterthumskunde*, Vol. III., pp. 822—869, and p. 1169.

§ Professor Lassen found Vanyarája printed; and he has changed it as above. The true name on the copper-plate is Vatsarája.

4. Nágadatta,* son of V.
5. Rámabhadra, son of N.
6. Bhoja I., son of R.
7. Mahendrapála I., son of B.
8. Bhoja II., son of M.
9. Mahendrapála II., brother of B. About A. D. 813.
10. Vináyakapála, son of M.† About A. D. 830.
11. Mahendrapála.
12. Karmaehandra. } Till about A. D. 850.
13. Vijayánanda. }

II.

14. Vairisinha. After A. D. 921.
15. Síyaka, son of V.
16. Munja, son of S. After A. D. 961.
17. Sinharája, younger brother of M. After about A. D. 985.
18. Bhoja, son of S. After A. D. 997.
19. Jayachandra, son of B. After A. D. 1053, till about 1063.

III.

20. Súravíra.
21. Gondala, son of S.
22. Aribalamathana, son of G. From about A. D. 993 till 1053.
23. Udayáditya, son of A. After A. D. 1053.
24. Naravarman, son of U. After A. D. 1093.
25. Yas'ovarman, son of N. After A. D. 1133.
26. Jayavarman or Ajayavarman, son of Y. After A. D. 1150.
27. Vindhavarman, son of J. After A. D. 1170.
28. Subhatavarman, son of V. After A. D. 1190.
29. Arjuna, son of S. From A. D. 1210, probably till 1225.

As I shall prove in detail, this long list, to represent the truth as concerns Central India, must submit to a deduction of at least fourteen persons. No. 1 is a duplicate of No. 23; Nos. 2—10, nine princes, as Professor Lassen counts them, have nothing to do with Málava; No. 19 is, most likely, a pure fabrication; Nos. 20 and 22 are certainly of that character; and Gondala, No. 21, was we know not what. Other retrenchments will be spoken of in due course.

* Rightly, Nágabhaṭa. Again the Professor has taken an unconfessed liberty.

† Son of Mahendrapála, No. 7. No. 9 is nothing. Professor Lassen has here been misled by bad decipherment. Vináyakapála was half-brother of Bhoja II.

Of Nos. 1, 20, &c., I wrote, in October, 1858, independently of the theory of Professor Lassen :

“ I now redeem the promise which I once made,* to demonstrate, that a mistake has been committed in throwing back Udayáditya to A. D. 613. Two facsimile copies of the Udayapura inscription, which I was at much pains in getting executed, have been of material aid to me towards arriving at a determination on this point.

“ The person for whom that wretched scrawl was indited, calls himself a descendant of Udayáditya of Málava : but it is clear, that, whether so or not, he knew nothing of Udayáditya’s family. The word *súravira*—rightly, *s’úravira*—in the monument adverted to, is not the name of a king. Gondala is the first regal personage whom it notices. His son seems to be Gyátá,—for which Pátá has been printed—the vernacular corruption, perhaps, of Jnátá, nominative of Jnátri. *Aribalamathana*, if such be the true reading, is an epithet of the doubtful Gyátá, and, by no possibility, an appellation. Udayáditya is represented as son of the last ; and he is distinctly stated to have been ruling in Samvat 1116, or S’aka 981, i. e., A. D. 1059. For four hundred and forty-six years subsequently, it is alleged, the Yavanas had been in the ascendant : and this term brings us to Samvat 1562, S’aka 1447—which should be 1427—or the year 4607—not 4669, as printed—of the *Kali-yuga*, i. e., A. D. 1506 ; at which time the person at whose instance the inscription was written appears to have assumed some sort of authority. Seven years later, in *S’rímukha*—an item wanting to Captain Burt’s copy—or A. D. 1513, he engaged in a pious transaction in honour of S’iva. His name was Ságaravarman,—metamorphosed, as printed, into Yogaradharmma,—commonly styled Chánddev, or Chandra Deva. Nor is S’áliváhana given as son of Udayáditya.

“ More might be said on the present topic ; but it is enough, if I have shown that we have here to do with a thing of no importance, abstracted from its liability to beget error. See the Journal of the Asiatic Society of Bengal, for 1840, pp. 545 etc.†

“ Professor Lassen, I am told, has accepted the inscription thus

* Journal of the American Oriental Society, Vol. VI., p. 517, note c.

† In the Vol. for 1838, p. 1056, the inscription analyzed above is first spoken of.

disposed of, as sufficient voucher for antedating Udayáditya some four hundred and fifty years. It is scarcely credible.*

“The first well authenticated fact,” says the Professor, “is, that Udayapura was founded by Udayáditya in 613; which city he named after himself.”† Of these assertions, on the contrary, there is not a particle of proof. Moreover, it was ill-advised to ignore Udayáditya’s filial relation to Bhoja,—a thing beyond dispute,—out of deference to the indications of an inscription which, even as it stands printed, should carry, to any properly sceptical mind, internal evidence of its worthlessness.

Devas’akti and the nine following princes of the Professor’s series are included among the kings of Málava, without the slightest reason that can endure investigation. In continuation of the passage quoted in the last paragraph, where mention is made of Udayapura and Udayáditya, we read: “Whether King Devas’akti, who is first named in the inscription from that city, was his immediate successor, can neither be affirmed nor denied.” The inscription referred to is on copper; and the supposition, on which the Professor’s reasoning hereabouts is mainly grounded, that it came from Udayapura, is a fiction of carelessness that may indeed excite surprize. A foot-note will render this sufficiently patent.‡

With regard to Mahendrapála, Karmachandra, and Vijayánanda, it is well to suspend decision. Much better warrant than that of the *Ajín-i-Akbari*§ is requisite as an inducement for prudence to deal

* Journal of the American Oriental Society, Vol. VII., pp. 34, 35.

† *Indische Alterthumskunde*, Vol. III., p. 827.

‡ See this Journal, for 1848, pp. 68—72. The contribution occupying those pages is headed “Inscription from the Vijaya Mandir, Udayapúr, &c.” Two inscriptions are treated of, the first of which, a hymn to the sun, is expressly stated to be “from the Vijaya Mandir at Udayapúr;” while no clue is given to the source whence the second was obtained, that in which are the names of Devas’akti, &c. In the Index to our Journal, published in 1856, we are informed, at p. 208, that from what locality it came is “not known.” Its translator was Bábú Rájendralál Mitra, who likewise compiled the Index. “The donor,” says the Bábú, “is evidently a scion of the well-known Pála dynasty of Gaur:” a conclusion which must be abandoned.

Vináyakapála, a lineal descendant of Devas’akti, at a time not ascertained, bestowed, by grant, a village near Benares on one Bhatta Bhulláka. Vináyakapála is signified as proprietor of numerous vessels. He must, then, have dwelt in the vicinity of some river, or, at least, have had one under his authority. His capital was Mahodaya; a fact which all previous investigators have most unaccountably overlooked. Mahodaya is a name of Kanyakubja, or Kanoj. See the *Haima-kos’a*, IV., 39.

I purpose to return, on a futuro occasion, to the subject here glanced at.

§ London edition of the English translation, Vol. II., pp. 49, 50.

with them after the manner of the German antiquary. No credit is to be placed in the date he has appointed for them, or in the two dates given just before.

A laudable soundness of judgment has been exercised in respect of the succession of Nos. 14—18.* Yet there is no foundation, beyond risk of challenge, for the belief, that any of them but Bhoja dominated over Málava; and his domination seems to have embraced but a part of that country.

So long as no better guarantee is producible than the careless compilation of Abulfazl, for the positions, that Bhoja had a son Jayachandra, and that Jayachandra was a king, he may confidently be accounted mythical.†

Beginning with Bhoja, one line of princes who have ruled in Málava will now be enumerated, together with the known regnal years of each member of it.

I. Bhoja. A. D. 1042.‡

* Good use has here been made of the Nagpoor inscription,—referred to in the second note to this paper,—which Professor Lassen has reedited and retranslated from a copy in facsimile. I have no access to the fruit of his researches on it, and must, therefore, take upon trust his Munja and Sinharāja as uncle and father of Bhoja. In the balance against a genuine inscription, the combined weight of the *Bhoja-charitra* and *Bhoja-prabandha* is as nothing. Now that we have Sinharāja, we may dismiss Sindhula as a mere invention. Nor need we be deterred from this measure by Colonel Tod's assertion, that Sindhula is read on marble at Madhukurgarh. For a parallel to the Colonel, in consistency of unceritcalness, and so in erudility, we should have to go to the Hindus themselves; and we are scarcely called upon to hesitate in presuming, that he altered the reading of his inscription into conformity with the silly romances to which he so easily accorded credence. See the Transactions of the Royal Asiatic Society, Vol. I., p. 226.

† See the *Indische Alterthumskunde*, Vol. III., p. 855; and the *Ayín-i-Akbarí*, Vol. II., p. 46.

‡ See Colebrooke's Miscellaneous Essays, Vol. II., p. 462.

“The Márwádí translation of the *Sinhásana-dwátrins'atí*—if such an authority be worth anything—represents Bhoja to have been reigning in *Samvat* 1066, or A. D. 1009. With greater probability, Bhoja is found spoken of as contemporary with Karna of Chedi, against whom Bhíma Deva waged war between A. D. 1022 and 1072. *Rás-máldá*, Vol. I., pp. 83 and 90.” *Vásavadattá*, Preface, p. 50.

In Colebrooke's estimation, the story that Bhoja was predicted to be king for fifty-five years, seven months, and five days, not improbably “is grounded upon a true tradition, that eventually such was the duration” of his reign. Transactions of the Royal Asiatic Society, Vol. I., p. 228.

Bhoja's ancestors were certainly regal; but they cannot be positively assigned to Málava.

In the *Rája-mártanda*, Bhoja of Dhára is entitled, by its author, Raṇaranamalla.

The verses said to have been reported to Munja,—when he supposed that Bhoja

II. Udayāditya, son of B.*

had been put to death in pursuance of his orders,—as his victim's last words, are these :

मान्नाता स महीपतिः कृतयुगोऽलङ्कारभूता गतः
 सेतुर्धनं सद्देदधौ विराचितः काऽसौ दशास्यान्तकः ।
 अन्ये चाऽपि युधिष्ठिरप्रभृतयो यावन्त एवाऽभवन्
 नैकेनाऽपि समं गता वसुभतौ मन्ये त्वया यास्यति ॥

“King Mándhātṛi, the ornament of the golden age, has passed away; and where, too, is the slayer of Das'áśya, Ráma, who threw a bridge over Mahodadhi, the southern sea? All other monarchs, likewise, that have flourished, Yudhisht'ira and the rest, where are they? None of these did the earth accompany: but I imagine that it will accompany thee.”

These lines are wrought into the *Bhoja-prabandha*. An earlier work in which they occur is the *S'arngadhara-paddhati*, written in A. D. 1363. There they appear as an anonymous extract. Their substance, as given by Abulfazl, according to the version of Mr. Gladwin, is: “What kind of man art thou, who, from the darkness of thy soul, stainest thy hands with the flood of the innocent! No monarch hath carried with him, at his death, either kingdom or treasure; but you suppose that your reign is to be immortal, and that you will experience nothing but happiness.” *Ayin-i-Akbari*, Vol. II., p. 46. This is, indeed, free handling with a witness.

Largely as the vogue has prevailed of placing reliance on the *Bhoja-prabandha*, it is strange that any person imbued with the smallest spirit of criticism can avoid to class it, for all historical purposes, with such vouchers as the Letters of Phalaris and the Book of Judith. Now that its age is settled, there will henceforth be less apology than ever for deeming it other than a collection of silly legends. Speaking of its author, Dr. Aufrecht says: “De Ballálæ ætate hæc comperi. Filium Ranganátham, nepotem Vis'warúpam habuit, qui astronomi seculo septimo decimo incunte vixerunt. Ipse, igitur, exente seculo sexto decimo floruit.” *Catalogus Cod. Manuscript.*, Pars. I., p. 151.

It is of very slight importance that Colonel Tod refers the *Bhoja-charitra* to Rájavallabha, disciple of Mahátílaka Súri, a Jaina, and adds: “He is also the author of the *Bhoja-prabandha*. When and where he wrote, though not specified, may be presumed to have been at Dháránagari, while Rájá Bhoja was still alive.” *Transactions of the Royal Asiatic Society*, Vol. I., p. 219. On this there is the following annotation by Colebrooke: “The epigraph of the *Bhoja-prabandha*, according to most copies of it, names Ballála as the author. But, in some copies, the name of Vallabha appears. Mr. Wilson considers both to have been by several centuries posterior to Rájá Bhoja.” Again: “It is not altogether likely that the *Bhoja-charitra* and *Bhoja-prabandha* should have been works of the same author. The discrepancies are too great to have come from the same pen.”

Colonel Tod's informant, it is reasonable to conjecture, was a Jaina; and the Jainas are unscrupulously given to arrogating as their own, persons and things to which they have no good right. Vikramāditya, if we are to believe them, was of their communion; and so was Bhoja. Nor do they stop here. One of their claims, in particular, is of the absurdest. Malayagiri, in his gloss on the *Nandi-sútra*, declares that Mahávira wrote the Vedas. To bear out this declaration, he cites, ridiculously enough, the ensuing invocatory verse, as from the grammar of S'ákataáyana, or else from its author's exposition of his text:

श्रीवीरसम्यक्तं ज्योतिर्नलाऽऽदिं सर्ववेदसाम् ।

* In one inscription, that from Nagpoor, Udayāditya is literally called son of Bhoja; and in another, which also was accessible to Professor Lassen, the language marking their relationship is such as to preclude all misgiving.

- III. Naravarman, son of U. A. D. 1104—1133.*
 IV. Yas'ovarman, son of N. A. D. 1133—1143.†
 V. Jayavarman, son of Y.‡
 VI. Vindhavarman, son of J.

Udayáditya was, very likely, in power in A. D. 1059, however reluctantly we receive the word of such as Śágaravarman, or his historicaster. See a previous page.

*See the Journal of the Bombay Branch of the Royal Asiatic Society, No. VI., pp. 259—286; and Colebrooke's Miscellaneous Essays, Vol. II., p. 303, sixteenth foot-note.

In the Madhukargarh inscription, Naravarman's date answers to A. D. 1107. Naravarman had a younger brother Lakshmídhara. In one place he is awkwardly called, from prosodial exigency, S'rilakshma Deva; the word Deva being an affix of respect. Professor Lassen puts S'rilakshmi. But this breaks the measure. Besides, S'rilakshmi, with Deva after it, cannot denominate a man, unless the additional word be taken as component part of a compound with which it ends, in the sense of Vishnu. Then, to avoid tautology, the S'ri is to be regarded as honorific; and we get, as the residuum, Lakshmi-deva. See the *Indische Alterthumskunde*, Vol. III., p. 824, 858.

What I wrote in the Preface to the *Vásavadattá*, p. 50, is here corrected.

† Had Yas'ovarman not been living in A. D. 1143, his younger son, who was not king, would surely have named, in a formal instrument of grant, Jayavarman, successor to their father. See Colebrooke's Miscellaneous Essays, Vol. II., pp. 299, &c.

‡ Of Yas'ovarman's two sons, Lakshmi-varman and Jayavarman, we are not informed, in so many words, which was the elder. If Lakshmi-varman was so, his death may have taken place before his father's, and must have taken place during the nonage of his son Haris'chandra. On this view, Jayavarman, whom Haris'chandra followed, acted as regent on behalf of his nephew, but using all the formulas of a king holding in his own right. Otherwise, let it be that Jayavarman was senior, and died childless, after adopting Haris'chandra. Either opinion might seem to be assisted by Haris'chandra's language about himself. Premising his ancestors, while he passes over his father, he mentions his uncle, and adds, of himself: एतस्मात् पूज्यतसप्रभोः प्रसादाद्वाप्त-निजाधिपत्यः. In other words, he acknowledges that he had "obtained his supreme rank by favour of that most worshipful ruler." But, despite of the phrase 'supreme rank,' he does not by any means unequivocally pretend to kingship. Both at the end of the deed from which those words are taken, and in the body of it, he styles himself only *mahákumára*, 'great prince;' and so he styles his father as well. Applied to the father, *mahákumára* cannot imply that he was cesar, but did not survive to enjoy actual possession of the throne. If eldest son of a king, he would, in any case, have been designated as *yuvarája*. It is to the younger sons of a sovereign, and to their sons, it should appear, that the title of *mahákumára*, is restricted.

Should this hypothesis be untenable, there may have been a third brother, Ajavarman, between Jayavarman and Lakshmi-varman. Then, Haris'chandra, if adopted by Jayavarman, must in time have become head of the state; or, if he did not, still the monarchy should have continued in the succession of Jayavarman, through adoption, or otherwise: and so we find room for Vindhavarman.

Again: did Jayavarman—miscalled Ajavarman—have a son in his old age, Vindhavarman, who stepped into the place of the disappointed Haris'chandra; provided the latter was not dead?

Offspring of Jayavarman we hear nothing of; but Ajavarman had a son Vindhavarman. Provisory, at least, it is maintainable that Ajavarman, which name we nowhere find but in some indifferent verses, is a mistake of

VII. Subhatavarman, son of V.*

VIII. Arjuna, son of S. A. D. 1210—1215.

Devapála, nominally a Rájá, if not really one, was reigning at Dhárá in A. D. 1353. His ancestors' names have not transpired.†

Vákpatirája, mentioned in the following inscription, was cousin german to Bhoja of Dhárá. Their life-times most probably osculated. The former, who dwelt at Ujjayiní, appears as an independent potentate; and there is no cause for thinking that he was not so.‡

INSCRIPTION.

याः स्मूर्जत्कण्ठद्विघानलमिलद्रूमप्रभाः प्रोल्लसन्-
 मूर्धाबद्धेशशाङ्गकोटिघटितायाः सैहिकेयोपमाः ।
 याश्चञ्चद्विरिजाकपोल्ललिताः कस्तूरिकाविभ्रमास्-
 ताः श्रीकण्ठकठोरकण्ठरुचयः श्रेयांसि पुष्पान्तु वः ॥ १ ॥
 यत् लक्ष्मीवदनेन्दुना न सुखितं यन् नाऽऽर्द्रितं वारिधेर-
 वारा यन् न निजेन नाभिसरसीपद्मेन शान्तिं गतम् ।
 यच्छेषाहिकण्ठासहस्रमधुरश्वासैर्न चाऽऽश्वासितं
 तद् राधाविरहातुरं मुररिपोर्वल्लदयुः पातु वः ॥ २ ॥

परमभट्टारकमहाराजाधिराजपरमेश्वरश्रीद्वयाराजदेवपादानुध्या-
 तपरमभट्टारकमहाराजाधिराजपरमेश्वरश्रीवैरिसिंहदेवपादानुध्या-
 तपरमभट्टारकमहाराजाधिराजपरमेश्वरश्रीसीयकदेवपादानुध्याता-
 परमभट्टारकमहाराजाधिराजपरमेश्वरश्रीमदमोघवर्षदेवपराभि-

ignorance, on the part of the poetaster, for Jayavarman, or else a liberty such as an unskillful practitioner might not scruple at, if in metrical distress: for the two names are hardly interchangeable. Yet Professor Lassen here encounters no difficulty.

See this Journal, for 1836, pp. 377 etc.; and for 1838, pp. 736 etc.; also Colbrooke's Miscellaneous Essays, Vol. II., pp. 297 etc.

The above is in supersession of a note in the Journal of the American Oriental Society, Vol. VII., pp. 35—37. Since writing that note, I have been able to consult the plates containing Haris'chandra's grant, the date of which is A. V. 1236, or A. D. 1179.

* As I have remarked elsewhere, between Vindhavarman and Subhatavarman a King "Amushyáyana" is interposed by Mr. Wilkinson, who mistakes an epithet for a proper name. This and several other misinterpretations are copied, without correction, by Mr. A. K. Forbes, in his *Rás-máld*, Vol. I., pp. 114, 208.

Amushyáyana is the adjective of *amushyáyana*, 'son of somebody,' an hidalago, a cupatrid.

† See my paper on an inscription where he is spoken of, in this Journal, for 1859, pp. 1—8.

‡ Professor Lassen is of a different opinion. *Indische Alterthumskunde*, Vol. III., pp. 841, 842.

धानश्रीमद्वाक्पतिराजदेवपृथ्वीवल्लभश्रीवल्लभनरेन्द्रदेवः कुशलो श्रीन-
र्मदातटे गर्दभपानीयभोगे गर्दभपानीयसम्बन्धिनि* उत्तरस्यां दिशि
पिप्परिकानाम्ना वडारे समुपगतान् समस्तराजपुरघान् ब्राह्मणोत्त-
रान् प्रतिवासिपट्टकिल्लजनपदादींश्च बोधयति ।

अस्तु वः संविदितं यथा वडारोऽयमस्माभिराघाटाः पूर्वस्यां दिशि
अगारवाहला मर्यादा तथोत्तरस्यां दिशि चिखिल्लिकासत्कगर्ता †या
समायता सा मर्यादा तथा पश्चिमदिशौ‡ गर्दभनदी मर्यादा तथा

* On the tablet the vowel is long. A couple of mistakes below, equally unimportant, have been corrected silently; and -देवत्तिर्ये^० has been exchanged for -देवतीर्ये^०

† The ditch of Chikhilliká is qualified by a term which, in an unpublished inscription from Gwalior, stands, in the feminine, as *satká*, before *vásaniká* and before *vithí*. Was *satká* a mediaevalism for *sat*? The common Sanskrit of a thousand years ago was not a little singular.

Akshapanímiká, *paliká*, *vaṭaka*, and *sáva* are met with in the same record. The second, now *palí*, or *parí*, is a large ladle. *Vaṭaka* may have denoted a particular cess. *Sáva*, deprived of its final vowel, is one of the forms, still current, of a word meaning, among other things, a dry-grocer. It is usually supposed—but it is not clear why—to be a corruption of *sádhhu*. Can it be that a proper name has herein become the appellation of a class? A trader named *Sádhhu* is eulogized in the *Satyá-náráyanakathá*, a book of universal prevalence in this part of India. I extract the thirty-first stanza of its second chapter:

अथाऽहं वर्षयिष्यामि गाथां साधूपचारिताम् ।

साधुर्यथा कृतार्थोऽभून् ष्टपस्याऽऽदेशतो वणिक् ॥

Every blind beggar is now known as *Súrdás*; and every one-eyed man, in these parts, as *Holkar*, from the monoculous *Maráthá* chieftain of that name.

‡ A blunder for *दिशि*; and it is repeated a little further on. Several other, even grosser, errors, evincing that *Vákpatiráju*'s conveyancer was but an indifferent clerk, will be noticed by the observant reader.

The fastidious respect for the laws of *Páñini* which is illustrated by the following couplet, taken from the *Saraswatí-kañṭhábharana*, had no doubt become obsolete long before the tenth century. If oral tradition be trustworthy, the interlocutors in the stanza were a king and a poor *Bráhmau* who was carrying home a huge fagot.

भूरिभारभराक्रान्तो बाधति स्त्रन्ध एष ते ।

न तथा बाधते स्त्रन्धो यथा बाधति बाधते ॥

“Your shoulder must pain you, weighed down with so heavy a load.’ ‘Not so much as Your Majesty’s *bádhati* does.’”

Bádhate would have suited the critical pauper better. But he came into the world too soon to profit by the example of *Sheridan* when correcting the *obleege* of “the first gentleman in Europe.”

A couple of specimens of particularly vicious Sanskrit are subjoined as a novelty. They were taken down as dictated by an intelligent *Pandit* who thoroughly appreciated their badness. That they are strictly metrical is no argument of their being the composition of a clever wag; for to *Hindus* in general prosody seems to come by nature. And, again, their syntax could be obviously mended, here and there, without prejudice to longs and shorts. It is most probable that they are the sober effusions of aspiring ignorance.

दक्षिणस्यां दिशौ श्रीपिशाचदेवतीर्यमर्यादा एवं चतुराघाटोपल-
क्षिताभिरैकत्रिंशसाहस्रिकसंवत्सरेऽस्मिन् भाद्रपदशुक्लचतुर्दश्यां प-
वित्रकपर्वणि श्रीमदुज्जयिनीसमावासितैः शिवतडागाम्भसि स्नात्वा
चराचरगुरुं भगवन्तं भवानीपतिमभ्यर्च्य संसारस्याऽसारतां दृष्ट्वा ।

वाताम्भविभ्रममिदं वसुधाधिपत्यम्

आपातमात्रमधुरो विषयोपभोगः ।

प्राणास्तृणायजलबिन्दुसमा नराणां

धर्मः सखा परमहे परलोकयाने ॥ ३ ॥

भ्रमत्संसारचक्रायधाराधारामिमां श्रियम् ।

प्राप्य ये न ददुस्तेषां पञ्चात्तापः परं फलम् ॥ ४ ॥

इति जगतो विनश्चरं सकलमिदमाकलयोपरि लिखितवडारः स्व-
सीमादणकाकलयूतिगोचरपर्यन्तः सदृक्षमालाकुलः* सहिरण्यभाग-
भोगः सोपरिकरः सर्वादायसमेतो†ऽह्निच्छत्रविनिर्गताय धामद्र-
क्षिणप्रपन्नाय‡ च्छानविज्ञानसम्पन्नाय§ श्रीमद्वसन्ताचार्याय श्रीधनि-
कपण्डितसूनवे मातापित्रोरात्मनश्च पुण्ययशोभिवृद्धयेऽदृष्टफलमङ्गी-

प्रातःकाले शिवं दृष्ट्वा निशीपापं विनश्यति ।

आजन्मकृतमध्याह्ने सायाह्ने सप्तजन्मानि ॥

मेरुकाञ्चनदत्तानां गवां कोटिशतैरपि ।

पञ्चकोटितुरङ्गाणां तत् फलं त्रिवदर्शनम् ॥

“ If one sees S'iva in the morning, the sins of the night are atoned; if at noon, *the sins* committed since one's birth; if in the evening, *the sins accumulated* during seven births. As of bestowing away gold in bulk as great as Meru, and billions of kine and fifty millions of horses, is the merit of beholding S'iva.”

आदौ देवकिदेवगर्भजननं गोपग्रहे वर्धनं

सायापूतनजीवितापहरणं गोवर्धनोद्धारणम् ।

कंसच्छेदनकौरवादिहननं कुन्तीसुतः पासनम्

एतद् भागवतं पुराणकथितं श्रीकृष्णलीलास्तम् ॥

“ First, the god's birth from the womb of Devakī; his nurture in the house of the neatherd; his taking the life of the illusory Pátaná; his lifting up Govardhana; his killing Kansa; his slaying the Kauravas and others; his protection of the sons of Kuntī: this is, *in essence*, the *Bhāgavata*, the nectar of the sports of the blessed Kṛishṇa, as set forth in the Purāṇa.”

* The *visarga* has been supplied.

† Corrected from -समेतः द्वि०.

‡ I do not know the meaning of this epithet. It is more than likely that the Sanskrit is depraved.

§ An emendation of -सम्पन्नाय.

द्वय चन्द्रार्काणवक्षितिसमकालं परया भक्त्या शासनेनोदकपूर्वकं प्रति-
पादितः* ।

इति मत्वा तन्निवासिजनपदैर्यथा †दीयमानभागभोगकरहिर-
ण्यादिकं सर्वमाज्ञाश्रवणविधेयैर्भूत्वा सर्वदाऽस्मिन् समुपनेतयम् ।

सामान्यं चैतत् पुण्यफलं बुद्धाऽस्मिन् दंष्ट्रजैरन्यैरपि भाविभोक्तृभिर-
स्मत्प्रदत्तधर्मादायोऽयमनुमन्तव्यः पालनीयश्च ।

उक्तं च ।

बहुभिर्वसुधा भुक्त्वा राजभिः सगरादिभिः ।

यस्य यस्य यदा भूमिस्तस्य तस्य तदा फलम् ॥ ५ ॥

यानीह दत्तानि पुरा नरेन्द्रैर्

दानानि धर्मार्थयज्ञकराणि ।

निर्माख्यवान्तप्रतिमानि तानि

को नाम साधुः पुनराददीत ॥ ६ ॥

अस्मत्कुलक्रममुदारमुदाहरद्भिर्

अन्यैश्च दानमिदमभ्यनुमोदनीयम् ।

लक्ष्म्यास्तडित्सलिलबुद्बुदचञ्चलाया

दानं फलं परयज्ञःपरिपालनं च ॥ ७ ॥

सर्वानेतान् भाविनः पार्थिवेन्द्रान्

भूयो भूयो याचते रामभद्रः ।

सामान्योऽयं धर्मसेतुर्दृष्याणां

काले काले पालनीयो भवद्भिः ॥ ८ ॥

इति कमलदलाम्बुबिन्दुलोणां

श्रियमनुचिन्त्य मनुष्यजीवितं च ।

सकलमिदमुदाहृतं च बुद्धा

न हि पुरुषैः परकीर्तयो विलोप्याः ॥ ९ ॥

इति । सं १०३१ भाद्रपदशुदि १४ ।

स्वयमाज्ञादापकश्चाऽत्रश्रीकंहपैकः‡ ।

स्वहस्तोऽयं श्रीवाक्पतिराजदेवस्य ।

* In the original is प्रतिपादिता.

† I have inserted the म of दीयमान०.

‡ On the plate, instead of the *anuswāra* over the क in this name, there is ण formed into a conjunct with च.

In the lower left-hand corner of the second plate is an engraving of Garuḍa holding a snake in his hand.

TRANSLATION.

1. May the deep hue of the hard throat of S'rikanṭha—a hue as of the smoke associated with the fire of the poison of strepitant* snakes; resembling Sainhikeya, when in contact with the horns of the resplendent moon adorning S'iva's head; and exhibiting the beauty of musk, when lying shadowed on the tremulous cheeks of Girijá—conduce to your well-being.

2. May the person of the foe of Mura, pining because of severance from Rádhá, and unquiet,—which derived no pleasure from the moon of Lakshmi's countenance; which was unrefreshed by the waters of the sea, uncomforted by the lotos in the reservoir of his own navel, and uncheered by the sweet effusions from the thousand hoods of the serpent S'esha—protect you.

* * * * *

3. As of the ræk is the transient wantoning of kingship. Sweet but till its disappearance, on scrutiny, is the fruition of worldly delights. Like a water-drop on the point of a spear of grass is the vital breath of men. Ah! virtue is one's only friend on the journey of the other world.

4. Of those who, having achieved prosperity,—of which the abode is the rim at the top of the wheel of the revolving world,—practise not liberality, the sole requital is remorse.†

* * * * *

5. By numerous kings, Sagara and others, the earth has been enjoyed. Whosoever, for protection, at any time has been the soil, his, meanwhile, in participation, has been the fruit of the merit redounding from the original bestowment thereof.‡

6. The grants—a source of merit, wealth, and distinction—once conferred, here on earth, by kings, rank with the reliques of sacrifices

* 'To thunder' is the only sense believed to be attached, in classical Sanskrit, to the verb *sphurj*.

† Colebrooke, as I have elsewhere remarked, from misreading two characters in the first verse of this couplet, errs in explaining it. See his *Miscellaneous Essays*, Vol. II., pp. 308, 309; and the *Journal of the American Oriental Society*, Vol. VII., p. 46.

‡ Just before this stanza, and serving to elucidate it, is the following sentence: "Moreover, knowing this recompence, merit, to be common, the coming occupants of our title, born in our line, or strangers, should admit and uphold this virtuous donation by us assigned."

Dharmádāya, 'virtuous donation,' is a curious neoterism for *dharma-dāna*.

and with vomitings. What right man, pray, would take them again ?*

7. By those who recite the traditionary munificence of our family, and by others, may this gift be approved. Donation, and preservation of the fame of others, *one's predecessors*, are the fruit of fortune, inconstant as lightning, or as the water-bubble.†

8. Again and again does Rámabhadra *thus* sue to all these *and* to future mighty kings : ‘ Universal to princes is this bridge of virtue, *safeguard*, *and* to be conserved, by you, in successive ages.’

9. When, therefore, men consider, that riches and human life are as uncertain as a bead of water on the petal of a lotos, and when they understand all this which has been propounded, of a truth it behoves them not to annul the repute of others.‡

Saugor, May 30th, 1861.

* For a relative note, see this Journal, for 1858, pp. 238 seqq.

† Misled by indistinct engraving, Colebrooke has made sad work of these lines. See his Miscellaneous Essays, Vol. II., pp. 311, 313. He really had before him, no question, the same reading as mine, with the sole exception of *valaya* for *salita*.

Colebrooke has : “ This donation ought to be approved by those who exemplify the hereditary liberality of our race, and by others. The flash of lightning from Lakshmi swoln with the rain drop, is gift ; and the fruit is preservation of another’s fame.” Taking उदाहरन् to signify ‘ exemplifying ’ is very natural for one off one’s guard. The verb being understood in one of its acceptations, the force of उदाहरन् is ‘ bringing as an example.’ ‘ To follow an example, is expressed thus : चैत्रस्याऽऽचरणं मैत्रेऽनुकरोति, or देवदत्तस्याऽऽचारं यज्ञदत्तो दधार. The idea of ‘ setting an example ’ is rarely worded, by the Hindus, otherwise than periphrastically. Yet here is an exception, in a couplet quoted in the *Kavya-prakásá*, p. 150 :

पुंस्त्वाद्पि प्रविचलेद् यदि यद्यधोऽपि
यायाद् यदि प्रणयने न भ्रह्मानपि स्यात् ।
अभ्युद्वरेत् तदपि विश्वमितीदृशीयं
केनाऽपि दिक् प्रकटिता पुरुषोत्तमेन ॥

“ Though one even had to lose one’s manhood, or had to descend, or had to abase oneself by mendicancy, *while making the endeavour*, still one should *not refuse* to rescue the world. An example in point has been exhibited by a certain preeminent person, *i. e.*, *Vishnu*.”

‡ Here, once more, the admirable Colebrooke, though all but unrivalled on the score of accuracy, has gone astray, and at the cost of the measure, the *Pushpitá-grá*. See his Miscellaneous Essays, Vol. II., pp. 311 and 313, with two foot-notes ; and the Journal of the American Oriental Society, Vol. VII., p. 45, notes 47 and 48.

*A few notes on Antiquities near Jubbulpoor.—By Lieut.-Colonel
H. YULE. (Bengal Engineers.)*

These notes have little substance, but notes of this kind often chance to supply a missing link in researches, and therefore they may be worth recording. When about to travel to Jubbulpoor with the Governor-General's Camp in December 1860, I asked Col. Cunningham if he could tell me of any antiquities on our line of march. He mentioned that there was a temple at Teoree on the Nursingpoor road and desired me to obtain certain particulars about it.

At Jubbulpoor I could not learn anything distinct about the remains indicated by Col. Cunningham, but on my return from a visit to the gorge of the Nerbudda above Bheraghat called "the Marble Rocks," I went in search of them, accompanied by my friend Mr. A. B. Sampson. The village is called in the Revenue Survey maps Tewar—by the people Teor.* In looking for ruins our attention was drawn to a stony eminence, about half a mile west of the village, to which we at once made our way.

It was swarming with labourers engaged in excavating and cutting stone for the Nurbudda bridge of the G. I. P. Railway, and the first impression was that it was a natural quarry. This impression was dispelled as soon as we mounted from the foot of the knoll and entered the excavations. The stones were being taken from a site in which they had been built together, but for what purpose it was impossible to say. On the side of the excavation fifteen to eighteen courses were visible of large blocks of roughly squared sandstone, from 10 inches to 18 inches and even 2 feet in thickness, and many of them exceeding 3 and even 4 feet in length. The bottom of the excavation also remained paved with such blocks, all as closely set as the material allowed, but without mortar.

Further inspection showed amid the masonry a number of stones with architectural sculpture on them which must have belonged to some previous building. Some of the stones also had marks of having been cramped with iron. In some places between two courses of sandstone blocks was interposed a course of large slabs of micaceous shale, as if to improve the bond.

* It is between the 6th and 7th milestones from Jubbulpoor.

The height of the knoll was (I should judge) scarcely short of 60 feet,—its diameter, before it was enlarged by the ejection of rubbish from the late excavations, about 250. The excavations were carried in a gully nearly all round the centre of the knoll, at a height of 12 or 15 feet above the ground, and leaving a solid centre of nearly 100 feet in diameter, so that the section was something like the sketch Fig. 1. Every part of this excavation disclosed masonry such as I have described, so that the building must have had a diameter of something more than 100 feet, whatever it was.

This mound is called by the people Karanbel. They told us that there was formerly a temple on the top, the stones of which were removed by a certain Nicholson Sahib to build a bridge.

Whether this was the temple of which Col. Cunningham had heard, I cannot say. But evidently such a structure as these excavated remains indicate could scarcely have been the mere base of a Hindu temple. I do not know what it could have been except a Buddhist Tope. Mr. Preston the district Engineer of the G. I. P. Railway did not regard it as a *building* properly speaking at all, but as a pile of stones which had been gathered together for the purposes of building. This seems to me out of the question. The stones are *built* beyond doubt.

If I am right in my conjecture of its original purpose, some of these stones will have had a curious history.

They have first formed part of the primitive building, the sculptured remains of which have been built into this mass of masonry ;

They have then been piled into a Buddhist Dagoba ;

Next they have afforded material for a Hindoo temple ;

And, lastly, they are being quarried and hewn for a Railway bridge over that "ancient river" the Nerbudda.

What shall be their next destination, who shall guess ?

This place has evidently been the site of a great mass of buildings, probably of a great city.

There are several other mounds adjoining, which have been the sites of extensive buildings. On one of these to the S. of Karanbel are traceable the foundations of an extensive edifice by the excavations which have been made to get out the stone.

Another mound to the westward of Karanbel is for 300 yards (and I know not how much further) covered with fragments of building

FIG. I.

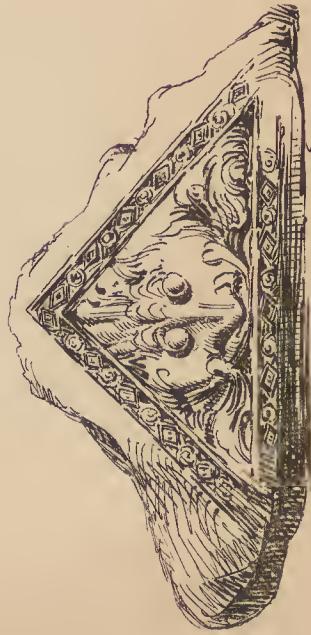


FIG. II.



FIG. III.

ANCIENT TEMPLE SUPPOSED JAIN.

NEAR TEWAR JUBBULPOOR.

stone, very many exhibiting the remains of architectural sculpture. Near the base of each of these mounds is the pit of a large and deep *baolee*, the stones of which have been removed.

Between Karanbel and the village of Tewar is a fine ancient well, 10 feet in diameter, built with squared and radiated blocks of sandstone, without mortar, and with layers at intervals of micaceous schist as noted above. Near this well are the remains of several buildings, perhaps *topes*, from which stones have been removed. On one block about 4 feet long I found the sculpture represented in fig. 2, presenting a modification of the grinning head which is found in so many ancient buildings of India, Burma and Java.

These remains, and the great mound in particular, are said by the people to have been used as quarries for the neighbourhood, including Jubbulpoor, for ages.

A Mussulman fakir whom I met at Muddun Mahal* told me some rather pointless legends about the Rance Dhurgowtee to whom he ascribed both that edifice and Karanbel.†

The latter he said was a very lofty building at the top of which there was kept burning through the night a great caldron full of *binowla* (cotton seed) steeped in oil, so as to lighten all the country round. This and other indications of arrogance on the part of Queen Dhurgowtee involved her in war with the "Badshah;" and a trai-

* A curious old Hindoo pavilion, built on the summit of two enormous granite boulders at the top of the hills over the ancient city of Gurha near Jubbulpoor.

† "In the time of Akbar—the celebrated Dhurgowtee, the queen of Gurha Mundula, whose reign extended over the Saugor and Nerbudda territories, and the greater part of Berar, was a daughter of the reigning Chundale prince of Mahoba. He condescended to give his daughter, only on condition that the Gond prince who demanded her should, to save his character, come with an army of 50,000 men to take her. He did so, and "nothing loth," Dhurgowtee departed to reign over a country where her name is now more revered than that of any other sovereign it has ever had. She was killed about 250 years ago, about 12 miles from Jubbulpoor, while gallantly leading on her troops in their third and last attempt to stem the torrent of Mahomedan invasion. Her tomb is still to be seen where she fell, in a narrow defile between two hills; and a pair of large rounded stones which stand near are according to popular belief her royal drums turned into stone, which in the dead of the night are still heard resounding through the woods and calling the spirits of her warriors from their thousand graves around her. The travellers who pass this solitary spot, respectfully place upon the tomb the prettiest specimen they can find of the crystals which abound in the neighbourhood; and with so much of kindly feeling had the history of Dhurgowtee inspired me, that I could not resist the temptation of adding one to the number, when I visited her tomb some sixteen years ago." *Sleeman's Rambles and Recollections* p. 245.

torous servant revealed to the Badshah the secret of the construction of Karabel. It was poised by curious art on a globe of a few inches in diameter; and a small force properly applied served to bring it down in utter ruin.

This shows that the native imagination has been struck, as we were very much struck, by the entire ruin and obliteration of form—"the line of confusion and the stones of emptiness."

On the edge of the mound to the westward mentioned above, on the slope descending to a large ravine, are the remains of two small temples of very ancient appearance; they have been entirely composed of sandstone. The smaller has been a simple colonnaded roof with a portico round. The larger is of the same character but more complex, and I did not ascertain its exact plan.* This latter has never been completed. Some of the columns are complete and boldly carved, showing with great distinctness as one of their features a Greek urn, which more or less disguised appears often to enter into the members of ancient Indian columns. In others the capital only, or the capital with some additional portion of the decorated members of the pillar, rests on blocks of stone squared and accurately fitted, but which never have received their ornamental sculpture. This is an example of the ancient Indian practice of sculpturing ornament after the erection of the building.

Both appear to have been Jain. We found about them, partially buried, very fine carved images about half the size of life, representing the Buddha-like figure which appears to be commonly found in Jain temples. The hair and face are those of Buddha, and so is the attitude, except that the hands rest symmetrically on the lap with the palms up. There is a quatrefoil on the breast, and a chatta over the head. Figures of worshipping elephants and devotees frame the figure. On my description Lord Canning commissioned Major Erskine to have these sent to Calcutta. Where they were they would soon have been destroyed. One of them had been smashed quite recently, apparently in pure mischief.

About two miles from this place are the celebrated marble rocks of the Nerbudda, where the river has forced a narrow passage through the nearly vertical marble strata, deserting apparently a more ancient channel to the north. On a hill in the island formed by these is a

* See Fig. 3.

stairease ascending to a temple of Shiva under the name of Gouri Shunkur. The temple is paltry and modern, but it is surrounded by a circular detached colonnade looking inwards, which if not itself ancient has apparently been built up of very ancient remains. This colonnade contains a great number of female figures more or less broken and defaced, some young and plump, others emaciated by austerities. They are called the 64 Jognees.

At Bhera Ghat below we saw the body of one of the Gosains belonging to this establishment brought down for commission to the waters of the Nerbudda. He was just dead, and had almost the appearance of life. The head and neck were decked with yellow flowers. The body was carefully placed in the Buddha-like attitude of the images described above and tied up in a sheet, with a gourd of water, food, a pipe for smoking ganja, and a small wooden hoe.

About $1\frac{1}{2}$ mile further east, and above a perpendicular fall in the Nerbudda, were seen on the high bank shapeless remains of stone-buildings which might have been anything, having become mere overgrown mounds. In one a square chamber was discernible. Still further, near the village of Gopalpoor and not far from Lamhata Ghat, are several Hindoo temples of old character with low pyramidal roofs, but nothing very interesting in the architecture. A larger building, now abandoned, has apparently been erected after Mahomedan ideas. It is a square, with a very handsome ribbed dome of a beautiful elliptical form, quite different from the ordinary Mahomedan dome, in excellent stone work, and probably 20 or 25 feet in diameter, resting on walls not more than $2\frac{1}{2}$ feet thick, and as yet quite sound, though the peepul trees have taken root and will soon bring it to ruin. I apprehend it was Hindoo in spite of its form..

February 2nd, 1861.

Note on the Rain-Fall in the Basin of the River Mahanuddy and the Floods consequent thereupon.—By Captain J. C. HARRIS, Bengal Engineers.

COMMUNICATED BY COLONEL BAIRD SMITH.

From any good Map of India it is easy to trace a general boundary line of the Basin of the Mahanuddy and having done so I find (from weighment of thick paper—cut to the required form) that it encloses an area of exactly 50,000 square miles made up of parts as follows:—

	Square Miles.
Area of main Body of Basin	40,000
" " neck of Delta	3,750
" " Delta Proper	6,250
	—————
" " Total area	50,000
	—————

or again the area of the whole basin may be (roughly) divided into portions as below, the areas of which I shall have occasion to speak of separately, by and bye;

	Square Miles.
Area above the Delta	45,000
" in " 	5,000
	—————
	50,000
	—————

Accepting the above as the area of the Mahanuddy Basin, I purpose considering here, *first*, whether the basin has any peculiarity either of size, form, position, or otherwise, which is pre-eminently calculated to produce excessive flood volume in the Mahanuddy; *secondly*, whether theoretical calculations of flood volume, based on "area of basin rainfall," &c., &c., are corroborative or otherwise, of the calculations based on "sectional area," "slope of bed," &c., &c., which have been previously made by me.

In respect of the first point offered for consideration, it appears above that the body of the basin has a mean diameter of 225 miles; that its centre is but 200 miles from the sea and its furthest limit little more than 300 miles from the same; so that the *size* of the basin is such, that but a very moderately wide-spreading

rain storm is required to ensure rain falling on every square inch of its area simultaneously; again, the *form* of the basin is that of an extremely round and compact body with a narrow neck and bell-shaped mouth; than which form it is difficult to conceive one (short of a geometrically perfect one) more calculated to empty itself rapidly—and it appears lastly, that the *position* is one of very close proximity to the sea, the source of rain clouds. With these pre-eminent qualifications for filling and rapidly emptying itself, engendered by form and position with its size being so limited as to leave no doubt but that a large rain storm may at once and the same time fall upon every square inch of the basin, with steep and densely wooded mountains encircling it, and with steep rocky slopes covering its area, I think it must be allowed that the Mahanuddy Basin *is* pre-eminently calculated to produce what are actually met with, floods ranging extremely high, but of very brief duration.

I will dispose of the second point proposed above by offering the subjoined questions for solution and going into the calculations necessary.

Question 1.—How many inches of rain must have fallen over the whole area of the Mahanuddy Basin above the Delta (the rain *in* the Delta was very insignificant) to have produced the great flood of the 29th July, 1855?

Solution 1.—This extraordinary flood commenced to rise at Cuttack at about 9 A. M. on the 27th July; at which time the river gauges stood (as they had done for several days previously) as follows:—

Kajooree,	18 feet*
Mahanuddy,	13 „

and the flood subsided to these gauge levels by the 2nd August. During this period of seven days the discharges of the two arms of the Mahanuddy were as below; *vide* Report Part III. Cuttack Rivers' Survey, page 25.

In the Mahanuddy,.....	Cubic feet	410,704,819,200
„ Kajooree,	„	351,067,824,000
		<hr/>
		761,772,643,200
		<hr/>

* Neglecting small decimals.

Now, if we suppose that but for the great rain storm which produced the extraordinary flood, the rivers would have continued to run during this seven-day period, at the level at which they had been for some days previously; they would have discharged per second (*vide* Table 16, Report Part II.) during this period—

The Mahanuddy,	Cubic feet	3,40,923
„ Kajooree,	„	2,94,340
		6,35,263

and in the seven days, cubic feet $6,35,263 \times 7 \times 24 \times 60 \times 60 = 384,207,062,400$ cubic feet.

Deducting from the whole discharge—

Or.....	Cubic feet	761,772,643,200
The above amount of	„	384,207,062,400
		377,565,580,800

as the volume of water thrown into the Mahanuddy by the rain storm. Distributing this amount over the whole area above Cuttack we obtain

$$\frac{377,565,580,800}{45,000 \times 5280 \times 5280} = 0.3 \text{ feet or } 3.6 \text{ inches}$$

as the portion of the rainfall which found its way into the channel of the Mahanuddy; and if we suppose this to be $\frac{2}{3}$ ths only of the total rainfall, that rainfall must have amounted to (inches $3.6 \times \frac{5}{2} =$) 9 inches.

Question 2.—What must have been the rainfall throughout the year 1856 in the Mahanuddy Basin above the Delta, to have produced the discharge which has been calculated to have taken place at Cuttack, as per subjoined extract from Table submitted with my Report Part II. *viz.* :—

**Theoretic discharge of the Cuttack Rivers throughout the year in 1856.*

Month.	Mahanuddy.	Kajooree.	REMARKS.
January,	17,581,881,600	11,338,099,200	These calculations were made for every day separately, of the year 1856. It is thought that the discharges for the flood season may be a trifle under-estimated if any thing; and those for the dry season over-estimated.
February,	13,721,097,600	9,739,440,000	
March,	9,490,953,600	8,427,369,600	
April,	4,705,257,600	6,026,400,000	
May,	8,538,998,400	8,055,936,000	
June,	88,370,006,400	73,856,448,000	
July,	506,251,814,400	436,002,220,800	
August,	676,590,844,800	622,331,164,800	
September,	345,237,120,000	359,677,929,600	
October,	220,090,780,800	226,476,172,800	
November,	50,347,699,200	31,868,640,000	
December,	25,211,606,400	19,227,001,600	
Total of each,...	1,966,144,060,800	1,803,026,822,400	

In the Mahanuddy, Cubic feet 1,966,144,060,800

„ Kajooree, „ 1,803,026,822,400

Giving the total annual discharge,... „ 3,769,170,883,200
or about $3\frac{3}{4}$ billions of cubic feet?

Solution.—Dividing this amount of “discharge through the rivers,”
Cubic feet.

by the “area drained,” we obtain $\frac{3,769,170,883,200}{45,000 \times 5280 \times 5280} = 3.004$ feet
Sq. miles. Feet. Feet.

or 36 inches; and supposing this amount as before to be $\frac{2}{3}$ th only of the “actual rainfall,” this latter will, it appears, have been ($36 \div \frac{2}{3} =$) 90 inches.

Theoretical calculations then, based on “area of basin” and “rainfall,” appear to corroborate the previous calculations, based on sectional area and slope of bed; in direct proportion to the value of the subjoined probabilities.

1st. The probability of an average of nine inches of rain having fallen over the whole area of the Mahanuddy Basin in a single storm, towards the end of July, 1855; at which time the River was tolerably full of water.

[* There are some clerical errors in these calculations.—EDS.]

2nd. The probability of the average annual rainfall in the Mahanuddy Basin above the Delta, having in 1856 been 90 inches.

It would be extremely satisfactory in this place to be able to point to a register of rainfall for the year 1856, kept at Sumbulpore, as furnishing observed facts which might be substituted for the above probabilities: but in the absence of the former, I must endeavour to measure the latter.

The probability of the nine inches of rainfall may be rated very high I think, for, on the 9th September, 1856, a fall of nine and a half inches was observed at Pooree by Dr. Pringle, the Civil Surgeon of that place; to say nothing of heavier rainfalls having been oftentimes observed in other districts similarly situated.

Again, the rainfall during 1856 having been observed in places in the Delta, Pooree and Cuttack, to have been respectively $63\frac{1}{4}$ and $67\frac{1}{2}$ inches, I conceive that its having been as much as 90 inches on the average, in the tract above the Delta, is not at all improbable; indeed highly the reverse.

Moreover, supposing that I have estimated too highly the annual rainfall above the Delta, (at 90 inches) I am inclined to think that the error would be found to lie, not in my calculation in No. 2 but in a possible under-statement of one of the factors; *viz.*: the ratio of the "amount discharged by the River" to the whole "rainfall of the tract:" for though that ratio may in ordinary cases be fairly represented by $\frac{2}{5}$ ths, yet in a rocky basin like that of the Mahanuddy, a larger proportion may possibly find its way into the channel of outlet, and if this be assumed, the amount presented as the solution of Question No. 2 will necessarily be proportionally diminished.

The general accuracy of the calculations based on "sectional area," "slope of bed," &c., &c., formerly submitted by me, having been confirmed in a most remarkable manner by evidence altogether independent of these calculations (*vide* Report Part III. Cuttack Rivers' Survey, page 23), and again being further, as I consider them to be, corroborated by those based on "area of basin" and "rainfall," which are given above, I think the subjoined general deductions from all the various calculations made, may be regarded as the great facts of the Mahanuddy which call for recognition when any scheme, with which that river is at all connected, may fall under consideration.

1st. The area of the Mahanuddy basin is about 50,000 square miles.

2nd. The maximum average rainfall in the basin has not been ascertained, but it is probably as much as 90 inches, possibly more.

3rd. The maximum annual discharge of the river is about four billions cubic feet.

4th. The maximum flood discharge between the Passes and the Delta, is 21,00,000 cubic feet per second.

5th. The maximum flood discharge at the head of the Delta is (not less, possibly somewhat more than) 1,800,000 cubic feet per second.

6th. The Delta channels (more or less embanked as they are) are able to pass off only one-half of the volume of a maximum flood; or 900,000 cubic feet per second.

7th. The occurrence of a maximum, or “*very* extraordinary flood is dependent on the contingency of an average fall of 9” of rain taking place over the whole area of the basin in a single storm, whilst the river is well filled by previous heavy rain. Such an occurrence may be looked for possibly once in twenty years.

8th. The effect of such “*very* extraordinary” flood is to carry away from 25 to 30 linear miles of the embankments of the Delta.

9th. “Extraordinary” floods, the necessary effect of which is the destruction of ten linear miles or so only, of embankments may possibly recur five times as often as the above.

Of the remedy which can be applied, I have written so fully in my Report, Part III. Cuttaek Rivers’ Survey, that I need not here say anything further regarding it, saving that I continue strong in the belief that the Mahanuddy can be rendered powerless for evil, by the construction of the proposed dam at Kundlepore, and the excavation of the proposed cutting at Daltollah, through the Mahanuddy’s eastern water-shed; at a *money* outlay of about a quarter of a million sterling, and after an outlay of *time* which I shall be better able than at present to estimate, when I receive from the Government of Bengal the information regarding the formation of the Vergel River in Ceylon, as a branch of the Mahawelligunga River, regarding which I have requested that certain particulars might be obtained from the Ceylon Government.

Notes on the River Yang-tse-Kiang from Hankow to Ping-shan.
By Lieut.-Col. SAREL, B.A., F.R.G.S.

Hong Kong, 11th August, 1861.

SIR,—I have taken the liberty to forward a copy of some notes taken during a journey of 1800 miles up the Yang-tse-Kiang, in the hope that they may prove of interest to your Society; I have also forwarded a copy to the North China Branch Society.

I have forwarded an application to His Excellency the Viceroy of India for his sanction to the formation of an expedition to penetrate into China through India and Thibet; I do not think the route through Birmah to be feasible at present, in consequence of the West of the Province of Yunnan being overrun by rebels.

I have the honor to be,

Sir,

Your most obedient Servant,

H. A. SAREL, CAPT. and BT. LT.-COL., *17th Lancers.*

To the Secretary Bengal Asiatic Society, Calcutta.

An expedition consisting of the undermentioned Officers left Shanghai on the 11th February, 1861. They were allowed by Admiral Sir James Hope to accompany the Naval expedition under his command as far as Yochow, from which place they proceeded in native boats. The original intention was to penetrate through the Province of Sz'chuan to Lassa, and thence to cross the Himalaya mountains to the plains of India. As will be seen, the unsettled state of the country in the West rendered the obtaining carriage an impossibility and prevented the carrying out of this plan.

The party was composed as follows:—

Lieut.-Col. SAREL, *17th Lancers.*

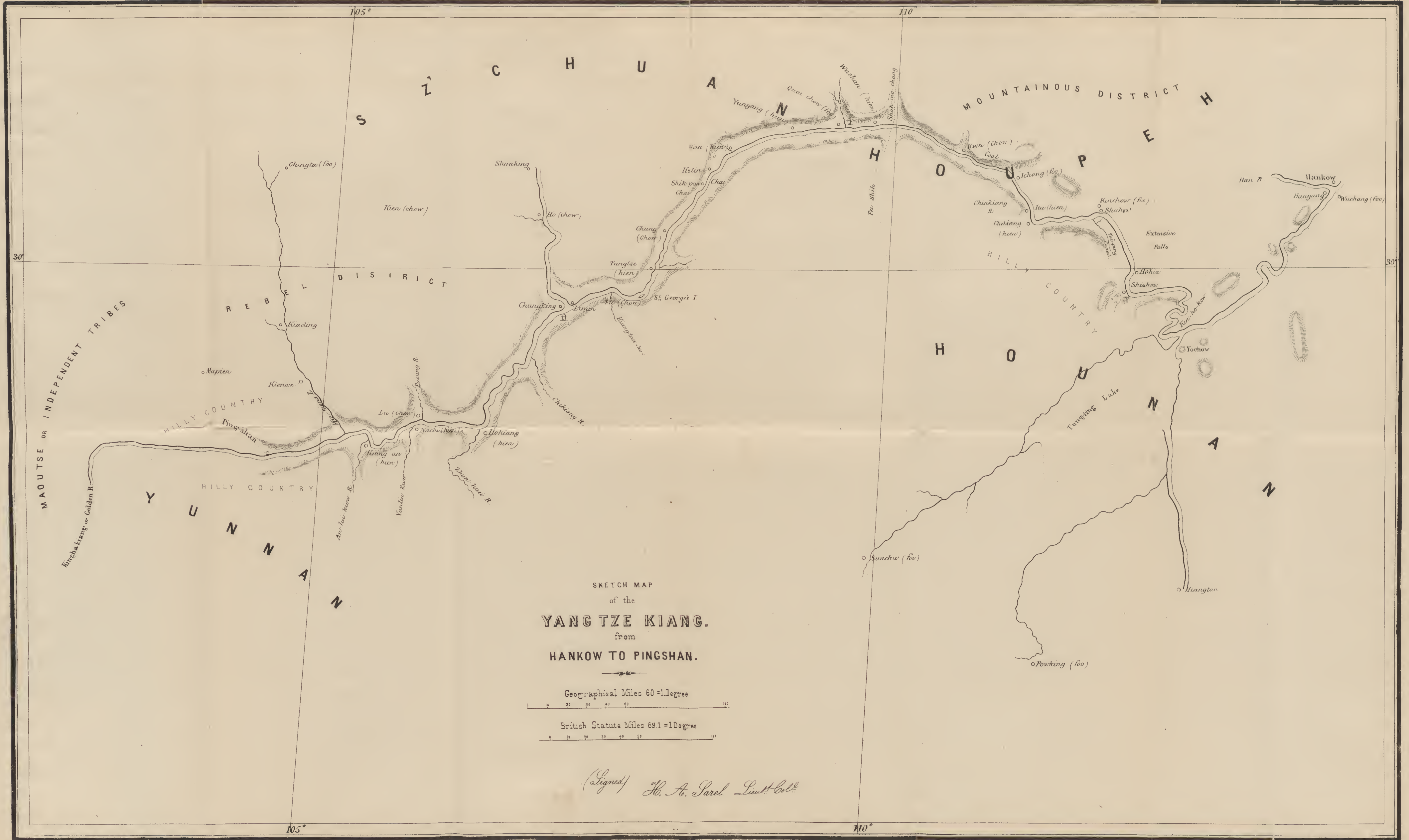
Captain BLAKISTON, R. A.

Doctor BARTON.

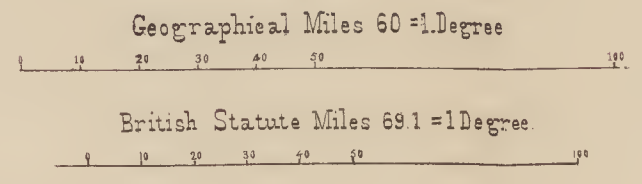
Rev. S. SCHERESCHEWSKY, American Mission.

The notes commence from the time of leaving Hankow, the river below that port having been surveyed and reported on.

From Yochow to Pingshan the river has been carefully surveyed by Captain Blakiston.



SKETCH MAP
of the
YANGTZE KIANG.
from
HANKOW TO PINGSHAN.



(Signed) *H. A. Sarel Lieut. Col.*

Specimens of mineralogy, ferns and insects have been collected and forwarded to England.

The country above Hankow is flat, large tracts on both banks being flooded in Mareh, but a low range of hills crosses the river shortly above the junction of the Han with the Yang-tse; about ten miles above Hankow, on the left bank, are some low grassy hills admirably suited for the encampment of a large body of troops; the situation is dry and airy, with the river close at hand and a creek running into the country. Ten miles higher up two hills called Takin-shan or the great, and Siau-kin-shan or the little golden hill, are passed on the left bank, the little hill being the largest; near these are hills on both banks, after which the country near the river again becomes flat, though low ranges are visible at some distance inland; the river here averages a mile in width; numbers of trading junks were seen on their way between Honan and Hankow viâ the Tungting lake; most of the boats come from Hiang-tang and Sun-chu (foo) in Hounan and some few from Chungking in Sz'chuan; some boats roughly constructed, their top sides being of deal planks unplanned and unvarnished, furnished with matting sails, bring coals from Pow-king (foo), a town in the interior of Hounan; when these boats reach Hankow, after discharging their cargo, they are broken up and sold for the wood.

Numerous timber rafts are also brought down the lake to the Yang-tse; they are made in divisions with huts built on them for their conductors; a division can be sold at any place without interfering with the rest of the raft, and the rafts being connected, like a train of boats, can turn the sharp bends of the small rivers they have to descend to the lake.

At the village of Lo-ji-kow, the rebels had left their traces; a small temple and some of the buildings were in ruins; these fanatical savages destroy everything they come across, their only idea being utterly to obliterate all traces of the Tartar government and to begin "*de novo*;" a few years will leave them nothing to govern even if they succeed in destroying the Tartar dynasty, which I much doubt; already many of them are said to be heartily tired of rebellion, and would doubtless return to their allegiance if they thought they could do so with safety to themselves, but rebels can expect no

mercy from a Chinese government, nor have their actions been such as to entitle them to it.

Between Hankow and the entrance to the Tung-ting lake only two places, deserving the names of towns, are passed ; the first being King-kow on the right, and the second Singti on the left bank ; at the latter there is some trade and a custom-house, where all the junks coming down the river pay toll.

Some miles before reaching the entrance to the lake, the river narrows to about half a mile between two bluffs of red sandstone ; soon after passing them a large rock about five feet above water in March, shows in mid-stream ; this is covered when the river rises, and would be dangerous until sufficiently under water for ships to pass over it.

The river between Hankow and Yochow is straight for the first and last parts of its course ; part in the middle makes a loop twenty-eight miles round, the neck being only about a mile across ; a canal cut here would be a great assistance to the navigation ; the ground being perfectly flat and only a few feet above the river, there would be no difficulty in making one, and the current of the river would be sufficient to keep it clear ; in July we passed through a narrow cut made by the river, finding from four to ten feet of water, with a strong current across this neck ; the reach below the lake entrance is long and straight running about N. E. and S. W. On the way from the river to Yochow at the head of the lake, a great number of sheep and goats with a few ponies were seen grazing on a low grassy flat, covered in floods ; these were the only sheep seen on the river for a distance of 1,800 miles.

From Hankow, Sir James Hope had taken a junk in tow for our expedition, the *Coromandel* and *Bouncer* being the only ships brought on farther than that town ; from Yochow the ships returned and we proceeded alone.

On preparing to start we were informed that a canal called the "Taiping" canal, connecting the Tung-ting lake with the Yang-tse, would shorten our route by five days ; we determined, however, on keeping to the river, in order to obtain all possible information about it.

The stream flowing from the Tung-ting lake to the Yang-tse-kiang is called "Kin-ho-kow" or the mouth of the golden river, by which

name the Yang-tse was formerly known as low down as this junction, and is now higher up. Its position at the junction is by Naval Dead reckoning from Hankow,

Lat. $29^{\circ} 27' 2''$ N.

Long. $112^{\circ} 50' 05''$ E.

Yochow, standing at the entrance to the lake, is in the direct road of the trading boats coming from the province of Hounan; there does not appear to be much business done, almost all the trade being at Hankow; the country towards the north-west is flat, being, in March, only a few feet above the water, and covered when the river is in flood; the town is in a dilapidated condition; it stands on high clay cliffs well above the water.

A short distance above the junction, the banks are often eighteen or twenty feet high in the bends of the river; opposite these banks are generally extensive flats of sand running far out into the stream; deep water is always found near the steep banks.

The course of the river for some distance after leaving the lake, is very tortuous, a whole day's travelling frequently not taking the junk more than five or six miles in a direct line from the last anchorage.

The country as far as could be seen from the river, is a flat, growing wheat, beans and carrots; in some extensive swamps on the banks, osiers were growing; about thirty miles above the lake it becomes undulating, ranges of hills appearing in the West; on the left bank a high and broad embankment protects the low country from the river floods; before reaching Shishow, a small walled town on the right bank, the river runs near some hills varying from 700 to 1,500 feet in height; three of these hills are excellent marks; one we named the "Camel's hump" another the "Ass' ears" and the third "Boulder hill" from a large round mass of rock standing by itself on the side of a hill; all these marks are visible at a great distance; higher up the river, close to the town of Shishow, two hills, called the little and great temple hills, are distinguishable by the white buildings on them, for many miles.

At Shishow, low hills of a hard red stone run down to the water's edge; from the top of the "Little Temple" hill, close to the river, a good view is obtained of the town and country to the S. E. and of a lake near the town in which are small islands with houses and

gardens ; the town is surrounded by a weak looking wall, and is protected on two sides by the river and lake ; the others are commanded by low hills near the walls ; within the town are gardens extending over nearly half the space enclosed by the walls, and this is the case with every town on the Upper Yang-tse ; nearly all are built at the foot of a slope, the extent of ground enclosed having reference to what a town may one day become rather than to the available number of inhabitants to defend such a length of wall.

At Hohia, a large village on the left bank, the river makes a sharp bend, and narrows from an average width of a thousand yards to about seven hundred ; through the narrows, the stream rushes with great force against the left bank, which, when we saw it, had been deeply cut into ; a fine wall, of very hard limestone, was in course of construction to protect the embankment ; in crossing the narrows, the lead gave, close to the village, fourteen fathoms, in mid-stream sixteen, and eight and a half at twenty yards from the right bank ; above the village, the embankment recedes from the river, until, at the distance of nine or ten miles up, it is fully a mile from it ; the land between this and the river is about fifteen feet higher than on its landward side ; it appears to have been built at a time when the river ran in a different bed from its present one ; as the river has retired from the embankment to its present channel, the intervening flat has become gradually raised by a succession of deposits of mud brought down by the annual floods, while the country beyond, has remained at its original level ; a road is carried along the top of the embankment, which is about twenty-five yards wide.

The carriage of this part of the country is a light cart, generally with two, sometimes with four solid wheels ; buffaloes are used for draught, and small ponies for the saddle ; the large wheeled barrow, the same as that used in the North and in other parts of China, is also found here.

About 170 miles above the junction of the Tung-ting lake with the Yang-tse, is the town of Shahsz' ; it is the first place of any importance above Yoehow, being the port of Kinchow (foo), a large city a mile inland ; Shahsz' is built on the embankment on the river's left along which it runs for about two miles or rather more ; on the whole of its river face, and in every creek, junks, some of a large size, were moored as closely as they could be stowed ; a mandarin

gave the population as 600,000, but probably more than doubled it; a Chinese will give any answer to avoid the trouble of thinking, and information picked up casually cannot be relied on.

Many west country boats come down the river as far as Shahsz', bringing sugar, pepper, salt, opium, tobacco and hemp, taking back cotton and some of the goods imported from Canton and brought thus far by the Tung-ting lake and the Taiping canal which joins the river six or seven miles above and to which, when the river is high, there is a short cut opposite Shahsz'.

Kinhow (foo) was said, by the above mentioned mandarin, to contain 10,000 Tartars, and too many Chinese to be counted; travellers by land reach it in five days from Hankow; 2,000 men from the Tartar garrison were said to have been sent to Hwangehow, a town below Hankow, which the rebels were reported to have taken.

Between Yoehow and Shahsz' the soundings in the channel were never under four fathoms, and varied from that depth to seventeen, near the banks being seldom under three; a continuous line of soundings could never be procured, our course being along shore, so that we were only able to get a east in crossing from side to side.

Six or seven miles above Shahsz,' the canal before mentioned as connecting the lake and river, is passed; it is called "Hu-du-kow" or "Taiping," more commonly the latter: boats come from Yoehow to the Yang-tse by it in five days, but make no use of it on the downward voyage, there being little or no stream in it; in fair weather boats go from Shahsz' to the entrance to the lake near Yoehow in a little over three days; the Taiping canal at its junction with the river is about a hundred yards broad.

To the West from Kiangkow, a town on the left bank and about two miles inland, the country becomes undulating and the river banks shingly; just below this town a large fleet, of upwards of two hundred junks, was met conveying soldiers down to oppose the rebels.

Limestone is quarried and burnt and red bricks and tiles are made near the village of Yungehi; from this point the country totally changes its character; from an almost dead level it becomes undulating, hilly and very shortly mountainous; to the South West and North West of the town of Chikiang is a range of high mountains called "Shih-urh-pei" or the hills of seven gates; peach trees were

in blossom on the side of those nearest the river, while the ground between them and the water was green with wheat and willows; in the distance they appeared well wooded, but there was probably nothing but underwood, no timber having been seen brought down to the river since quitting the lake.

The town of Chikiang stands on the right bank; a battlemented wall runs round three sides of it, that on the river side with a large portion of the suburbs having been laid in ruins by an unusual rise of the river in 1860. The scenery in this part of the river is very fine and the change most refreshing after the flat country below Yangchi.

Itu (hien) the next town reached is also walled; it stands on the right bank at the junction of the river Chinkiang with the Yang-tse; a range of hills runs to the East, while to the West mountains rise to a considerable height; the sand flats in the bed of the river are not so numerous as lower down; the banks become clayey and gravelly, while in some places rocks of conglomerate stand out from the shore; soon after leaving Itu, the course is between vertical cliffs of conglomerate, and the river narrows to 490 yards from an average of eight or nine hundred; reed and rubbish left on bushes and in crevices of the rocks, show the rise of the river during the floods to be occasionally sixty or seventy feet above its level in the end of March; last year, it was unusually high; its rise in June is probably from forty to fifty feet higher than in the cold months; this will not appear so much when it is considered that the river is here only fifty yards more than a quarter of a mile in width, and at Hankow where it is fully a mile, the rise in June was ascertained to be twenty-seven feet, the river being even then rising.

The hills below Ichang are immense masses of conglomerate, not in continued ranges, but standing sometimes singly, sometimes in groups of two or three, and of all sorts of shapes and sizes; some are flat topped, others run up into sharp peaks, some are cultivated while others are too precipitous to hold soil, and on these a few stunted, thorny bushes grow; in some are natural caves used as houses and temples; the bases of some are overhung by the tops, and under these, if a stream is at hand, the inhabitants construct huts, merely by building a wall with a doorway, from the ground to the rock overhead; from the highest peaks nothing could be seen towards

the South, South West and West, but confused masses of hills; the valleys are thinly inhabited and the people we saw looked poor and sickly; they seemed alarmed at our appearance, some taking to flight; those living near the river suffered severely from the flood of last year, many head of the few cattle they possessed having been destroyed; this year they are said (apparently truly) to be suffering from want of food; streams of clear water run through the valley, near which the bamboo is extensively cultivated; peaches, pears, cherries, peas and beans were in blossom and violets were growing in profusion.

The boats of the lower Yang-tse ascend no higher than Iehang, and we had here to engage a boat fit for the ascent of the rapids; we anchored for some days off the "Tien Chan" pagoda, a mile below Iehang; the occupation of the men here is principally fishing, the field work being, for the most part, performed by women; sturgeon (called by the natives yellow fish) are said to be found in this part of the river; porpoises are in great numbers from near the sea until a short distance below the rapids, when they disappear.

The town of Iehang (foo) stands close to the river on the left bank; its position, as ascertained by Captain Blakiston, is—

Lat. $30^{\circ} 41' 5''$ N.

Long. $111^{\circ} 3' 0''$ E.

It is distant from Shanghae 950 geographical or about 1,100 statute miles, from Hankow it is 366 geographical or about 420 statute miles; steam vessels would find no more difficulty between Yoehow and Iehang than between Hankow and Yoehow; the most easy time to ascend would be when the river is low, as after its rise, the whole country below Shi-show is so flooded that the banks are not visible, and some difficulty might be found in keeping to the channel.

Most of the trading junks from Sz'ehuan go no further down the river than Iehang, though many go to Shahsz' and some few to Hankow; this would be a very advantageous port for trading with the West of China, the difficulties of the navigation above being such as few owners would allow their vessels to risk, at any rate until something more is known of the rapids, and boats of a different construction to any at present in use on the Chinese waters have been built; an immense number of junks were moored along shore when we were at Iehang, and a crowd of them at anchor under the walls on a bank; these latter had on board a number of braves

who had been collected to be sent in different direction against the rebels.

To the East and South East the country is hilly, to the North mountainous; should this town ever become a trading port, excellent situations for houses will be found opposite the town on some low hills, and both above and below the town itself on the same side of the river is ample room for building, if it should be thought necessary to have places of business near the native merchants; the town side is not so much raised above the river as that opposite. A mile below the town and at the town itself the river is 940 yards wide in May and June; in the month of March we never found less than three fathoms and a half in any part of the channel between Shabsz' and Ichang; the river begins to rise about the beginning of April and rises until June; it remains at about the same level until the end of September and is at its lowest in the month of December when the water loses its usual red mud colour and becomes clear; it rose last year about twenty feet above its usual level. Coal is plentiful at no great distance up the river, but does not appear to be of a very good quality; it is small and dull looking, and is made into bricks as in the north, before being used as fuel; still higher up the river there is a district from which both coal and coke (which is made there) could be brought to Ichang by country boats in eight days; this latter coal seems to be of a superior quality.

On leaving Ichang our course was for about three miles, rather to the East of North, when it turned abruptly to the N. W.; from travelling on a wide stream flowing evenly through a slightly hilly country, we suddenly entered a gorge varying in width from 150 to 200 yards: the current increasing to 5 and 6 miles an hour with many strong eddies telling of rocks below the surface; our lead line of 25 fathoms found no bottom except close to the sides; the cliffs rise perpendicularly from the water's edge, in some places overhanging the river, to a height of from 300 to 500 feet; cultivation is extensively carried on in these hills wherever there is a sufficiently level space for soil to rest; wheat, beans, peas and different sorts of fruit trees were in blossom high up on the hill sides.

Tracking the boats in this part of the river is excessively severe work from the broken nature of the ground; the banks are strewed with masses of rock, and men have to be constantly clearing the

line ; above Ichang the boats do not use the sculls in use lower down the river ; in their stead each boat has from 10 to 20 oars, and, to assist the helm, a long oar is worked over the bow by 5 or 6 men ; the swirls of the current would twist a boat's head round in an instant if the men were not ready with this oar to force it in the right direction ; the tracking ropes are made of plaited strips of bamboo, and are very light and strong ; the sails of the Houpeh boats are the same as those used lower down the river, but the boats have one mast only ; the West country boats have light square sails of cotton, with a yard and boom of bamboo, on which they roll up when not set ; they are not used on a wind and have not the cross bamboos usual with Chinese sails ; they are generally hoisted on shears.

A very hard limestone is quarried in these gorges close to the water's edge ; holes are cut in the stone and wedges of soft wood driven in, which, being wetted, swell and split the stone along the line in which they are placed.

About 12 miles above Ichang at the village of Shantow-pien, the river begins to be obstructed by rapids, that of Patung (*sze*) being the first met with ; when the river is low, many rocks are here above water ; in the strong part of the rapid, nearly 100 men on the line drew the boat up by inches ; accidents sometimes occur from the towing line parting ; the boats are fended off the rocks by a simple but effective plan ; a stout rope is made fast on each bow, and a spar laid along each gunwale ready for use, but on ordinary occasions the bamboos, used for poling in shallow water, are made use of ; when the boat nears a rock, the pole is projected to meet it, and, at the same time two or three turns of one of the ropes made fast to the bow are taken round it, when the pole strikes the rock, the strain is taken by the rope, which tightening gradually, protects the boat from any shock ; these spars can be projected from any part of the boat.

In the gorges of "Lu-kan" and "Mi-tan" the cliffs on both sides, rise perpendicularly from the water's edge to a height of nearly 1,000 feet ; they appear to have been originally one hill, split in two by some convulsion of nature ; the same marks and strata can be seen on both sides of the river at similar heights ; in some places the hills are covered with brown scrub or grass, at a distance resembling

heather; roads are carried across the mountain to the villages in the interior, and are sufficiently good for baggage animals.

The first town reached above Ichang is Kwei (ehow) called Koue on Arrowsmith's map; it is a small walled place on the left bank containing about 100 houses, and the suburbs about 30; near the town a good road runs along the river bank, crossing the ravines on well constructed stone bridges.

Two miles above Kwei, coal is worked in galleries driven into the hill sides; this coal does not appear of good quality; it is brought to the surface in small, dull looking lumps; a number of people are employed in breaking it to powder, mixing it with water and moulding it into brieks for fuel; boats carry it to Ichang in about six hours.

At the rapid of Yeh (tan) 3 miles above Kwei, the water, in the first week in April, falls about 4 feet in 70 yards, but breaks only near the left bank.

The town of Wushan (hien) is approached by a long gorge of the same name; about half way through it are two creeks, one on each side of the river, marking the boundary between Houpeh and Sz'ehuan; that on right bank is called "Pei-shih," that on the left "Shah-mo-ehang;" at Wushan the poppy is cultivated; on the hills about the town, peaches, apriots, walnuts, the eastor oil plant, hawthorn, honey suekle, and many wild flowers grow; a tree called "Tung-shu" is extensively eultivated in this part of the Yang-tse valley; from the nut, called Tung-tse, an oil used for varnish is expressed; each nut contains three or more kernels in shape and taste like a small Brazil nut, but very poisonous.

Above Wushan the hills recede slightly from the river, as far as a gorge most appropriately named "Fung-siang" or the wind box; it averages no more than 80 yards in width; the stream is strong, but not rapid; the cliffs rise vertieally from the water's edge to a great height; at its upper end the hills again recede from the river, and close to a small stream on the left bank stands Quaiehow (foo).

Quaiehow (foo) is distant from Shanghae 1,028 geographical or nearly 1,200 statute miles; it is 444 geographical miles from Hankow and 78 above Ichang; there appeared no signs of trade in the town and few boats were lying near it.

Between Ichang and Quaiehow, the navigation would be difficult

and dangerous ; when the river is high, small powerful steamers of light draught might ascend the rapids, but the safest plan would possibly be to tow them up ; of these rapids there are eight, though some are called so merely from the water running rapidly over a shallow near one shore, while near the other the stream is deep and still, running perhaps 7 miles an hour ; the largest country boats ascending are about 120 feet long by 15 broad, drawing, when loaded, under three feet ; they come down without difficulty merely by keeping in mid stream, the channel being apparently free from obstructions, and should the commerce of the Upper Yang-tse present sufficient advantages to compensate for the risk attending the navigation of this part of the river, steamers will doubtless be taken up and down in safety ; it is difficult for a military officer to give an opinion on such a subject, but the obstacles appear to me by no means insuperable ; at a short distance from the shore the water is deep, and the object of having vessels of light draught is to enable them to come close to the side, and to prevent the current from taking so much hold of them ; any number of hands are always procurable at the rapids, men living there whose business it is to assist boats on their way up, and among whom good pilots would certainly be found ; it would not be easy to anchor in all places on account of the rocky nature of the bottom and the depth of water, but many sandy bays are to be found where a vessel would lie snugly.

The road from Quaichow to Ching-tu was reported impracticable for baggage animals ; the regular road strikes across from Wan, a town a short distance up the River. The Authorities at Quaichow had heard of the existence of a Treaty between England and China, but had never seen a copy ; the Prefect was supplied with one by us.

Mexican dollars had been readily taken on the river as far as Ichang at 1,000 cash each ; at Quaichow, having no more dollars, Sycee silver was exchanged at 1,720 cash per tael, but the Sz'chuen, Hankow and Shanghai weights differ in the following proportions :—

100 Sz'chuan taels = 101.6 Shanghai taels.

100 " " = 102.48 Hankow "

Wan was said to be 360 li or about 110 miles above Quaichow ; in this part of the country, a day's march, whatever its actual distance, is called 100 li, and the li may therefore be taken as a

measure of time rather than of distance; in this instance we were rather over three days in reaching Wan, but the distance is under 60 miles.

Between Quaichow and Wan the river is no where less than 150 yards in breadth; there are some rapids but none so strong as those in the gorges below Quaichow; there are also rocks and reefs, but plenty of water in the channel; the hills recede much from the river and are not so high as those lower down; the poppy is cultivated, the opium being collected during April and May; the seed-pods of the Sz'chuen poppy are quite as large and in many places larger than any I have seen in India; the specimens of opium brought down have been pronounced good, and the quantity produced in the province is so great, that it may well interfere with the foreign market.

Shortly before reaching Wan are some flats of sand and shingle on which gold is washed for, but the quantity produced is small, and none but those who can find no other occupation are employed in the work.

The town of Wan (hien) stands on the left bank; it is a small walled place; the shops are well supplied, and the inhabitants well off; coal, sulphur, ginger, sugar-cane, spices, and blue cotton prints were exposed for sale; the hills about the town are well watered and produce, besides the poppy, tobacco, peas, beans, wheat and barley; rice and cotton follow later in the season; the Tungshu tree is also much cultivated.

Numbers of soldiers were on their way up the river towards the West, and we found here a Tartar General to whom the Viceroy of Houpeh had given us letters, he was civil and attentive; all along our route we had heard that Sz'chuen was in an unsettled state, and the General confirmed the report; he had come to Wan to make dispositions of troops, and having done this, was hastening from the rebel proximity. He reported the insurgents to be in possession of many towns between Wan and Chingtu, and the land route to be impassable on that account. He said the people had been so plundered themselves, that they had taken to robbery as a means of existence, and that it would be impossible to obtain carriage, as no one would be induced to venture into the disturbed districts. The Prefect, whom we afterwards visited, told the same story and recommended

our going by water to Chung-king, which we were obliged to do ; he had copies of the Treaty, which he called that of Prince Kung ; it was not seen posted anywhere.

About six miles above Wan, the ranges of hills become less rugged, the river being about half a mile wide ; farther on, gold is washed for on the shingly flats ; the river is bordered by many precipitous rocks, but they do not rise from the water's edge.

At the village of Hulin we found some native Roman Catholics ; they appeared delighted to see that foreigners were travelling about the country without even disguising their dress and with no attempt at concealment ; they complained that the authorities treated them badly, and that not long since they had raised a mob on them, who had burnt and plundered their chapel ; our arrival was made the occasion of a general holiday ; we were invited to a feast, and salutes and crackers fired in our honour.

Before reaching the town of Chung-show the river is tortuous, varying in breadth from 200 yards to three quarters of a mile ; in the narrow part the stream is strong, but in the channel is no where broken into rapids ; about 25 miles above Chung are many rocks in the river, some of which, in the middle of April, are about five feet above water, others just visible, and probably others hidden ; later in the season, these would all be covered, and the navigation would be difficult without a good pilot ; men who know the river well are to be found in all the towns ; the crags by the river side and the hills would afford marks by which a pilot would know his situation.

Above Wan with wheat, barley, and peas, the poppy and tobacco were every where seen ; at an island named from the day on which we passed it, "St. George's" island, the island itself and the whole surrounding country to the tops of the highest hills, were covered with poppy, and from this place to Chung-king, a distance of about 76 miles, with the exception of a few patches of wheat and tobacco near the villages, nothing but poppy was grown as far as could be seen on both sides of the river ; the crop is over by the end of May, and is immediately followed by sugar-cane, indian-corn, and cotton ; in the poppy districts rice was growing only near the villages.

From the entrance to the gorges above Ichang, the scenery is very grand ; here the appearance of the country is very fine though not so imposing as below Quaichow ; the villages and their inhabitants

were, when we saw them, very superior to those lower down the river, though they would present the same wretched appearance after a visit from the rebels; the dress of the people is the same, but they look better off and the farm houses and others are better built; they stand among clumps of bambus and fruit trees, each detached house having its own garden surrounded by a fence; there is a greater appearance of comfort here than in any part of China I have seen, but the universal reservoirs of liquid manure forbid a close inspection.

At the town of Fu (ehow) on the right bank, the river Kiang-tan-ho falls in; it is said by the boatmen to be navigable for some distance above its mouth, and to be one of the routes by which traffic is carried on between Canton and the West of Sz'ehuan; redoubts of masonry have been built on four high peaks near its mouth.

Below the town of Chang-show (hien) on the left bank, a small clear river joins the Yang-tso; near its mouth are many rocks, reefs, and shoals, but deep water is found near the right bank.

In all the districts above Chang-show the country people have banded themselves together against the rebels; the rebels in the West all go by the name of "Tu-feh" or local robbers, and are in no way connected with the "Taipings" of Nankin; they are both called "Chang-mao" or long hairs, but the Tufeh cut off the queue which the Taipings retain in case of falling into the hands of the mandarins.

A narrow gorge leads round a bend of the river to Limin, a walled town on the left bank separated only from Chung-king by the river Hoehow or Hokiang; along the whole front of both these towns and in the Hoehow river, numbers of both large and small junks were either at anchor or moving about; there was every sign of a great amount of business being carried on.

Chung-king (foo) is most admirably situated for a trading port, being at the mouth of the Hoehow coming from the North of Sz'ehuan; about 120 miles farther up the Yang-tze the river Fusung falls in also from the North; eighty miles above this the Min (ho), coming from the North, joins at Süehow, the river being connected with Ching-tu (foo), the capital of the province, by a canal. The Hoehow is navigable for large junks as far up as the town of Shün-king, and probably higher when the river rises. Articles of mer-

chandise such as silk, wax, and hemp come principally from the districts near Kiading on the Min, from which place they are shipped; these districts are now in the hands of the rebels, Kiading being their head quarters, so that trade with that side of the country is at a stand still; the great objection to Chung-king as a port open to foreigners is the state of the river between it and Ichang; above Quaichow the navigation is comparatively easy, but eighty miles of dangerous ground would have to be passed above Ichang. From Quaichow to Ping-shan properly constructed river steamers could easily ascend, but as no trade is at any time carried on above Sūchow there would be little inducement to go beyond that town. Chung-king is the depôt for the whole commerce of the West, and is the largest and most flourishing city in the West, being of greater extent and population than the capital of the province; none of the buildings have the tumble down appearance so common in many Chinese towns; a stone wall, said to have eighteen gates, surrounds it; it is built close to the river; opposite the town on the right bank is an extensive shoal of shingle, but good anchorage would be found near the walls and in the Hoehow; Captain Blakiston's observations place the "Taiping-mun," one of the water gates, in—

Lat. 29° 33' 8" N.

Long. 107° 5' 0" E.

Population. It contains, according to the statement of some French missionaries resident here, a population of 200,000, of whom between 2,000 and 3,000 are Christians, and 500 families Musulmans; in Chingtu there are said to be 1,000 Musulman families.

The Toutai of Chungking was not inclined to be civil, and the French missionaries warned us that the soldiers intended to murder us; a very sharp letter was sent to the Toutai in which he was warned that the responsibility would rest with him if any Chinese lost their lives, which they would most assuredly do if they attempted to molest us; after this he became very civil and we were received at his Yamun with all honour; the soldiers had to be shown that they could not insult every one with impunity, but we were fortunately not obliged to use our fire arms.

Besides the three rivers already alluded to by which merchandise is brought to the Yang-tse, several small ones come in from the

province of Kweichow, but of these I am unable to give any information.

The following statistics of the trade of Chungking are from the information of a Chinese merchant.

EXPORTS.

Raw silk,...	...	...	...per catty, 2.4.4	Taels.
White insect wax,	...	...	...	0.3.1 "
Do. before the time of the rebels,	...	...	...	0.2.8 "
Bees' wax (scarce),	...	...	...	0.2.5 "
Hemp (for grass cloth),	...	...	...	0.0.9 "
Medicinal drugs, price unknown.				
Hung-qua (safflower) for dying, price unknown.				
Rhubarb (bad),	...	...	...	0.1.3 "
Sieh (tin or spelter),...	...	...	...	0.2.8 "
Lead (from Yunnan),	...	...	...	0.1.0 "
Salt,	...	...	...	0.0.3 "
Sugar,	...	...	...	0.0.5 "
Tobacco,...	...	...	...	0.0.7 "

Copper is brought from Yunnan and iron from the district of Lan-shwan-hein 300 li to the S.E.

Coal (best quality) not much exported,	...	per picul,	300	Cash.
Silver,	...	per tael,	1,500	"
Gold,	...	"	16.0.0	Taels.
Rice (said to be little exported),...	...	per picul,	2.5.0	"

The above were given as wholesale prices.

The freight on silks, drugs, &c. from Chung-king to Ichang is	...	...	1.0.0	"
On coarser articles,	...	...	0.3.0	"
The duty on silk was believed by the informant to be,	...	...	3.0.0	"

Silk embroidery is worked in the town and a coarse silk manufactured.

The following list is of specimens purchased in Chung-king, and their wholesale prices, as given by a Native writer attached to the party, are set down opposite each.

Opium,	...	per tael,	380	Cash.
Insect wax,	...	per catty,	400	"
Sieh (tin or spelter),...	...	"	390	"

Copper, ...	...	...	...per catty, 240	Cash.
Rhubarb, ...	...	...	...per pieul, 8.0.0	Taels.
Chuan-pè-ma (a drug),	...	...	.. "	75.0.0 "
Hung-quà (safflower),	...	...	.. "	32.0.0 "

Coal and limestone are brought in considerable quantities along the great Eastern road, and across the river by a ferry to the Tai-ping gate; this is carried up the hills by a flight of stone steps six feet wide; the road for some miles inland, is paved.

IMPORTS.

Tea (best quality) from Honnan,	...	...	...per pieul, 50.0.0	"
Do. (No. 2),	...	...	.. "	16.0.0 "
Do. (inferior) grown in Sz'ehuan,	...	...	.. "	3.3.4 "

Freight from Ichang to Chung-king is less than from Chung-king to Ichang.

Foreign goods are now brought from Canton viâ the Tung-ting lake; before Suehow in Kiangsu was taken by the rebels, the route was from that town viâ the Yang-tse.

The following is a list of foreign cloth goods imported from Canton; the figures prefixed to the colours signify the proportion in which each is in demand, 1,000 being the maximum; the Chinese names are in brackets.

(Piki) Long Ells.

1,000 Searlet,	...	...	...per piece, 11.0.0	Taels.
150 Dark-blue,	...	...	.. "	9.8.0 "
150 Light-blue,	...	...	.. "	8.8.0 "
100 Black,	...	...	.. "	8.0.0 "
80 Green,	...	...	.. "	10.5.0 "
50 Foreign-blue,	...	...	.. "	10.0.0 "

(Yu-mau) Dutch Camlet.

100 Dark-blue,	...	...	.. "	30.0.0 "
80 Sky-blue,	...	...	.. "	28.0.0 "
10 Black,	...	...	.. "	19.0.0 "
10 Searlet,	...	...	.. "	27.0.0 "
10 Foreign-blue,	...	...	.. "	25.0.0 "
5 Green,	...	...	.. "	22.0.0 "
5 Pale-yellow,	...	...	.. "	25.0.0 "

(Yu-sho) English Camlet.

100 Dark-blue,	...	...	...	„	28.0.0	Taels.
80 Sky-blue,	...	...	...	„	18.7.2	„
10 Black,	...	...	...	„	17.4.0	„
10 Scarlet,	...	...	...	„	25.3.0	„
10 Foreign-blue,	...	...	...	„	23.3.0	„
5 Green,	...	...	...	„	19.8.0	„
5 Pale-yellow,	...	...	...	„	23.5.0	„

(Ki-tow) Fine Cloth.

100 Dark-blue,	...	...	...	„	10.3.0	„
60 Sky-blue,	...	...	...	„	10.2.0	„
10 Scarlet,	...	...	...	„	10.2.0	„
10 Foreign-blue,	...	...	...	„	10.2.0	„
5 Brown,	...	...	...	„	10.1.0	„
5 Black,	...	...	...	„	10.1.0	„

(Ma-kien) Common Cloth.

100 Dark-blue,	...	...	...	„	10.4.0	„
50 Sky-blue,	...	...	...	„	10.3.0	„
10 Scarlet,	...	...	...	„	10.3.0	„
10 Foreign-blue,	„	10.3.0	„
5 Brown,	„	10.2.0	„
5 Black,	„	10.2.0	„

(I-cho-ni) Broadcloth.

20 Black alone used,	„	20.0.0	„
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(Yu-ling) Lastings.

20 Dark-blue,	„	16.0.0	„
100 Sky-blue,	„	17.0.0	„
100 Foreign-blue,	„	17.0.0	„
20 Black,	„	15.0.0	„

Cotton goods packed in boxes of 20 pieces.

White prints,	...	...	...	„	3.7.0	„
Coloured do.,	...	...	...	„	4.8.0	„
Cheeks, ...	...	...	...	„	4.4.0	„
White calico (1st quality),	...	...	...	„	3.6.0	„
Do. do. (2nd quality),	...	...	...	„	3.4.0	„
Do. do. (unbleached),	...	...	...	„	3.3.0	„
Printed chintz,	...	...	...	„	2.5.0	„

Sundries.

Brass buttons, ... ..	.. per gross,	3.2.0	Taels.
Telescopes, ... ..	.. each about	10.0.0	„
Pistols, ... ..	.. „	4.0.0	„

No carriage was procurable at Chung-king, the country between it and Chingtu being full of rebels, so that we had to proceed by water to Sūchow.

The first town reached above Chung-king is Kiang-tse (hien); the current runs about four miles an hour and rapids occur; the river, from passing through such a hilly country as the province of Sz'chuan, is liable to sudden freshes, every thunderstorm in the hills pouring a large body of water into it; it falls nearly as rapidly as it rises; flats of shingle are washed for gold as below Chung-king; coke is used for fuel, and coal and limestone are dug near the village of Yochi.

Above Chung-king, none of the boats use sails and dispense with the steering oar used for assisting the helm in the rapids; boats with salt and merchandise were continually passing down, and bales of cotton being carried up on rafts formed of bamboos; a number of oil boats were also passing down.

Above Chungking the poppy crop was over, and sugar cane and indian corn were being planted in its stead, at the same time that rice was taking the place of wheat and barley; buffaloes (many of a pink colour) are the only animals used in farming operations.

At the town of Hokiang (hien) a small river called Zhun-huei, rising in Kweichow, falls into the Yang-tse; in this district the safflower (Hungqua), is extensively cultivated, and a species of hemp is grown both here and at Chungking.

The river Fusung joins the Yang-tse at Lu (chow) (called Che-li-leou on some maps); this river passes about 30 miles to the East of Chingtu, and, at the time we passed, the country through which it flows was held by the rebels; it is one of the roads to Chingtu; at Lu, a great number of spars, apparently of fir, were stacked.

At the town of Nachi (hien) the appearance of the farm houses and villages changes for the worse; the people look poor forming a great contrast to those a short distance below; the district was visited last year by the rebels, which may account for the wretched appearance of the inhabitants; the river Yanlin here falls in from the South. Below Nachi several reefs and shoals occur in the river,

but the channel appears clear and there is plenty of water ; the breadth of the stream opposite Nachi is 660 yards.

The river An-lui-kilow flowing from the South falls into Yang-tse at the town of Kiang-an (hien) ; the country is hilly, the hills well watered and extensively cultivated with rice ; the people were in a great state of alarm about the rebels ; on the hills many new redoubts had been constructed, and men were on outpost duty on the river in boats.

From the town of Nanki (hien) hills can be seen in the interior rising to a great height ; a short distance above Li-chuan-pa, a small town, coal is worked.

Süchow is a large town on the left of the Yang-tse and Min-kiang which here falls in from the North ; it is at all seasons navigable for large junks as far as Kiading, a town about 100 miles from its mouth, and, when the water is high, up to Chingtü, a canal having been cut from the river to the town ; when the water is low the communication above Kiading is kept up by means of small boats.

The navigation of the Yang-tse from Chung-king to Süchow would not be difficult for steam vessels ; there are rocks in places, but seldom under eight fathoms water in the channel, and near the sides rarely under three ; the average rate of the stream in this part of the river is perhaps five and a half miles an hour.

Süchow (foo) is a large town at which in quiet times a large amount of trade is probably carried on ; a great number of junks were waiting here in the hope that the banks of the Min river might be deserted by the rebels so as to enable them to proceed to Chingtü or Kiading, which place was held by them : they were said to have detached parties much nearer Süchow, and to be robbing and murdering every one they could lay hands on ; headless bodies, with their hands tied behind their backs, floating down the Min at all hours, plainly showed that there was some truth in the stories we had heard on our way up ; the gates of the town were closed, and there were no means of ingress or egress but by a rope over the walls ; a strong garrison of braves from Sz'ehuan and Yunnan were quartered outside the city, and fighting among themselves ; an engagement took place between them during our stay, and the Yunnan party had to be removed by the authorities ; on our return they attacked our boats with stones, but the sight of the rifles, &c., put them to

flight. The position of Süchow according to Captain Blakiston is in—

Lat. 28° 46' 6" N.

Long. 105° 7' 0" E.

The products of the neighbouring country are yellow and white silk, insect wax, bee's wax, tobacco, honey, coal (220 Cash per picul), a small quantity of iron, which is worked close to the town and green tea. Sycee was worth 1,630 cash per tael.

No one could be found to accompany us through the rebel districts to Chingtu, and we had therefore to ascend the river to Ping-shan in the hope of being able to get round them; the only traffic above Süchow is in coal, which is brought down in boats; above Ping-shan no trade at all goes forward.

The country above Süchow is very mountainous and the river decreases in width; its average is about 250 yards; twenty miles above the town it runs through a district in which coal is extensively worked, being dug out in galleries high up on the hill sides, and sent down in baskets sliding on stout ropes of bamboo, a full basket drawing up an empty one; these galleries are often at such a height that a half way stage is necessary; this coal district extends for 17 or 18 miles along both sides of the river; the coal appeared to be of a superior quality to any seen below; it was brought out in large and bright lumps; in every place where coal was seen the rock was sandstone, and where washed by water was jet black and polished; boats would carry coal from this district to Hankow in twenty days, to Iehang in ten. Many men here have brown hair; this is not seen lower down the river.

Above Süchow the geographical name of the Yang-tse is the "Kin-cha-kiang" or river of gold; it is called by the boatmen merely the Yunnan river; nothing could be learnt about it above Ping-shan, but there are said to be falls at a distance of 100 li above; our boatmen and Captain refused to go further, and would not proceed beyond Süchow until we promised to take them no farther than Ping-shan.

Ping-shan, a small walled town on the left bank, is the farthest point to which we ascended; no Europeans, as far as is known, have ever reached this point before us; the walls have lately been put in a state of repair, and strengthened on the landward side by traverses

constructed on the banquette, as the hills close to them completely command them and expose them to an enfilading fire; the Prefect was here at first very civil, and promised all assistance, but said the rebels were in the neighbourhood and that we had better leave the place; the townspeople closed the gates and fired on us from the walls, but no bullets came anywhere near us, and finding we remained quiet they discontinued; that same night the rebels attacked the town; the walls were illuminated, and every man of the attacking party carried a lantern; the fighting did not appear to be very severe, being confined to distant firing and shouting.

Except for purposes of exploration there is nothing to bring a steam-vessel beyond Süchow; the river is navigable as far as Ping-shan, with the exception of the eighty miles between Ichang and Quaichow, and even that may be practicable; above Ping-shan I can give no information about the river, but from the tops of the highest hills near the town, nothing can be seen but high hills towards the West.

From this point we were compelled to turn back, no one being willing, for any amount of pay, to venture into a district overrun by rebels; no boats ascend the river beyond Ping-shan so that we were unable to visit the country of the Maoutse or independent tribes, which is near Ping-shan to the West; a chief of these tribes with some of his followers paid us a visit and were very friendly; we exchanged presents of knives and wine; they are a totally different looking race to the Chinese, their faces being open and honest, which the Chinese faces certainly are not; some had the head clean shaved, others let their hair grow, and one only had a queue; the weather was warm and their dress consisted only of a coarse white cotton jacket, drawers and grass sandals; their turbans were of blue cotton twisted into a knot above the forehead; they called themselves "Huh-I" or "I-jin" black barbarians or foreigners, and repeatedly said they were not civilised men; they were very curious and inspected everything in the cabins narrowly, but were perfectly well behaved; the chief spoke a little Chinese but none of his followers could make themselves understood; we were considered by the people to be in some way connected with these people, and were called by them "White Maoutse;" none of the Maoutse could read or write; they possess horses and cattle in their own country; they said their only crop was indian corn; the chief said if we came to his country

there would be no difficulty about carriage, but we should have a mountainous country to cross before reaching it, and there was no possibility of procuring earriage at Ping-shan; he said that travellers would be plundered by the tribes unless under the protection of a chief; it was impossible to make out the limits of their country, but its western boundary cannot be far from the frontiers of Burmah and Assam.

The country round Ping-shan is hilly and fertile; silk is produced in considerable quantities; indiau corn, rice, sugar cane, and turmeric are cultivated on the hills, and the cactus grows to a large size; water snakes and eels caught in the rice fields are eaten by the boatmen and villagers.

The boundary of Yunnan is passed just below Ping-shan, though we could not clearly ascertain where; the country on the South bank of the river opposite the town, was said by the Prefect to be in that province.

On both sides of the river the whole way from Yochow and even from Hankow to Ping-shan, the country is destitute of cattle with the exception of a few sheep and goats at Yochow, and goats in a few places; buffaloes and ponies were seen at times, but their number is small, nor does the country appear thickly populated; should an expedition, hostile or otherwise, ever ascend the river, the whole of their supplies would have to be carried with them; a few fowls, eggs, fish and a considerable amount of flour, salt and vegetables would be procurable; the towns would accommodate a large number of men, but few places are fit for encamping, the ground near the towns being covered with grave mounds; the hills above Hankow have been before alluded to; the people generally burn charcoal, except in the coal districts; fire wood is grubbed up about the country and brought in boats to the towns; there would be difficulty in obtaining it in large quantities.

The people are, wherever we met them, a quiet inoffensive race, but as the rebels increase in numbers they find it necessary to combine for their own safety, the government giving them no aid; in fact wherever the imperialist troops are in the field against the insurgents, the people are worse off than when left to protect themselves, being plundered by both parties; in the districts above Chang (show) hien they are keeping the rebels off and have outposts in the river, lookout stations on the highest hills, and redoubts in

the most defensible situations; no artillery larger than a jingall is used in this hilly country, and, it is only necessary to construct the redoubts so that they may be safe from escalade. If the Chinese government had the least energy, the rebels would have no chance to establish themselves in a country where the popular feeling is so strong in favour of law and order, but should the present state of affairs continue much longer, the feeling of the population will probably undergo a change; finding the government powerless to protect them, they will lose their respect for it, and the habit of carrying arms will make them less likely than formerly to submit to the exactions of the authorities; being by nature industrious and peaceable they are the people of all others likely to make good and loyal subjects to a government strong enough to ensure them peace and quietness; many of the rebels have become so either from necessity or compulsion, and would gladly embrace an opportunity of returning to a quiet life, and among them would doubtless be found men who, with officers in whom they could trust, would make first-rate soldiers.

The rebels in the West have no connexion with the Tai-pings, but have sprung from bands of robbers, doubtless encouraged by the weakness or want of energy of the government; the provinces of Sz'chuan and Yunnan have always been in an unsettled state, being infested, like England in the olden time, by numerous bands of robbers; about two years ago, four of their leaders by name "Lan-tashun," "Li-chwan-tata," "Chang-u-mats," and "Mou-san-chow" collected larger numbers of men than usual, and uniting their forces, have since, that time, set the government at defiance; at the present time they occupy a large portion of the province of Sz'chuan, and are said to have burnt the suburbs of the capital Ching-tu (foo), and to be besieging the city; these bands first became formidable in the 9th year of the reign of the present Emperor, "Heën-Fung;" on the authority of a Mandarin who commanded our Chinese escort, they are now occupying the following towns in Sz'chuan; between Wan (hien) and Chingtu:—Ping-chi, Shè-kung, Chung-kiang, and Shünking; between Chungking and Chingtu:—Ho (chow), Ting-yuen, Mien (chow), Nan-ching, and Si-chung; between Lu (chow) and Chingtu:—Niu-fu-tu, King-yen, and Wè-yuen; between Süchow, and Chingtu:—Kiading, Kien-wè, Yow-ku-tu, Kiöh-kih, Manien-chang, and Utung-kiow; the sons of a Moolvee at Chung-king gave the following as the names of places occupied by them in Sz'chuan;

Mé (ehow), Sintu, Mien (ehow), Kin-shu (hien), Pun-shan (hien), Kien (ehow), Kwan (hien), Ho (ehow), Ting-yuen, and Suè-ling (hien); several names in the two lists corroborate each statement; from a Chinese map in the possession of the Prefect of Ping-shan, many places to the West of any of the above named either had been or were at the time in the hands of the rebels; after getting all they can out of one town, they often leave it and move to another.

Part of the Mussulman population of Yunnan is also in insurrection under the leadership of a Hadji by name "Ma Yussu;" his headquarters are at Ta-lif (foo) in the West of the province, and on the high road leading from the Burmese frontier to Yunnan, the capital of the province, and to Chingtu (foo), the capital of Sz'chuan.

China, to the South and West, may be said to be out of the hands of the government; though the mandarins still govern some towns and districts, they are ready to take to flight on the first attack of the rebels; the military commandant of Ping-shan was reported to have done so with his garrison, as soon as the town was attacked, and considered to have acted quite properly; as far as the safety of the town was concerned, he did, no doubt, the best thing possible, for the rebels would in all probability have been admitted by some of the soldiers.

Trade is, in the West, almost at a standstill, and it would seem of little use to open ports up the river for trade with that part of the country, until the rebels have been put down; Ichang is the only place at present where trade might be carried on with advantage, and the prospect of it might assist in settling the western provinces; the rebels there are not the same fanatical savages that the Taipings are; they do not destroy for the sake of destroying only, though in attacking a town they will burn buildings that interfere with their operations; many of these men would undoubtedly be glad of a chance to escape from their present life, and the opening of trade with the foreigners would give them an opportunity of doing so.

A body of the Taipings under a leader called "Shih-ta-kai" is said to be in the province of Kweichow, and this seems to be the most westerly point to which they have penetrated; on our way down the river we found a large imperialist camp at Yoehow, from which the rebels were said to be 180 li distant; they were also reported to be 30 li from King-kow, a town on the right bank a short distance

above Hankow, but until the floods subside, they cannot move much about the country in the vicinity of the river.

The mandarins, as far as we could see, threw no obstacles in the way of our expedition : excepting at Chung-king, we were everywhere most civilly received ; the authorities were curious to know what we were really about, and the mandarins and soldiers sent with us, though ostensibly a guard of honour, were more probably for the purpose of reporting on our proceedings, and it is probably well known, long before this, at Peking that the river has been surveyed and soundings taken as far as Ping-shan ; I attribute our failure to penetrate into Thibet to no hostility on the part of the authorities, but to the impossibility of obtaining people to accompany us through a country where they had a very good chance of having their throats cut ; the Viceroy of Sz'chuan is the governor of Thibet, and is said to be well affected towards foreigners ; he is a brother of the newly made minister for foreign affairs at Peking, and resides at Chingtu.

Some time back there was some talk of attempting a route into western China by Burmah ; the Yang-tse seems to me to be the preferable route in every way ; it is most likely navigable for country boats a long way above Ping-shan, and the conveyance of goods by land across such a hilly country as Yunnan would be difficult and expensive.

As we descended we found the river very much risen since we passed up ; in the gorges below Quaichow the rapids had almost disappeared ; two bad places occurred below Shan-tow-pien, but no others ; the stream ran, except in these places, six and seven miles an hour.

Below Shi-show the river banks were much flooded, and it would be difficult, when the river is high, for ships to keep in the channel, there being nothing to mark the bank ; looking towards the Tungting lake there was a clear horizon, the view being broken only by trees and half submerged villages standing out of the water.

I regret being unable to add more to the very slight knowledge possessed of the interior and west of China ; whenever the rebels are put down, and not till then, a great amount of trade ought to be carried on with the west, and our knowledge of this most interesting country will increase ; under a good government the Chinese have the makings of as fine a nation as any under the Sun, but, as far at least as the West is concerned, we must for the present rest satisfied with the little that is known of them.

Register of Thermometer.

DATE.	SUN-RISE.	8 A.M.	NOON.	8 P.M.	REMARKS.
March 17	53	53	53.5	53.5	Cloudy with rain.
" 18	50	54	...	55.5	Foggy and sultry.
" 19	49.5	56	64	59	Heavy dew, fine.
" 20	57	57	57	54	Cloudy with rain.
" 21	48.5	52	58	52.5	Cloudy.
" 22	47	51	...	52.5	Cloudy and clear.
" 23	48.5	56	63	57	Cloudy.
" 24	54	58	65	62.5	Cloudy.
" 25	59.5	59	58	50	Overcast, rain.
" 26	...	46	50.5	48.5	Thick with rain.
" 27	46	47.5	53	51	Overcast.
" 28	50	54	66	59	Clouded over.
" 29	54.5	55.5	57.5	58.5	Cloudy with rain.
" 30	47	48.5	53	52	Cloudy with rain.
" 31	49.5	51	57	55.5	Clouded over.
April 1	55	58.5	68	65	Clear and cloudy.
" 2	47	53.5	67	58.5	Misty and cloudy.
" 3	60	64	...	62.5	Cloudy.
" 4	60	62.5	69.5	63	Clouded over.
" 5	58.5	...	61	62	Overcast and rain.
" 6	59	58	...	59.5	Cloudy with rain.
" 7	58	60.5	63	60	Cloudy with rain.
" 8	56	63.5	70	63	Cloudy.
" 9	59	...	71.5	74	Cloudy.
" 10	64	63.5	65	66	Cloudy with rain.
" 11	64	65	70.5	69	Clouded over.
" 12	...	65.5	64.5	63.5	Cloudy with showers.
" 13	...	62.5	62	58.5	Cloudy with rain.
" 14	56	59.5	67.5	...	Clear and cloudy.
" 15	57.5	62.5	71.5	61.5	Cloudy and clear.
" 16	56	64	71	68	Cloudy.
" 17	60	63	71	65.5	Foggy and hazy.
" 18	62.5	66.5	71.5	66	Hazy and thunder clouds.
" 19	62	66	76	70	Cloudy and hazy.
" 20	65	70	77.5	76	Overcast and hazy.
" 21	71	73	79	68.5	Cloudy with rain.
" 22	66	68	72	68	Cloudy, heavy rain.
" 23	65	67	74.5	73	Foggy and clear.
" 24	64	68	82	75	Clear.
" 25	66.5	72	86.5	78.5	Clear.
" 26	71.5	76	88	87.5	Cloudy and clear.
" 27	76	83	88.5	71	Cloudy with rain.
" 28	70	71	80	74	Rain and clear.
" 29	68	71	73.5	67.5	Rain and overcast.
" 30	66	68	...	73.5	Cloudy and clear.
May 1	67	69	80.5	...	Clear and hazy.
" 2	68.5	73.5	81	76	Clear.
" 3	69	77	92.5	78.5	Clear, oppressive.
" 4	73.5	79	88.5	81	Clear, oppressive.
" 5	74.5	80.5	90	84	Cloudy, raining very oppressive, lightning to S. working to W. and N.W.
" 6	77.5	79	85	80	Cloudy.
" 7	74	77.5	84.5	73.5	Cloudy, thunder-storm.
" 8	74	72	67.5	67.5	Cloudy, heavy rain.
" 9	...	69	77.5	71	Rain, Cloudy.
" 10	68.5	68.5	69.5	67	Overcast, rain.

Register of Thermometer—(Continued.)

DATE.	SUN-RISE.	8 A.M.	NOON.	8 P.M.	REMARKS.
May 11	68	73	79	76	Cloudy with fresh wind from N. to E. with heavy rain and thunder at night.
" 12	70	63.5	65	64	Steady and heavy rain.
" 13	65	69	74	68	Clouded over.
" 14	63	64	67	67	Thick and cloudy.
" 15	63	64.5	...	67	Rain and cloudy.
" 16	65.5	68.5	77.5	70	Overcast, cloudy.
" 17	70	73	82.5	73	Cloudy.
" 18	69	...	84	80	Cloudy and hazy.
" 19	73	...	...	82.5	Light clouds.
" 20	73.5	74	78	68.5	Cloudy and showery.
" 21	69.5	76	78	76	Cloudy.
" 22	70	72.5	79.5	78	Cloudy.
" 23	74	80	86.5	83.5	Cloudy.
" 24	78.5	81	90	71.5	Cloudy with rain.
" 25	...	71	79	74.5	Rain and cloudy.
" 26	70.5	78	84.5	76	Overcast, strong rain.
" 27	72	74	77.5	70	Overcast, strong rain.
" 28	71	76.5	84.5	77.5	Clouded over.
" 29	...	71	81.5	77	Heavy rain, cloudy.
" 30	...	73.5	77.5	74	Cloudy, heavy rain.
" 31	67.5	69.5	80	73	Cloudy with rain.
June 1	67	72	78.5	73.5	Cloudy.
" 2	71	70.5	72.5	71	Steady rain, Cloudy.
" 3	67	69	69.5	69.5	Rain, thick weather.
" 4	68.5	68.5	68	67	Incessant rain.
" 5	67	71	75.5	75	Clouded over.
" 6	71	73	76.5	74	Foggy and cloudy.
" 7	69	76	84	76	Hazy and cloudy.
" 8	72.5	76	83	77	Thick mist, cloudy.
" 9	75	76	79.5	76	Hazy and cloudy.
" 10	72	76.5	79	80.5	Cloudy and close.
" 11	74	77.5	83	72.5	Cloudy, squally from S.W. with thunder, rain all night.
" 12	71.5	71.5	1 1/2 10'	70	Cloudy with rain.
" 13	68	74	79	75	Clear and cloudy.
" 14	71	76	86	81	Cloudy (Thermr. exposed 116° river water 73°).
" 15	72	75	85	77	Clear, close and sultry.
" 16	76	81	88	76	Cloudy, thunder.
" 17	...	81	88	81	Cloudy, (after Thermr. 90°).
" 18	75	81	91	82	Cloudy, rain at night.
" 19	75	82	93	68.5	Cloudy with rain.
" 20	64	72	70.9	69	Heavy rain, cloudy.
" 21	...	71	80	72	Cloudy, (river water 74°).
" 22	71	77	91.9	77	Clear and cloudy.
" 23	76	80	84	79	Clear and cloudy.
" 24	79	82	85	82	Cloudy.
" 25	75	76	78	76	Cloudy.
" 26	76	79	82	80	Cloudy.
" 27	78	87	81	68	Cloudy with rain, during aftern. strong gale from N.W. to W.bN., with rain and wind.
" 28	60	72	...	...	Cloudy.



ANDAMAN ISLANDERS

from Photographs

Papers relating to the Aborigines of the Andaman Islands.

(COMMUNICATED BY THE GOVERNMENT OF INDIA.)

*From Captain J. C. HAUGHTON, Superintendent of Port Blair, to
W. GREY, Esquire, Secretary to the Government of India,
No. 67, dated the 10th January, 1861.*

In continuation of my letter No. 53, of 11th November, 1860, I have the honor to report our further intercourse with the Aborigines.

2. On 15th December, a party of them came upon some men of the *Clyde* who were getting water at the watering-place, and slightly wounded one European sailor. The men went off immediately to the ship, a boat was sent to recover some buckets and clothes which had been abandoned, an Andamanese swam off to it with the clothes, —the buckets had been destroyed for the sake of the hoops.

3. On the 17th December, a party of convicts cutting bamboos, West of Viper Island, was shot at from an ambuscade, and one man was wounded by an arrow, but not severely. The Natives were not seen, so that the Guard could not use their weapons.

4. On the 31st, the Gangsman at Viper Island seeing some Aborigines on the other shore went over to them, and gave them some plantains. On 1st January, he went to meet them at the same place on their calling out to him, and again gave them some plantains. Before parting, they returned the favour with a shower of arrows, by one of which a boatman was wounded. He has since died of lockjaw. The cause of this hostility the Gangsman attributes to the European Apothecary having come down to look on from the opposite shore, and having been seen by them.

5. On the 3rd January, three of the Aborigines landed on Viper Island, and walked all over it. Some plantains were given to them. They saw a young pig and attempted to carry it off, but were prevented.

6. On 4th January, they again to the number of five persons landed on Viper Island, *viz.*, two boys and three men—I happened to visit the Island as they were leaving. They had roamed over the Island, and had been rather injudiciously allowed to lade themselves

with as many plantains as they could carry. I found them with a rotten and broken canoe which they were endeavouring to get into, with a full load of plantains,—after baling out two or three times with a nautilus shell, they at last set off, but were eventually compelled to get into the water and swim behind the canoe, pushing it along. During the time I saw them—some twenty minutes—they were examined by myself and the European Guard without betraying the least symptom of fear; they laughed and talked incessantly, and were quite ready to dance if any one clapped hands by way of music. They had bows and arrows with them, which however they did not attempt to use.

7. I enjoined on the Gangsmen greater caution, and referred them to the orders they had already received, *viz.*, to signal away any Aborigines coming armed, and to allow them to land only on their leaving their weapons on the opposite shore. I may here note that experience has fully proved that these people, with all their extreme rudeness, fully understand it to be good manners to leave weapons behind when meeting strangers. The Gangsmen were also again warned not to encourage plunder, by allowing them to help themselves *ad libitum*, but directed to restrict the Aborigines closely to that moderate amount which should be given to them.

8. On the 9th, eight Aborigines came over again in a canoe to Viper Island. Four came up and four remained in their canoe. The former were fed as usual, and dismissed with a full stalk of plantains to each; they took what they had received down to their canoe, and returned for more. On being refused, they rushed into the convict lines, and began to plunder. The Sebundy Guard was called, and when they came in sight, the Gangsman caused the Aborigines to be seized by convicts. Their bows and arrows, with which they had threatened people, were taken from them, and after a short time they were released and suffered to depart. The Gangsman reports that as they left, another canoe, full of Aborigines, came, who however returned with their fellows. The Gangsman begged he might be allowed to keep them off in future, as he apprehended mischief.

9. He was again referred to his standing orders, *viz.*, to prevent any from landing till they had deposited their arms on the other

shore, to treat them kindly, feed them moderately, and dismiss them. He was directed to prevent them from landing armed, and to seize any who though unarmed should persist in plundering.

10. On the next day, the 10th January, the Gangsman reported that a large number had come down on the opposite or Western shore, facing Viper Island, of whom eight came over in one canoe. That in spite of the presence of the Madras Guard, and the exhibition of muskets, they had landed and cut plantains by force, lading their boat so full that to enable them to carry off their plunder they were obliged to leave three of their number behind. These three he seized, and it appearing that the canoe was returning with a larger number, he requested the Guard to fire over them, whereon the party in the boat, together with those on the shore, fled. In seizing the three, one convict was wounded with a knife made from iron hoop, which the savage carried suspended from his neck.

11. One of these Aborigines, afterwards named by the sailors Punch Blair, was recognised as having been always a foremost personage, and as being the man who unprovoked shot the arrow on 31st December, from the result of which a boatman lost his life.

12. The Aborigines did not appear again in that quarter immediately. On the 14th, however, a party of eight came down upon a gang of convicts cleaning a path from Atlanta Point to Navy Bay, and without much resistance on their part, carried off the tools with which they were working; they also took the tickets bearing the convicts' numbers, the pieces of string, &c., about their persons, and the Juneo or Brahminical thread of those that wore it.

13. Previous to this occurrence, Aborigines had not been known to cross the line upon which the convicts were working for at least fifteen months. A Guard of 20 Sebundies were ordered to support the party next day.

14. On the 15th, this party was again attacked. The Sebundies fired a few shots which proved sufficiently harmless, and the convict Gangsmen with the party seized and bound three of the Aborigines, taking their arms from them. Of the Sebundies, one was wounded with an arrow, three convicts were also wounded, two with arrows, and one with a bad bite in the arm. Of the Aborigines, two had ribs broken, and two also had slight bayonet wounds, all I am sorry to say inflicted by the Sebundies after their capture.

15. One of the men captured had a convict's ticket hung from his neck; this as well as an axe, Juneos, &c., found on them, had been plundered from the convicts on the previous day.

16. On 16th, Punch, who had been closely guarded by the Naval Brigade, managed to give them the slip. Being the most boyish of the party, though no boy—he had only been secured with a rope, which he bit through in silence during the night; once that he had made a rush in the dark, the sentry might as well have attempted to catch a fox as him. The whole Brigade was turned out in an unsuccessful chase after him.

17. On the 18th, one of the male convicts from the Punjab escaped from Viper Island with the woman—a female convict from the same quarter—he had espoused. On 24th, a canoe was seen passing Viper Isle with an Andamanese in it, having a white garment on—it was fired upon, the clothed one being, it was supposed, Punch. In the canoe, which the men instantly abandoned, was found a tin containing Ghee, which could only have been of the stock of the convict who ran away on the 18th. About the same time, distant from Viper Island six or seven miles, a very large canoe containing eight or ten persons was observed coming round the North Point of the Harbour. Mr. Brown of the Naval Brigade was sent with a boat to observe them. Meanwhile looking on with a glass, I distinctly saw a party on shore, shooting fish with bows and arrows, and taking shell fish, going parallel to the canoe. The shore party had one man with white cloth round his head and waist, and two men were painted bright red from head to foot, but otherwise in a state of nature.

18. I observed, as Mr. Brown's boat approached the party, a portion of them, including the white clothed one, who was, I think, an Andamanese, disappeared in the jungle. A number, however, swam off boldly to the boat, one very distinctly, before he entered the water, waving a red cloth. Mr. Brown observed something in their motions which led him to distrust them. He caused a shot to be fired over them, whereon they made off. The red cloth was abandoned by the Aborigine, and has since been identified as the upper clothing of the female who ran away on the 18th.

19. On 29th, the Aborigines who had been taken out for an airing attempted to bolt. They violently resisted recapture, but ineffectually.

20. The course to adopt with regard to these people has been a subject of much anxiety to me. If too much encouraged, our people were liable to be plundered, killed, or wounded—on the other hand without some encouragement we must for ever remain strangers, and, it would seem, at war with them. My endeavour has been to maintain the golden mean,—at all times to avoid aggressive attacks and bloodshed,—to treat them kindly, and at the same time not to mislead them into plundering and killing our people.

21. Considering the circumstances under which they came into our hands, *viz.*, that three were taken in an aggressive attack, that the other three, though not actually at the time fighting against us, formed a portion of an armed plundering party, and that one of them had, as far as I have the means of knowing, without the least provocation, inflicted a wound on one of our party, from the effect of which he died,—I have thought myself warranted in detaining them with a view to their being made, if possible, the means of intercourse with their countrymen hereafter.

22. But I find it impossible to retain them here without an amount of restraint which would defeat entirely our object in keeping them. The temptation to escape is too great, and they are as slippery as eels.

23. One of them is old and grey headed, another of them is deformed (hump-backed), and stupid. These two I propose to keep for a time and release. The other three I purpose shipping to the Commissioner of Pegu, to be retained for a few months, taught a little English, and sent back.

24. I consider the climate and circumstances of the Tenasserim Coast the most favorable for them, and with reference to this fact, and the fate of the man captured by the Andaman Committee, abstain from sending them to Calcutta.

25. They will be embarked on the *Tubal Cain* bound to Rangoon, and I have requested the Officer commanding the Naval Brigade to send with them one of the men who has been specially in charge of them, to remain till his services are dispensed with by Colonel Phayre.

26. Apart from the natural effort to regain liberty, they have shown themselves quiet and tractable. They appear fond of their keepers. They caress children and young animals, and seem kind to

one another, but I will not on the present occasion enter on an account of their manners.

27. In conclusion I trust my proceedings with regard to these people will meet the approval of the Government, and that in such case the Government will be pleased to instruct Colonel Phayre accordingly.

From Captain J. C. HAUGHTON, Superintendent Port Blair, to W. GREY, Esquire, Secretary to Government of India, No. 85, dated the 27th March, 1861.

In continuation of my letter No. 67, of 10th January, I have the honor to report for the information of His Honor the President in Council, that finding nothing further was to be gained by keeping the two Aborigines remaining in custody, I released them on the spot where they had been captured on 15th February.

2. They were supplied with as many yams, plantains, old hoops, and other trifling articles of little value, as they could carry, care was taken not to give them anything that was likely to be converted into a weapon of offence.

3. When they finally left us, they shewed great reluctance at parting with their keeper. They kissed his hands, and tried to induce him to accompany them, I cannot doubt but that they felt affection for him.

4. The effect of the capture and treatment of these men as yet appears to be good, we have had no attack since, and a few days ago one of our boats a short way down the coast fell in with a party of them, among whom the humpbacked man named by the Sailors "Tuesday Blair," was recognized. They laid aside their bows and arrows and came down to the boat, two or three of their number remaining with the women and arms, watching about one hundred paces off. One got into the boat. They asked eagerly for plantains, which they call *cangary* or *hangary*. One of the Seamen wishing to possess himself of a bow, made them to understand by signs what he wanted, this was called for, but no sufficiently tempting offer in exchange for it being made, it was taken back again. The boatmen made them a present of a fishing line and some hooks, and parted with them on friendly terms. On the evening of 28th March being

myself out for a sail north of the harbour, I landed at a place which had the appearance of being supplied with fresh water. Though no native was in sight, footmarks in the sand assured me they were close by; and in fact we soon observed a party watching us at a distance. On re-embarking I hung up a bunch of plantains brought to meet the contingency of our meeting them. The party as we left cautiously approached the spot, and when they saw the plantains, rushed at them, and apparently in a few seconds left none remaining. I may here remark that the plantain appears to be indigenous, but in its wild state, the fruit is a mere bag of large seeds, slightly covered with glutinous matter.

5. The general impression conveyed to us by the demeanour of the captives was very favorable. They appeared kind to one another, and generally when not in the act of attempting escape, very gentle and tractable. Tuesday had one of his ribs broken by a Sebundy after capture, while being brought in—a piece of wanton cruelty duly noticed by me. His comrades at his request scarified him with broken glass, and, on being furnished with a cupping lancet, performed the operation very successfully, to his great relief. If allowed they would eat from morning till night. The food they chiefly preferred was pig's flesh, fish, unripe plantains, (which they roast) yams, rice and biscuit,—ripe plantains they cared but little for. It was observed that whatever they received was honestly divided, though the party into whose hands it first fell took care to help himself first. Any food remaining at night was carefully packed up to be eaten in the morning.

6. It is a matter of much regret that so very few words of their language have been acquired. The restraint under which it was necessary to keep them, and want of time, prevented me from devoting myself to the interesting task of learning something of it. The sound of it is not unpleasing to the ear, and it would appear to be more regular than the Burmese. We judged it to be polysyllabic, but I must confess that our slender vocabulary cannot be appealed to with confidence. To acquire anything like certainty regarding it, requires the devotion of much time and patient attention to it.

7. There is one point of great interest regarding them which I must not suffer to pass unnoticed—the question as to whether they acknowledge any spiritual power or not? Colonel Symes

says they do. The convict Doodnath, who lived among them for thirteen months, assured me that he could discover no trace of religious worship or the acknowledgment of any unseen power among them. It was reported to me by their keepers, that they daily, but not at any fixed time, went through what was supposed to be worship. The time chosen was when they were by themselves in the small room appropriated to them. They all sat, and one repeated some words to which all the rest responded, touching in turn various parts for their bodies. This would last for more than half an hour. I was very anxious to satisfy myself on this subject, but though I gave directions that I should be informed whenever they were so engaged, could not gratify myself in this respect, as they invariably left off when they discovered that they were observed.

8. I append a list of the few words acquired from them, and also some notes made by Lieutenant S. Hellard, Indian Navy, while they were in his charge, which I trust may not be without interest.

9. In conclusion, I beg to assure His Lordship the Governor General in Council, that it will always continue to be my anxious desire not only to prevent any aggression upon the natives, but if possible to conciliate them—the task is however a delicate and difficult one.

P. S.—Since the foregoing was written, a party has visited Viper Island; they came unarmed, and instead of attempting to take plantains by force, begged for them. The beggar's whine is thoroughly understood and used even here.

NOTES ON THE ANDAMANESE CAPTURED AT PORT BLAIR.

Thursday, 10th January, 1861.—Three of the aborigines captured at Viper Island. Went up in the launch, and found them in the stocks, and apparently quite indifferent, until taken to the boat, handcuffed with their hands behind their backs. In beating down, they seemed to expect to be landed whenever we neared the shore: they instantly asked for *punno* (water) and all three at the same moment managed to bring their hands in front. On landing at Ross Island they were very sullen, but eating plantains freely or any

thing else that was given them. During the night one remained awake, and two out of the three managed to get off their handcuffs, their wrist being remarkably small. A man was appointed to look after each, and they named them Punch, Friday, and Crusoe, with the surname of Blair. They did not appear the least astonished at any thing they saw, nor do they like the men over them to *leave them*.

11th.—Fish being brought for them, Crusoe turned cook, opening and cleaning them with his teeth, and, when done, divided it all equally; this finished, he roasted green plantains, and they all ate enormously. During the night the one on watch, Punch, fancied the sentry was asleep, and awoke the others to be ready for a run; he then crept to the bottom of the bed, but a box on the ear soon convinced him that if Jack did sleep it was with his weather-eye lifting. When taken they were quite in a state of nature, but to-day they were dressed and taken up to the Superintendent's house. Here they appeared somewhat surprised, particularly at a large mirror, at which they grinned, but they were very much taken up with little Harry H—, and so inquisitive did they become, that Mr. Punch wished to lift his clothes to see whether he was a boy or girl; he also wished to take ornaments from the neck of one of the native women. They now are not the least afraid, although at times very sullen.

12th.—Had all three at the Officers' Quarters, with the view of picking up some of their language, but they were so much taken up with pictures and other things, that they merely repeated every word we said. Their height is: Friday Blair, 4 feet 10 inches; Punch Blair, 5 feet 4 inches; Crusoe Blair, 5 feet 2½ inches.

13th.—Being Sunday, all three were nicely dressed in white, with straw hats with "I. N. Brigade" on the ribbon, which was a vast improvement. In the afternoon they went for a walk on the beach, and went over the gun-boat, walking after their keepers in a quiet orderly manner. Every thing like metal they admire and want, and when the handcuffs were removed they did not wish them to be taken away, and at the blacksmith's shop they wanted to take away all the bar iron. In the evening seeing the new moon for the first time they called out Auckalareoo, and commenced dancing, and in-

sisting on the men doing so with them, clapping with their hands to keep time, so that this is no doubt a great day with them.

14th.—They seem to improve daily, and their health is good. They all went to see the men at work at their different trades, but seemed only to care for the blacksmith and tinker. Punch seeing an English woman wished to kiss her, and Friday took the chain, a silver one, off an ayah's neck, which was of course returned. Seeing me he came up, and taking hold of my beard, put his hand inside my shirt collar, to see whether I had a chain of any kind. He also made motions to another officer, that he would cut his throat for his gold chain and ring; they are apparently fond of all animals, and have constantly a cat and a dog in their arms. They are very suspicious of our food, but will take anything uncooked, but they don't appear to eat undressed meat of any kind, and they also share all they get equally; at one meal they will eat a bunch of plantains weighing 9 seers, or eighteen pounds, besides meat. When the natives of India were near them, they mutter at them, but it is impossible to catch the words, but it appears from their manner to be abuse. They were asking for their fish to-day, and having none, a pigeon was given to each, which they cleaned and boiled, but they were very much puzzled to see four killed at one shot. Crusoe seeing a spy-glass, took it up, and brought it to the ready, taking aim at the same time, he then made a noise with his mouth, and threw his head back, as if he was killed. The working party at Aberdeen were attacked to-day, and driven in with the loss of all their tools, and a party of men were sent (N. B.) but saw nothing of the aborigines; although they recovered some of the axes, &c. The officer states that he should say about twenty had been there, the natives report fifty. A strong guard will be in future sent to protect the convicts. The savages are evidently accustomed to food the instant they awake, and if any thing is left they roll it up in a piece of cloth, and mar it down, in the same way they hide away bits of iron of any kind: they seem quite resigned, and do not appear to care for their own free land.

15th.—The aborigines again attacked and wounded the convicts working in the jungle, also one of the Sebundy Guard, but three were taken prisoners, and brought over, two are old men, and the other a nice looking lad. I was informed that one of them, the

oldest, and who has been injured in the back apparently by a shot some time back, knocked over eight natives before he was taken prisoner, some bows and arrows were taken with these men; they are nearly the same as the others, and all about the same height. Their teeth appear to be all worn down flat, not sharp as in other people's. On their being taken to the Barracks, their friends came to meet them, but they are not of the same party apparently, and they did not show any sign of pleasure at seeing them. Signs were made to take them to the wash-house, and here they were scrubbed, excepting the injured man, who was carefully placed on a cot until the arrival of medical aid, when he was fomented on the back, and had some medicine, and he slept for some time, and could then eat a good supper. At night these three were taken to another part of the barracks, when they all became frightened, and elung to the men in charge, and begged them not to let them go; and, to make them quite easy, they were shown where they were going, and they went to bed quite contentedly. They dance and sing every evening, but they require to be constantly watched, as they want every thing they see. One of the men passed during the day with some fresh pork, and they caught hold of him, and insisted on having some, calling out *Rhogo! Rhogo!* (pig, pig.) The instant food is given to them they eat, and if you tell them that they do not want it, they draw in their stomachs, as though they wished you to understand they were empty. The men taken to-day are very much thinner than the others, and their heads are all shaved; one has the great toe of his right foot off, and he says it was taken off by a large clam. He is named Toeless Blair, height* _____; another has a long scar extending from above the knee down to the ankle, and is named Tuesday Blair, height _____ the other is named Jumbo Blair height _____ Crusoe was most anxious to have them dressed, and without being told they took off all the wild ornaments, and threw them down. One man had a large quantity of rubbish about his neck; also a convict's ticket, and even a Brahmin's thread, and two old rusty nails.

16th.—This morning they were in sad tribulation because they had no fish, and the beef and vegetables given by the Steward did not satisfy them, but before eleven some came up, and they were

* [These blanks are in the original.--Eds.]

perfectly frantie, dancing and caressing the man who brought it up. Mr. Crusoe turned doctor, he got the sick man up, washed his back with cold water, and punctured it all over with a sharp piece of glass which appeared to relieve him vastly, and he then washed off the blood, and turned to clean and cook the fish, eating all the small ones first, and leaving the coarser kind for the evening meal: in the evening they danced to the fiddle, and appeared in high glee.

17th.—About half-past three Punch made his escape, having succeeded in the night to get his handcuffs off, but these were too precious to be left behind. Every search was made immediately, but the jungle gave him shelter, until he no doubt swam to the mainland, to fetch which he must be an expert swimmer, as it was blowing hard and a good sea rolling in. Friday had his irons off his hands, and was evidently ready for a start, but the first noise caused an alarm, and to his no small annoyance all his hopes were frustrated. On the principle of locking the stable door, the whole of them were placed in slight leg irons, which will at least prevent their removing far: all day they have been very sullen, and when out, their eyes seem to be constantly fixed on Atalanta Point, as though they expected aid from that quarter.

18th.—This morning, when raining, and they wished to go out, they took their clothes off first, so that they might not get wet. They still keep sullen, and are evidently ready for a bolt, provided they see a favourable opportunity, and with no place of security, and their well known cunning, it is impossible to keep them, however strongly watched. Shortly before sunset the air being cool and damp, I found them sitting round the fire, and each had a large piece of it holding it between his legs.

19th.—No fish being caught to-day, they had only plantains, and in the evening Crusoe went up to H. Smith and kissed him, at the same time pointing to the barracks, and making signs he was hungry, for sometimes they went to the men's messes of an evening, but since the escape it has not been allowed.

20th.—Irons are not at all pleasant, and to hear them growl is not bad; they are very anxious to have them taken off, and towards dark, they pretend to have pains in all their limbs. Crusoe asked so as to be understood when he would be let go.

21st.—To-day they beg hard to have the irons off, and promise as well as they can not to run away, but it must not be done.

22nd.—Not at all pleased at having to clean their room out; the beds they are almost too lazy to wash, but would eat all day if allowed.

1. Bow	Borogelly.	15. Take off.....	Ne giah.
2. Fly	Boomee.	16. To paddle ...	Cheilla.
3. Bow-string.	Flyda.	17. Tongs	Chy.
4. Water, give.	Pano de walay.	18. Moon.....	Chuekalareoo.
5. Yes	Oh.	19. Whiskers ...	Sooka.
6. Flesh.....	Rogo.	20. Musie	Dentregnah.
7. Fowl.....	Deer.	21. Eat.....	Lay.
8. Shell	Ortamboo.	22. To give	De walay.
9. To eat	Cha loek.	23. Yam	Chatah.
10. Knife.....	Coono.	24. Fish	Dar, Jouh.
11. To drink ...	Meengohee	25. No good ...	Fa maekrey.
12. Canoe	Hobab.	26. Wood	Chopah.
13. Water	Panno.	27. Bed, quilt ...	Doo tram.
14. Plantains ...	Changrah.		

A Note on certain Aborigines of the Andaman Islands, by Lieut.-Colonel ALBERT FYTCHE, Commissioner of the Tenasserim and Martaban Provinces.

A ehanee has occurred to me lately of observing three Aborigines of the Andamans, who were captured in the vicinity of Port Blair, some four months ago, in an attempt, together with others of their countrymen, to acquire possession of the working implements of a party of convicts. They were however surrounded by the convicts, who happened to be in considerable numbers at the time, and as many as seven of them were taken prisoners. These were deprived of their arms, and detained for some weeks at Port Blair, when one of them managed to effect his escape, and three others were released from duranee. The remaining three who were less advanced in years than the rest of the party, it was deemed advisable to send off by a Steamer leaving the settlement for Rangoon, with a view to ascertain whether some knowledge of their language could be acquired, and at the same time to impart to them some idea of the power and resources of their captors.

While in Rangoon, they were lodged for security's sake within the precincts of the Jail, under charge of an English Sailor, who took them out daily for a walk about the town and suburbs. Though regarded with great curiosity by the Burmese, they did not appear to be at all disconcerted by the notice they occasioned. No progress was however made in acquiring means of communication with them, and it was thought desirable to forward them to Moulmein, from which place they might the more readily be shipped to their own country, should circumstances require it. On their landing at Moulmein from the Steamer, they happened to meet, and recognize in the street, an intelligent Burman, who was formerly in the service of Captain Haughton, the present Superintendent of Port Blair, a man who had moreover a passable knowledge of the English language, and who willingly undertook the charge of them upon the terms offered to him.

On the voyage from Rangoon to Moulmein, Mr. Blyth of our Society had a constant opportunity of observing them, and contrived to ingratiate himself into their good favour. Short as had been their introduction into civilized life, they had already acquired a fondness for tobacco, and he states there was no better passport to their good graces than an offer of a cheroot, and it was amusing to observe how quickly they learned the pocket, in which any one kept his cheroots, for they would point to the pocket, and give a gesture by way of hint, that they would like to enjoy one. Being thus indulged, they would quite politely offer to take a light from the cigar of any one, who happened to be smoking in their vicinity, and in return would offer a light from their cigar, when it was needed. They were in high spirits when on board the Steamer, evidently supposing that the vessel was destined for their own country, they had picked up the name Port Blair, and could always most readily indicate the exact direction of their own islands, pointing to the position of the sun as their guide. This they intimated by signs, that it would be difficult to misunderstand. They were accordingly disappointed when brought ashore at Moulmein, and were at first down-hearted, when the Steamer left without taking them, but apparently recovered their self-possession in the course of a few days. One however was ailing from a pulmonary disorder, from which he is still suffering.

Since the arrival of these men at Moulmein, I have made an especial study of them, and their reputed similarity to the true African Negro appears to have been greatly exaggerated. The forehead is well formed, and not retreating, neither are the lips coarse and projecting, and the nostrils are by no means broad, the ear is small and well formed, the hair unlike the so-called woolly hair of a Negro and growing conspicuously in separate detached tufts. They have absolutely no trace of whiskers, beard, or mustache, and have been long enough in captivity for the growth of such, were it existent. The hair of the head also shews little disposition to elongate, it continues very short and crisped. The complexion is not a deep black, but rather of a sooty hue, hands and feet small, the latter not exhibiting the projecting heel of the true Negro.

The Andamanese appear to be one of many remnants, still extant, of a race, that was formerly very extensively diffused over South Eastern Asia and its Archipelago, which, for the most part, has been extirpated by races more advanced towards civilization, being now driven to remote islands, or mountain fastnesses, such as the Andamans, the interior of the great Nicobar (where they are reported to be constantly at warfare with the people of the coast), and within the present century for certain (*vide* Crawford), and probably even now, there are, or were, tribes of them in the mountains of the interior of the Malayan Peninsula, Sumatra, Borneo, and especially the Philippine Islands, where the island of Negros, derives this, its Spanish appellation, from its being inhabited by a blackish race, variously known as the Negrillo, Negrito, or true Papuan. The race has its head quarters in the great islands of Papua or New Guinea, where some tribes are found attaining to six feet in stature, whilst others are as diminutive as the Andamanese.

Upon the island-continent of Australia, the true Papuan type has never been detected; but it formerly constituted the people of Tasmania, so numerous at the time of Captain Cook's visit, but which race is there now all but extinct, three or four individuals only surviving. The history of the capture of the last remnant of the race inhabiting Tasmania is well known, and their removal to an island in Bass's Straits, where the Government provided them with blankets, and a certain amount of food; but it is remarkable, that they died off fast, and chiefly from pulmonary consumption.

The same remark has been made also of the New Zealander, belonging to a very different race of humankind, since the introduction of blankets, and other European clothing amongst them, they having also been subject to pulmonary diseases, which seem to have been previously unknown.

Now it is remarkable of the three Andamanese at present in Moulmein, one is already suffering from a pulmonary affection, and it is desirable, that he, at least, should be returned to Port Blair, by the first opportunity. The others also appear pining from this cause, and from home sickness,—they are not likely to learn much more than what they have already learnt, should their stay be further protracted. Besides it may not be advisable to overstrain their faculties. They are quite able to appreciate the kindness, with which they have been treated, and it is well that they should communicate this to their fellow savages. It may be finally added, that they have been uniformly tractable and good humored, and have manifested a marked partiality for children. It is to be regretted, that scarcely a word has been gathered of their language, the sounds of which are by no means confused, or inarticulate. The reason is, that they persist in imitating every sound, that is addressed to them, and it is only when they try to make themselves understood, or in speaking one to another, that an idea of their vocal enunciation can be obtained. Although in the prime of life, they are in fact too old to be taught much. But should any accident happen to throw children of the race under the care of Captain Haughton, there might then be a better opportunity of acquiring means of linguistic communication.

Since the foregoing remarks were committed to paper, our Andamanese friends conceived the idea of an escapade, and very nearly carried it into effect. One very boisterous and rainy night, it was discovered at 2 A. M., that they had absconded, and at dawn their foot prints were traced to a sawpit, on the banks of the Moulmein river, near their late place of abode, where it appears they had collected a few loose planks, with which they had formed a raft, and boldly launched themselves off. A single large yam was the only provision they had taken with them, as far as could be learned. Three police boats were sent immediately in pursuit of the fugitives, and at nightfall intelligence was obtained of their having been seen by a Talong, on an islet about twelve miles below Moulmein. On

the same night they must have again pushed forward on their raft, which was soon broken up on their arrival in rough water, whereupon they swam ashore, landing at the S. E. corner of the Island of Belookywn, near the entrance of the river. They were there seen by some villagers, who, suspecting them to be runaways, took them to their kyee-dan-gyee, or village elder, by whom they were taken proper care of, and forwarded into Moulmein.

On the evening prior to their departure, they went to see Major Tiekell, to whose charge they were intrusted, and appeared to be in particularly high spirits, patting him and others on the back, with the utmost good humour, and talking to each other in (to us) an unintelligible language. When brought before Major Tiekell on their return, they appeared just as good humoured as ever, quite unabashed and unconsious of having done wrong. They were very hungry when first taken, as might be supposed, and submitted unrepiningly to their destiny, very probably consious that they had escaped a worse evil.

Moulmein, June 10th, 1861.

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*On the Identity of the Toramānas of Eran, Gwalior and Kashmir.—*  
By *Bábu RÁJENDRALÁLA MÍTRA.*

Some months ago I received from Mr. Grote a number of Sanskrita inscriptions collected, at various times, by Colonel Alexander Cunningham, during his tours in central India. They are in facsimile on paper, and prepared with great care and accuracy; but owing to decay and defacement of the stones from which they have been taken, most of them are full of lacunæ and ill-adapted to afford any reliable historical data. Of those which are legible, the most ancient appears to be a record comprised in 9 lines of the Gupta characters inscribed on a slab 2' 7" by 7" inches. The position which the stone occupies is the porch of a temple in the fort of Gwalior, and the inscription is well cut and well preserved, excepting a small portion on the left side which, having been covered by the plastering of the adjoining wall or otherwise defaced, is quite obliterated on the facsimile. The first line of the record which contains a complete stanza in the máliní meter has lost the initial syllable. The second has three syllables missing. The subsequent lines being in prose, it is difficult to say the number of letters that

have been lost of them. It is evident, however, that the extent of the loss cannot be great, and that of no material consequence in an antiquarian point of view, however much it may stand in the way of a literal interpretation of the monument.

The subject of the record is the dedication of a temple to the sun in the 15th year of the reign of PASHUPATI son of TORAMĀNA, by one MÁTRICHEṬA son of MÁTRIDĀSA and grandson of MÁTRITULA. No information has been vouchsafed as to the antecedents of the donor, nor of the sovereign in whose reign the dedication was made, and entire silence has been preserved as to their native country. The name of the hill on which the temple is said to have been erected was Sarpāhvaya, and that of the engraver Kesava, the former being either an *alias* or the name of a particular spot of Udayagiri or the Gwalior Hill.

The historical magnitude of this event cannot but be extremely insignificant, and the only point of importance in the document—the identity of the prince named—is so involved in doubt that nothing better than a conjecture can be hazarded in regard to it.

In one of the two inscriptions brought from Eran by Captain Burt, James Prinsep noticed the name of a paramount sovereign whom he called Tárápáni. He was supposed to have been the successor of Budhagupta in Saurāstra and liege lord of a petty chief of Bhupal who styled himself Mahárájá Mátrivishnu. Professor Lassen, when commenting upon these inscriptions in his “Indian Antiquities,” set the title *Rájádhirája* “king of kings” to the credit of oriental hyperbole, and assumed Tárápáni, the owner of it, to have been “a viceroy of Budhagupta in Bhupal or Eastern Malwa.” The arguments, however, from which the Professor’s conclusions are drawn, are too weak to admit of any scrutiny. Prinsep, notwithstanding his untiring diligence and splendid critical acumen, was obliged, owing to his own want of familiarity with the Sanskrita, to depend upon his interpreters, and they, blind to the importance of the work upon which he was so ardently engaged, neglected their duty and trifled with him in all matters, in which he could not readily detect the imposition they practiced upon him. Hence it is, that his translation of the Eran records (vide ante Vol. VII. p. 631 et seq.) is sadly defective in many respects. Even the proper names in two instances are misrepresented, and the paramount

sovereign Tārapāni appears only to be a mislection of Toramāna. Col. Cunningham was the first to point out the mistake with regard to the name of the king, but by assuming the rest of Prinsep's translation to be correct, he was led to opinions which the advantages of subsequent rescarches shew to be other than well-founded. He supposed that the record adverted to a regency of Dhanyavishṇu during the minority of the young prince Toramāna, and by a curious mislection of the document now under notice, made him the son of Mātridāsa and the grandson of Mātrikula.\* According to him the principality of Toramāna extended from Eran to the banks of the Jumna, and his reign from A. C. 520 to 550. Mr. Fitz-Edward Hall in his "Note on Budhagupta"†—accepts these deductions with only a few reservations. He assumes Toramāna to have been "an usurper and a proximate, if not the immediate, successor of Budhagupta, the first sovereign of a tentative independent branch (of the Gupta dynasty ?) which almost certainly ended with himself."

However this be, from the revised translation of the Eran records lately published by him, it is certain that one Mātrivishṇu who describes himself as a "Mahārājā," "the owner of the splendour of royalty," "of fame recognised as far as the four oceans," "of unimpaired wealth and dignity,"‡ and "victorious in many a battle over his enemies"—was the immediate ruler of a tract of country of which Eran was an integral portion if not the centre, and that he owned allegiance to a suzerain of the name of Budhagupta, whose dominion extended from the banks of the Jumna to that of the Nerbudda, and that his brother Dhanyavishṇu succeeded him in his dominion at a time when one Toramāna held the paramount power. This we accept from the statement of the inscriptions, without any reference to the argument implied in the remark of Mr. Hall when he says, "By the kings of all ages the minting of money has been zealously

\* *Bhilsa Topes*, p. 163.

† Ante, p. 145.

‡ अक्षिणमानघनस्य It is remarkable that a critic so fastidiously exact as Mr. Hall, should have overlooked the word *māna* in the epithet and translated it "of unimpaired wealth," which at best can be but a dubious praise, quite unworthy of the royalty it is intended to eulogise. His version, in another place, is open to a rhetorical objection from which the original is free. He makes the king acquire, "like as a maiden sometimes elects her husband, the splendour of royalty;" whereas according to the Sanskrit recorder the goddess of royal fortune, Rājā Lakshmi, elects him as her lord.

reserved as a royalty; and Toramāna is known to have coined copper;" for we shall presently shew that a Toramāna did strike gold without assuming the imperial purple, and that his copper coins are still extant, not to advert to the privilege of coining held by the Cæsars or younger Rájás of Rome.

The inscriptions are most provokingly silent as to the antecedents of the two sovereigns, and the epithet GUPTA is almost the only voucher\* to the assumption that Budha belonged to the race of Chandragupta Vikramāditya. Of Toramāna there is not even that unsatisfactory clue. Prinsep threw out only a conjecture when he called him a king of Saurástra,† and Messrs. Lassen,‡ Cunningham§ and Thomas|| make him a successor of Budhagupta in Ougein on no better grounds. "As the celebrated hill of Udayagiri is mentioned in the Gwalior inscription, there can be no doubt" says, Col. Cunningham, "of the identity of the two Toramānas" i. e. of the Gwalior and Eran inscriptions. The similiarity of the characters (Gupta) of the two records may be taken, *ad valorem*, as a proof in support of the identity, and the circumstances of the country between the Jumna and the Nurbudda being mentioned in the Eran record,¶ and Udayagiri being situated within that country, may be assumed as another and a strong one in its favour; still the evidence, it must be admitted, is not conclusive. It is quite within the range of possibility that there should be two kings of the same name

\* The only other is the mention of *Fo tho kiuto* as one of the Guptas by Hwán Thsang, Ante, XVII. p. 487.

† Not, as it has been supposed, by the misapprehension of a word in the inscription, which Mr. Hall (Ante p. 18) has read *saisurabhv*. It would be a presumption on our part to question the reading of one who has the evidence of his own eyes to support it, and yet we feel disposed to think that Mr. Hall's reading is the offspring of an illusion. The particle *Sam* is seldom if ever used before other than a verb or a participial noun; Pánini says that prefixes of the class *Gati* (which includes *Sam*) should be used before verbal roots only (ने प्राग्घातेः १।४।८० Bohtlingk I. p. 51.) It is not at all likely, therefore, that the writer of the inscription should have so sinned against grammar, as to put the particle before the noun *sura*, and produce the dubious epithet of *sam* "with," *sura* "a god," and *bhu* "land," Mr. Prinsep's reading is *samsuratam*, from *sam* "with" or "altogether" *su*—"well" and *rata* "pleased," i. e. a country the people of which were well pleased with its government. Such an epithet appears much more appropriate than the amendment of Mr. Hall.

‡ *Indische Alterthumskunde*, II. p. 751.

§ *Bhilsa Topes*, 163.

|| *Journal Rl. As. Soc.* XII. p. 71. et ante XXIV. p. 515.

¶ The allusion is made with reference to Budhagupta, and not Toramāna, whose dominion has not been defined.

at different times in the same country, and that inscriptions should be found in the same character bearing their names in a manner, so as to appear that they were productions of one reign. But I believe it will be readily admitted that the arguments in favour of the identity of the two Toramānas are stronger than those against it; and if that identity be admitted, I think, we shall find a clue to the antecedents of our monarch which, for purposes of Indian history, may not be altogether worthless.

The Gwalior inscription was put up in the 15th year of the reign of Pashupati, son of Toramāna, and at about the time when the Toramāna of Eran flourished i. e. about the end of the 5th century A. C. there lived a king of the same name in Kashmir, and the name of his son was Pravarasena *alias* Pashupati. The question hence arises are the two Pashupatis identical? Both are descendants of the solar race; both are said to be the sons of Toramāna; both lived at about the same time, and both had considerable influence in central India. According to the history of Kashmir, Pravara was the fourth in a direct line from Meghavāhana, the founder of the Gonardya dynasty. The second monarch of the line was Sreshthasena\* whose two sons Hiranya and Toramāna succeeded him on his death. The latter, like Cæsar, was never the rightful occupant of a throne, but having been an able and intriguing prince, he long exercised sovereign powers. Kalhana† says that he suppressed the ancient coinage of the country which was known by the name of *Balāhāt*, and issued a gold dinar which continued for a long time to be the standard coin of his race. Specimens of this currency are not now extant, but the number and variety of his copper coins attest the high influence which the prince exercised in his brother's dominions. That influence did not, however, save him from an untimely death in a prison, to which he was consigned for his presumption in striking coins in his own name during the lifetime of his liege lord. Pravara *alias* Pashupati was the only son of Toramāna. He was born in the house of a potter when his father was in prison, and was brought up under the care of his

\* In Thomas's Prinsep, vol. II. p. 244, evidently by a misapprehension of the term "grandfather," this king is said to have *Pravarasena* for his *alias*. According to the history of Kashmir, it was from the name of his maternal, and not paternal, grandfather, that Pravara son of Toramāna assumed his name.

† Troyer's *Histoire des Rois de Kachmir*, II. p. 137.



maternal grandfather. After a long life spent in travel he wrested his uncle's dominion from the hands of a brahmin usurper Matri-gupta\* on whom Harsa Vikramāditya of Ougein had bestowed it. His reign proved long and highly prosperous. According to his chroniclers he extended his arms from Kashmir to where the Ganges pours into the sea; † and his minister Morāka, in his name, swayed the royal sceptre in Ceylon To the south, Pravara extended his conquests as far as Guzarāt, whence he restored Malwa to Silāditya *alias* Pratāpasila son of Vikramāditya, who had been expelled for some time from his patrimony by his enemies. The only return which he exacted, for this act of magnanimity to one whose father had been instrumental in giving away his uncle's dominion to a parasite, was, it is said, no more than the famous throne of Vikrama which was supposed to have been mounted on thirty-two nymphs of rare merit. As an encourager of public works, Pravara's name stands connected with the foundation of the city of S'rinagara, which he is fabled to have built in compliance with the advice of Vetāla, the demon attendant of Vikrama. A large bridge across the Vitastā (Byas) and several minor works of utility are likewise set down to his credit. Although described as a staunch Hindu and named Pashupati from his ardent devotion to Siva, he seems to have been connected by his mother's side with the followers of, at the time, a heretical faith; and his uncle Jayandhra claims preëminence for his dedication of a large Vihara to Vrihad Buddha. It is nowhere mentioned that Pravara ever had any control over Gwalior, but the circumstance of his power having extended as far as Guzarāt viâ Ougein, would justify the supposition that he had, and that the name in the Gwalior inscription is his.

The first objection which suggests itself against this identification is the fact of Pravara's having assisted the son of Vikramāditya in regaining his paternal throne. Now, if this Vikramāditya be, as supposed by Col. Cunningham, the same with Chandragupta *alias*

\* In an excellent paper on Kālidāsa, read before the Bombay Branch of the Rl. Asiatic Society, Dr. Blau Dájec has attempted to prove the identity of Matri-gupta with that renowned poet.

† स गङ्गालिङ्गिताङ्गस्य पूर्व्व वारिनिधेर्व्यधात् ।

सैन्येभसदनिष्यन्दैः कालिन्दोसङ्गमस्त्रिरं ॥

Rāja Tarangini, chap. 3, v. 37.



Harsha Vikramāditya, the Pravara of Kashmir would be synchronous with Kumāragupata, several generations before Budhagupta assumed the royal sceptre, while the prince of the Gwalior inscription, believing him to be identical with the sovereign of the Eran temple, would be a generation after that event. This difficulty, however, is more apparent than real. The title of Vikramāditya has been assumed by so many princes at such different times, and Hindu writers have used it with such utter indifference to precision, that it is quite unsafe as a historical guide, and not at all deserving of the regard which allusions of such contemporaneity usually claim. Where every prince above mediocrity, proclaimed himself a Vikrama, it is futile to expect that the occurrence of the title alone in any ancient document should help us to its date. But were it otherwise, there would still be no difficulty in finding a Vikrama, to whose son our Pravara might have been a benefactor. Skandagupta, the immediate predecessor of Budhagupta, in one of his coins\* calls himself a great Bhāgavat and Vikramāditya, and if we could, relying on Mr. Hall's assumption of Budha having been "the first sovereign of an independent branch which ended with himself," suppose that he had deposed the rightful heir Pratápāsila *alias* Ś'ilāditya, Skanda would be the sovereign of whom mention is made in the Rājā Taraṅginī under the title of Vikrama. He was succeeded by an usurper in the person of Budhagupta, who, in his turn yielded the empire to another. It is not at all unlikely that an adventurous and ambitious prince like Toramāna should, with the resources of his brother at command, issue forth from the "hill-enclosed valley" to found a kingdom of his own in the fertile land of central India, the seat of a once flourishing empire, but then distracted by the rule of an usurper, and have himself recognised as the paramount sovereign. Without some such success, it is difficult to suppose, that a prince would venture to assume the high prerogative of issuing money in his own name and suppressing the old currency of the country. Thus he was an usurper in central India and a rebel in his own country. Mr. Hall admits the first, and we have the authority of the Rājā Taraṅginī for the second position. A prince so situated, however successful for a time, could never reign in safety. His brother and liege

\* *Parama bhāgavata Sri Vikramāditya Skandagupta.* Tuli device coins. Journal Rl. As. Soc. XII. pl. I. p. 51.

lord in the land of his birth naturally looked upon him with fear and envy, and his foreign dependency could not be trusted without the assurance of help from his native country. The usual consequence followed, and he ended his days in prison.

The second objection to the identification would be the date of the *Satrunjaya Māhātmya* which makes Ś'ilāditya the contemporary of Pravarasena, flourish in the year 477 of the Christian era, while according to the recorded date of the Varāha inscription, coupled with the assumption that the era of that record commenced a little after the third century, in the year 319 A. C., the father of Pravarasena lived at the beginning, if not in the middle, of the sixth century. But Orientalists are very much divided in opinion regarding the origin of the Gupta era. According to Mr. Hall's conjecture its starting point may be taken to be 278 A. C. to which if we add 165 of the Budhagupta inscription, we completely rid ourselves of the anachronism, and have Toramāna brought within a few years after 443.

Col. Cunningham in his essay on "the ancient coinage of Kashmir,"\* assumes the Toramāna of that country to have reigned from the year 415 to 430 A. C. But, as his revision of the chronology of the Gonardiya dynasty is effected, principally, by a distribution of the 300 years of the reign of Ranāditya among his predecessors, and by casting averages, which when many centuries are taken into account, cannot be so precise as not to admit of a difference of twenty or thirty years, his calculations will not, we presume, be taken as opposed to our assignment of the date of Toramāna. It must be admitted that in his Bhilsa Topes,† the learned Colonel has placed the Toramāna of the Eran monument in the middle of the sixth century, but as his calculations in that case were founded upon the assumption of the Gupta era having commenced in the middle of the fourth century, they are open to revision whenever the starting point of that era is definitively fixed.

Of the coins of Toramāna, three different types are now available,‡ of which the first is of the true Kenerki stamp, exactly similar to the

\* Numismatic Chronicle, vol. VI. p. 18.

† *Loc. cit.*

‡ Mr. E. C. Bayley, C. S. informs me of a copper coin of Pravara with the Kenerki obverse, but the female figure on the reverse mounted on a lion. I hope ere long to have an opportunity of presenting a figure of this unique specimen to the readers of the Journal.

Kashmir coins of the successors of the Toramāna\* of that country; the second is of the Gupta device, with the Shah profile on the obverse and the peacock on the reverse.† And for the third we have the Shah profile on one and a *chakra* or discus on the other side.‡ These might suggest the idea of two distinct Toramānas, one of central India with the mint mark of the Guptas and the other of Kashmir. But if it be supposed—and there is nothing opposed to it—that Toramāna in his conquered dominions retained the mintage best known to his new subjects, the difficulty may be easily met, and the conjecture regarding the identity of the several Toramānas allowed to stand *pro tempore* as a fact in Indian history.

*Transcript of the Gwalior Inscription.*

I. (जग) (1)ति जलदनीलं(2) ध्वान्तमुत्सारयन्स्वैः किरणनिव-  
हजालैर्योमविद्योतयद्भिः उ(दयगिरि) (3)तटाग्रं मण्डयन्(4) यः  
खरामैः चक्रितगम(5)नखेदभ्रान्तचञ्चत्स(6) टान्तैः उदयगिरि

II. \* \* \* चक्रभक्तार्त्ति(7)हर्त्ता भुवनभवनदीपः शर्वरीनाशहेतुः  
तपित(8)कनर(क?)वैर्यंरंशुभिर्पङ्कजान(9)मभिनवरमणीयं योविधत्ते  
स वोच्यात् (10)—श्रीतोरमाण इति यः प्रथितो

III. \* \* \* पः प्रभूतगुणः सत्यप्रदानसैन्याद्येन (11)मही व्यायत्ता-  
साम्ना तस्योदितकुलकीर्त्तिः पुत्रोतुलविक्रमः पतिः पृथ्याः मिहिरकु-  
लेतिख्यातोभवात् (12) यः पशुपति पर द म (13)

IV. \* \* \* (रा) जनि शासति पृथ्वीं पृथुविमललोचने (आ) र्त्ति-  
हरे अभिवर्द्धमानराज्ये पञ्चदशब्दे नृपवृषस्य शशिरश्मिहासविक-  
सितकुमुदोत्पलगन्धशीतलामोदे कार्त्तिकमासे प्राप्ते गगन

V. \* \* \* र्मले भाति द्विजगणमुख्यैरभिसंस्तुते त्रि(14) पुण्याह-  
नादघोषेण तिथिनक्षत्रमुहूर्त्ते सम्प्राप्ते सुप्रशस्तदिने-माहृतुलस्य (15)  
तुषौत्रः पुत्रश्च तथैव माहदासस्य नाम्ना च माहचेटः पर्व

\* *Numismatic Chronicle*, Vol. VI. pl. I. p. 24.

† Ante vol. XXIV, p. 514.

‡ J. Prinsep's *Antiquities by Thomas*, vol. I. p. XXIV. Fig. 6.

VI. \*\*\*र वास्तव्यः नानाधातुविचित्रे सर्पाङ्गव(16)नाम्नि भूधरे  
रम्ये कारितवान् शैलमयं भानोः प्रासादवरमुख्यम् पुण्याभिवृद्धिहेतो-  
र्मातापितुस्तथात्मनश्चैव—वसता च गिरिवरेस्मि(न्) राज्ञः

VII. \*\*\* पदेन ये कारयन्ति भानोश्चन्द्रांशुसमप्रभं गृहप्रवर-  
न्तेषां वासः स्वर्गं यावत्कल्पद्वयो भवति—भक्त्यारवेर्विरचितं सद्धर्म-  
ख्यापनं सुकीर्त्तिमयं नाम्ना च केशवेतिप्रथितेन च \* \*

VIII. \*\*\* त्वेन—। (17) यावच्छ्वर्वजटाकलापगहने विद्योतते  
चन्द्रमा दिव्यस्त्रीचरयैर्विभूषिततटो यावच्चमेरुर्नगः यावच्चोरसि नी-  
लनीरदनिभे विष्णुर्विभर्त्युज्वलां श्रींस्ताव (18) द्विरमूर्द्धनि

IX. \*\*\* दमुख्यो \* र \* मे ॥

(1.) Having had an opportunity of shewing my reading of the inscription to Colonel A. Cunningham, I avail myself of this opportunity to express my obligations to that learned antiquarian for his many valuable suggestions. A few of his amendments I have not been able to adopt, but I shall point them out in this and the following notes.

He takes the first visible letter of the inscription to be *p*. I assume it to be *ti* which with the two missing letters before it, which I maintain were *j* and *g*, just make the word *jagati* 'on the earth.'

(2.) *Bilam* and not *nilam* according to Col. C.

(3.) The *u* is distinct after which there is space enough for four letters, which I conjecture were *udayagiri*.

(4.) The letter *न्* is interlined.

(5.) Col. C. takes the *m* for a *sh*.

(6.) The sibilant is wrong: it should be *श*.

(7.) Col. C. reads this part *Grastachakorte*, but the measure won't admit of it. The loss of three syllables at the beginning of the line prevents any satisfactory translation of the entire foot.

(8.) I am indebted to Col. C. for this lection. The word, however is not correct, grammatically, it should be *tapta*.

(9.) *पङ्कजानाम्* recte.

(10.) The letter *t* is given below the line.

(11.) For *सत्यप्रदानं सैन्याद्येन*, Col. C. reads *सत्यप्रदानं सोदाद्येन*. The meaning of the clause is my guide.

(12.) *अभवात्* for *अभवत्*.

(13.) *परदस* from *para* "enemy," and *dama* "to subdue." Col. C. reads it *वरदस*. It may be *baradeva* "the noble deva," but the meaning of the word

cannot be guessed. The loss of the initial letters of the next line, stands in the way of a correct explanation.

(14.) The syllable *त्रौ* is not distinct in the facsimile, it is perhaps an expletive of the following word *puṇya*.

(15.) Col. C. reads this *Mātrikūlasya* which would mean "the grandson of his mother's race." The *k* is blotted and may either be a *t* or *k*. The context requires the name of the donor's grandfather.

(16.) The first and third syllables doubtful. Col. C reads *supāhwaya*.

(17.) There are blots before and after the syllable *या*, but the measure seems to be complete without any letters being supplied.

(18.) *श्रीनावत्* recte.

### *Translation.*

(May he) who, by his web of innumerable sky-enlightening rays, dispels the darkness which envelops the earth (*a*) like a dark autumnal cloud; whose radiance, passing through the dancing mane of his wandering coursers fatigued by incessant motion, (gilds the peak of the eastern mountain) Udayagiri (*b*) \* \* \* \* he who removes the pain of his frightened worshippers, who is like unto a lamp to this chamber of the world; who is the cause (supreme) of the destruction of night; who bestows its charm to the lotus by his rays bright as molten gold; may he protect you.

He who was celebrated as Sri Toramāna \* \* \* \* full of talents innumerable, who subjugated the earth by truth, charity, conciliation, his army and the like. Unto him of the renowned race was born a son of unrivalled prowess named Pashupati, the lord of the earth, and the most distinguished of the solar race (*c*) \* \* \* \* at the time when the earth was governed by such a king of large and lustrous eyes, in the 15th year of the prosperous reign of the remover of all suffering, the pre-eminent sovereign (*d*), in the month of Kartika (when the air was) redolent with the aroma of the Kumuda (*e*) and

(*a*). This word is conjecturally supplied. The only letter visible in the facsimile is *त्ति* with a perpendicular line before it, which may be the second line of *ग*. Col. Cunningham takes it for a *प*. Vide note 1 of the preceding page.

(*b*). Udayagiri is the fabled mountain on which the sun rises. Here the Gwalior hill on which the temple stands is likewise meant.

(*c*). Literally Mihira kula, and therefore may mean the Mihira race. Mihira is a synonym of the sun.

(*d*). Lit. *Nṛipabṛiṣha* "the bull of kings."

(*e*). *Nymphaea cœrulea*.



the Utpala (*f*) just blown by the light of the smiling moonbeams, and the sky was bright with \* \* \* \* on such an auspicious date resonant with the sounds of a holiday, when the lunation, constellation and *muhurta* (*g*) were in such conjunction as is recommended by the chiefs of Brahmans, MÁTRICHEṬA the son of MÁTRIDÁSA and grandson of MÁTRITULA \* \* \* \* (of the) *Vástavya* (gotra?) (*h*) with a view to promote the virtue of his parents and self, dedicated a noble marble (*i*) temple to the sun on the charming mount Sarpáhvaya radiant with many a metal. Living on this mountain \* \* \* \* Those who cause the dedication of a noble temple, bright as moon-beams, to the sun, live in heaven as long as the cycle (*kalpa*) lasts (in which such dedication is made) \* \* \* \* This temple, which proclaims the true faith, and is an emblem of noble deeds, was built with (a heart full of) devotion to the sun, by an architect named Kesava \* \* \* \* As long as the moon will sit resplendant on the forest of Sarva's matted locks (*j*); as long as the mountain Meru (*k*) will have its sides graced by the tread of heavenly nymphs, as long as Vishṇu will hold on his blue cloud-like breast, the gorgeous Sri (*l*), even so long on the mountain top may \* \* \* \*

(*f*). *Nympha esculenta vel rubra*.

(*g*). A division of time, equal to 48 minutes according to some, and an hour and 36 minutes according to others. Hindu astrologers divide the day into 15 *muhurtas*, of which some are auspicious, others inauspicious.

(*h*). The rendering is open to correction. *Vástavya* "fit for dwelling" may refer to some noun which preceded it, but is now obliterated.

(*i*). Preferably "of stone" *sailamayam*.

(*j*). Sarva is an *alias* of Siva, whose diadem is a crescent, which is generally placed on his matted crown lock with the horns pointed upwards.

(*k*). A fabled mountain in the middle of the earth, the favorite pleasure-ground of heavenly nymphs.

(*l*). A synonym of Lakshmi the wife of Vishṇu. It is also the name of a peculiar mark on Vishṇu's breast caused by a kick he received from the renowned saint Bhrigu.



*The great Comet of 1861.—By the Rev. Dr. MACKAY.*

The following paper contains the computations by which the elements of the great Comet of 1861 were determined. They deserve record, partly as being the earliest determination of the elements known in India, but chiefly as being founded on observations taken with a common sextant, reading to  $10''$ , and as showing how much can be done, and with very considerable accuracy, with means apparently so insufficient.

The method adopted was to choose two stars, one to the south, the other to the east, of the comet's apparent position, and, about the same time every available evening, to measure the comet's distance from both very carefully, and, by the mean of several observations, to reduce them to a fixed time. From these observations the comet's A. R. and Declination were computed; and, to ensure greater accuracy, the distance of the comet from a third star was first measured by the sextant, and then computed with its R. A. and Dec., as already found. If the measured and computed distances agreed, the observations were looked upon as trustworthy. The differences, one time with another, averaged a little more than  $1'$  of arc: and as the united effects of nutation, precession, and aberration, partly balancing each other, will not amount to more than a few seconds of arc, while the uncertainty of observation is more than a minute, not wishing to affect accuracy where it was not attainable, I have omitted them altogether. In like manner, not knowing beforehand the comet's distance from the earth, I was unable to correct its position for parallax, leaving the parallax to be applied in the computation of another set.

The stars chosen were Vega and Arcturus (the 3rd being Eta of the Great Bear): and the observations fixed on were those of July 5th, 10th, and 15th.

My normal triangle therefore was P A V, where P A and P V are the North Polar distances of Arcturus and Vega, and A P V the difference of their right ascensions, all taken from the Nautical Almanac. A V was then computed, and the other two angles found by the common rules; thus



$$\begin{array}{rcl}
 \text{A P} = 70^\circ & 5' & 40'' \\
 \text{A V} = 59^\circ & 2' & 16'' \\
 \text{A P V} = 65^\circ & 43' & 50''
 \end{array}
 \qquad
 \begin{array}{rcl}
 \text{P V} = 51^\circ & 20' & 32'' \\
 \text{P V A} = 88^\circ & 22' & 0 \\
 \text{P A V} = 56^\circ & 7' & 0
 \end{array}$$

During the first half of July the comet was without the triangle : during the latter half within it. The observations of the 15th for 3h. 12m. Greenwich mean time (9h. 5m. 33s. mean time at Chinsurah) will show how the R A and Dec. were determined. A C, measured by the sextant, corrected for index error, was  $35^\circ 1' 48''$  and C V was  $44^\circ 3' 0''$ . Then P, C is evidently the comet's N P distance, and A P C, V P C, its differences of R A from Arcturus and Vega.

1. In C A V (3 sides given) find C A V =  $52^\circ 45' 10''$   
 P A V =  $56^\circ 7' 0$

$$\therefore \text{P A C} = 3^\circ 21' 50''$$

2. In P A C (2 sides and included  $\sphericalangle$ ) find P C =  $35^\circ 9' 28''$   
 $\therefore$  Comet's Dec. =  $54^\circ 50' 32''$  North.
3. In the same  $\Delta$ , find A P C =  $3^\circ 21' 11\frac{1}{2}'' = 0h. 13m. 25s.$   
 Right Asc. of Arcturus  $\qquad\qquad\qquad 14h. 9m. 22s.$

$$\text{Comet's A R} = 14h. 22m. 47s. ;$$

and Comet's Dec. N.  $54^\circ 50' 32''$ .

Comet's distance from Eta Ursæ Majoris. Measured  $7^\circ 51' 20''$  ;  
 and computed  $7^\circ 52' 30''$ .

The next step is to reduce the right ascensions and declinations to Geocentric longitudes and latitudes. This is done by help of the following formula ; in which

$$\begin{array}{ll}
 \alpha = \text{Right ascension.} & \lambda = \text{longitude.} \\
 \delta = \text{Declination.} & \beta = \text{latitude.} \\
 \epsilon = \text{Obliquity of Ecliptic.} & \phi = \text{auxiliary angle.}
 \end{array}$$

I select again the 15th as an example.

$$1. \quad \text{tang } \phi = \text{tang } \delta = + 0.152230 \qquad \text{tang } \phi = \frac{\text{tang } \delta}{\sin \alpha} \quad (1)$$

$$\text{Sin } \alpha = -9.765896 \text{ (3rd quadrant.)}$$

$$\phi = 112^\circ 20' 4'' = -0.386334 = \text{tang } \phi$$

$$\epsilon = 23 \quad 27 \quad 28$$

$$\phi - \epsilon = 88 \quad 52 \quad 36$$

$$2. \quad \text{tang } \lambda = \cos (\phi - \epsilon) \text{ tang } a$$

$$\begin{array}{r} \cos \phi \\ \cos (\phi - \epsilon) = 8.292358 \end{array}$$

$$\text{tang } a = 9.856204$$

$$\hline 8.148562$$

$$\cos \phi = -9.579797$$

$$\text{tang } \lambda = -8.568765$$

$$\therefore \lambda = \text{geoc. long.} = 177^\circ 52' 42''$$

$$3. \quad \text{tang } \beta = \sin \lambda \text{ tang } (\phi - \epsilon)$$

$$\sin \lambda = 8.568455$$

$$\text{tang } (\phi - \epsilon) = 1.707558$$

$$\text{tang } \beta = 0.276013 \therefore \beta = \text{geoc. latitude} = 62^\circ 5' 32''.$$

We have next to find the earth's longitude and radius-vector, which we denote by  $L$  and  $R$ . Still taking the 15th by way of example, we find in the Nautical Almanac;

| July 15th.         | Sun's long.                                          | Radius Vector.                                          |
|--------------------|------------------------------------------------------|---------------------------------------------------------|
|                    | 112° 54' 7" 7                                        | 0.0070489                                               |
| Corr. for 3h. 12m. | + 7 37 7                                             | Corr. for 3h. 12m. — 40                                 |
|                    | <hr style="width: 50%; margin: 0 auto;"/> 113 1 45 4 | <hr style="width: 50%; margin: 0 auto;"/> R = 0.0070449 |
|                    | Add 180                                              |                                                         |
|                    | <hr style="width: 50%; margin: 0 auto;"/>            |                                                         |

$$L = \text{earth's long. } 293 \ 1 \ 45 \ 4$$

Results having been obtained, by the same process, for the 5th and 10th, we may now proceed to more direct computation. We use the following additional symbols.

Let  $\delta, \delta'$  = comet's curtate distances from the earth at the 1st and 3rd observations.

$c$  = the chord joining the comet's positions at 1st and 3rd observations.

$r, r''$  = radii vectores of the comet at the 1st and 3rd observations.

$t, t'$  = intervals between the observations.

$T$  = whole time between 1st and 3rd.

$b, b''$  = heliocentric latitudes for 1st and 3rd.

$l, l''$  = ————— longitudes.

$u, u''$  = arguments of latitude.

- $\theta, \theta'' =$  true anomalies.
- $\phi =$  inclination.
- $\Omega =$  ascending node (longitude of).
- $\pi =$  long. of perihelion.
- $D =$  perihelion distance.
- $P =$  time of perihelion passage.

The method I have followed is that of Olbers with slight variations from Delambre and Bowditch. The correction, in finding the time of perihelion passage, depending on the true anomalies, is taken from Table III. of Bowditch's appendix to the 3rd volume of Laplace.

I proceed to tabulate the results in a form adapted for the computation. The comet's path is supposed to be parabolic, partly for facility of computation, and partly, because computations for an unknown elliptic orbit give varying and altogether unsatisfactory results even in the most skilful hands. I believe that I have determined the ellipse in this case: but I shrink from the labour of computing it.

| Gh. Mn. time. | $\lambda$ | $\lambda'$ | $\lambda''$ | $\beta$ | $\beta'$ | $\beta''$ | L   | L' | L'' | R         | R'                                                  | R'' |
|---------------|-----------|------------|-------------|---------|----------|-----------|-----|----|-----|-----------|-----------------------------------------------------|-----|
|               | °         | '          | "           | °       | '        | "         | °   | '  | "   |           |                                                     |     |
| July 5 3 12   | 133       | 34         | 0           | 55      | 16       | 15        | 283 | 29 | 15  | 0.0072256 | } $\frac{t'}{t} = \frac{5}{5} = 1.$<br>T = 10 days. |     |
| 10 3 12       | 162       | 50         | 25          | 61      | 43       | 55        | 288 | 16 | 11  | 0.0071663 |                                                     |     |
| 15 3 12       | 177       | 52         | 42          | 62      | 5        | 32        | 293 | 1  | 45  | 0.0070449 |                                                     |     |

Let  $\frac{\delta''}{\delta} = M$  : then, if we make  $\frac{\text{tang } \beta'}{\sin(L' - \lambda)} = m,$

M may be found by the formula,  $M = \frac{\text{tang } \beta - m \sin(L' - \lambda)}{m \sin(L' - \lambda') - \text{tang } \beta''} \times \frac{t'}{t}$

1. To find  $m$   
 $\text{tang } \beta' = 0.269166 = (61' 43' 55')$   
 $m = \frac{\text{tang } \beta'}{\sin L' - \lambda} = \frac{0.269166}{\sin L' - \lambda} = 9.911067 = (125 25 46)$   
 $\therefore m = 0.358099$

2. To find M  
 $\text{tang } \beta = 0.159149$  Nat No. = 1.442614  
 $m = 0.358099$

$\sin(L' - \lambda) = 0.6307427$   
 $9.988417$  Nat No. = .974634  
 $\text{Log of Numr.} = 9.6702273 = .467980$

For denominator,

$$m = 0.358099$$

$$\text{Sin } L' - \lambda' = 9.9718945$$

$$\hline 0.3299935 \text{ Nat no. } 2.137935$$

$$\text{tang. } \beta'' = 0.2760130 \text{ Nat no. } 1.888048$$

$$\text{Denr. } .249887$$

$$\text{Numr. } = .467980 \text{ Log } 9.6702273$$

$$\text{Denr. } = .219887 \text{ Log } 9.3977436$$

$$\hline \text{Diff} = 0.2724837$$

$$\text{Log } \frac{t'}{t} = 0.0000000$$

$$\hline \therefore M = 0.2724837$$

and

$$M^2 = 0.5449674$$

This may be checked by the formula

$$M = \frac{\text{tang. } \beta \text{ sin } L' - \lambda' - \text{tang } \beta' \text{ sin } L' - \lambda}{\text{tang. } \beta' \text{ sin } L' - \lambda' - \text{tang } \beta' \text{ sin } L' - \lambda'} \times \frac{t'}{t}$$

Having thus found M we proceed to find the values of  $r^2$ ,  $r'^2$  and  $c^2$ . The formulæ are

$$r^2 = R^2 + \text{Sec}^2 \beta \delta^2 + 2 \delta R \cos L - \lambda$$

$$r'^2 = R'^2 + \text{Sec}^2 \beta' M^2 \delta^2 + 2 \delta R' M \cos L'' - \lambda''$$

Leaving  $\delta$  to be afterwards determined, we find—

|                                         | For $r^2$                                                        | Nat No.             | For $r'^2$                                  | Nat No.    |
|-----------------------------------------|------------------------------------------------------------------|---------------------|---------------------------------------------|------------|
|                                         | $\text{Sec}^2 \beta = 0.488712 =$                                | $3.081145 \delta^2$ | $\text{Sec}^2 \beta'' = 0.6594160$          |            |
|                                         | $2 = 0.3010300$                                                  |                     | $M^2 = 0.5449674$                           |            |
|                                         | $R = 0.0072256$                                                  |                     | $\hline 1.2043834 =$                        | $16.00970$ |
| $\text{Cos } L - \lambda = 9.9371835 -$ |                                                                  |                     | $2 = 0.3010300$                             |            |
|                                         |                                                                  |                     | $R'' = 0.0070449$                           |            |
|                                         | $- 0.2454391 = 1.759720 \delta -$                                |                     | $M = 0.2724837$                             |            |
|                                         |                                                                  |                     | $\text{Cos } L'' - \lambda'' = 9.6284050 -$ |            |
|                                         | $R^2 = 0.0144512 = 1.033835$                                     |                     | $- 0.2089636 = - 1.6179442$                 |            |
|                                         |                                                                  |                     | $\hline R'^2 = 0.0140898 =$                 | $1.032975$ |
|                                         | $r^2 = 1.033835 + 3.0811450 \delta^2 - 1.7597200 \delta$         |                     |                                             |            |
|                                         | $r'^2 = 1.032975 + 16.0097000 \delta^2 - 1.6179442 \delta$       |                     |                                             |            |
|                                         | $r^2 + r'^2 = 2.066810 + 19.0908450 \delta^2 - 3.3776642 \delta$ |                     |                                             |            |

The formula for  $c^2$  is

$$c^2 = r^2 + r'^2 - 2\delta^2 (\cos \lambda'' - \lambda + \text{tang } \beta \text{ tang } \beta') M - 2\delta R M \cos L - \lambda'' - 2\delta R' M \cos L'' - \lambda''$$

$$\begin{aligned} 2 &= 0.3010300 \\ R &= 0.0072256 \\ R'' &= 0.0070449 \\ \text{Cos } L'' - L &= 9.9939490 \end{aligned}$$

$$\begin{aligned} &0.3092495 \\ \text{Nat No. } &2.0382130 \end{aligned}$$

$$\text{Cos } \lambda'' - \lambda = 9.854640 = .715550$$

$$\begin{aligned} \text{tang } \beta &= 0.159149 \\ \text{tang } \beta' &= 0.276013 \end{aligned}$$

$$0.435162 = 2.723717$$

$$\text{Log } = 0.5364658 = 3.439267$$

$$\begin{aligned} 2 &= 0.3010300 \\ M &= 0.2724837 \end{aligned}$$

$$\begin{aligned} &1.1099795 \\ \text{Nat No. } &12.8818872 \delta^2 \end{aligned}$$

$$\begin{aligned} 2 &= 0.3010300 \\ M &= 0.2724837 \\ R &= 0.0072256 \\ \text{Cos } L - \lambda'' &= 9.4298720 - \end{aligned}$$

$$\begin{aligned} &0.0106113 - \\ \text{Nat No. } &- 1.0247343 (1) \end{aligned}$$

$$\begin{aligned} 2 &= 0.3010300 \\ R'' &= 0.0070449 \\ \text{Cos } L'' - \lambda &= 1.9714841 - \end{aligned}$$

$$\begin{aligned} &- 0.2795590 \\ \text{Nat No. } &= - 1.9035270 (2) \\ \text{Nat No. } &= - 1.0247343 (1) \end{aligned}$$

$$- 2.9282613 \delta$$

Hence  $c^2 =$

$$r^2 + r'^2 = 2.066810 + 19.0908450 \delta^2 - 3.3776642 \delta$$

$$\text{Remr. } = 2.038213 + 12.8818872 \delta^2 - 2.9282613 \delta$$

$$\therefore c^2 = 0.028597 + 6.2089578 \delta^2 - 0.4494029 \delta$$

We have now values of  $r^2$ ,  $r''^2$  and  $c^2$  in terms of the unknown quantity  $\delta$ , viz.

$$r^2 = 1.033835 + 3.0811450 \delta^2 - 1.7597200 \delta$$

$$r''^2 = 1.032975 + 16.0097000 \delta^2 - 1.6179442 \delta$$

$$c^2 = 0.028597 + 6.2089578 \delta^2 - 0.4494029 \delta$$

To find  $\delta$ , we have the formula  $6\mu T = (r + r'' + c)^{\frac{3}{2}} - (r + r'' - c)^{\frac{3}{2}}$  where  $T$  is the time between the 1st and 3rd observations, and  $6\mu$  is a constant, of which the logarithm is 9.0137302.

It is evident that  $\delta$  can only be found by successive approximations, and by a very tedious and laborious process. Table II. of Bowditch gives the corresponding times to any values of  $r^2 + r''^2$ , and  $c^2$ ; or more nearly to  $r + r''$  found at the head of the column and  $c$  at the side.

If we suppose  $\delta$  to be 1, then roughly

$$\begin{aligned} r^2 + r''^2 &= 2.0668 \\ &+ 19.0908 \\ \hline &21.1576 \\ &- 3.3776 \\ \hline &18.7800 \end{aligned}$$

$$\begin{aligned} c^2 &= 0.0286 \\ &+ 6.2089 \\ \hline &6.2375 \\ &- .4494 \\ \hline &5.7881 \end{aligned}$$



But  $c^2$  is never likely to exceed 1, in the parabolic orbit visible from the earth, and therefore this value of  $\delta$  is rejected.

Supposing  $\delta$  to be  $\frac{1}{8}$  and  $\delta^2 = \frac{1}{64}$ , then  $T = 11$  days nearly. Tab. II.

————  $\frac{1}{9}$  and  $\delta^2 = \frac{1}{81}$ , —  $T = 9.76$  nearly.

————  $\frac{2}{17}$  and  $\delta^2 = \frac{4}{289}$ , —  $T = 10.19$ .

Try  $\frac{2}{17} = .1176 = \delta \therefore \log$  of  $\delta = 9.0704073$  and  $\log$  of  $\delta^2 = 8.1408146$ .

| $r^2$                                                              | $r'^2$                      | $c^2$                                    |
|--------------------------------------------------------------------|-----------------------------|------------------------------------------|
| Sec <sup>2</sup> $\beta$ 0.488712                                  | 1.2043834                   | 0.7930186                                |
| Log $\delta^2$ 8.1408146                                           | 8.1408146                   | 8.1408146                                |
| 8.6295266 = .04261149 $\delta^2$                                   | 9.3451980 = .2214104        | 8.9338332 = .08586838                    |
| 0.2454391                                                          | 0.2089636                   | 9.6526360                                |
| 9.0704073 Log $\delta$                                             | 9.0704073                   | 9.0704073                                |
| 9.3158464 = .2069410 $\delta$                                      | 9.2793709 = .19027020       | 8.7230433 = .05284978                    |
| 1.033835 R <sup>2</sup> Nat No.                                    | 1.032975                    | .0285970                                 |
| .0426115 $\delta^2$ Nat No.                                        | .2214104                    | .08586838                                |
| 1.0764465                                                          | 1.2543854                   | .11446538                                |
| .2069410 $\delta$ Nat No.                                          | .1902702                    | .05284978                                |
| .8695055 = $r^2$                                                   | 1.0641152 = $r'^2$          | .06161560 = $c^2$                        |
| 2) 9.9392723 = log $r^2$                                           | 2) 0.0269478                | 2) 8.7896906 = log $c^2$                 |
| 9.9696361 = log $r$                                                | 0.0134739                   | Log of $c$ 9.3948453                     |
| $\therefore r = .9324727$                                          | $\therefore r' = 1.0315113$ | $\therefore c = .2482249$                |
| $r'' = 1.0315113$                                                  | $r = .9324727$              |                                          |
| $r + r''$ 1.9639840                                                | 1.9639840                   | $(r + r'' + c)^{\frac{3}{2}} = 3.290329$ |
| $c = .2482249$                                                     | $c = .2482249$              | $(r + r'' - c)^{\frac{3}{2}} = 2.247122$ |
| $r + r'' + c = 2.2122089$                                          | $r + r'' - c = 1.7157591$   | 0.0182430 = 1.042907                     |
| Log 0.3448262                                                      | Log = 0.2344564             | 9.0137302 = $6\mu$                       |
| 3                                                                  | 3                           |                                          |
| 2) 1.0344786                                                       | 2) 0.7033692                | 1.0045128 = $T_1 = 10.10445$             |
|                                                                    |                             | $T = 10.$                                |
| log( $r + r'' + c$ ) <sup><math>\frac{3}{2}</math></sup> 0.5172393 | 0.3516816                   | Error + 0.10445 days                     |
| Nat No. = 3.290329                                                 | Nat No. 2.247422            |                                          |

Thus it appears that .1176 is considerably too much; and we must make a 2nd supposition, which, from having no precise data for proportioning, must be somewhat of a leap in the dark. Let us suppose  $\delta = .1160$ : then the whole computation for the 1st supposition must be repeated for the 2nd and every successive approximation: a tedious and most fatiguing process. We shall tabulate only the results; observing that after the 2nd approximation, we can proportion for the following, and thus slowly but surely arrive at an accurate value of  $\delta$ .

|                              |                          |                   |
|------------------------------|--------------------------|-------------------|
| 1st approx. $\delta = .1176$ | gives $T_1 = 10.10445$ . | Error $+ 0.10445$ |
| 2nd ————— .1160              | — $T_2 = 9.9676$ —       | — 0.032           |
| 3rd ————— .11639             | — $T_3 = 10.00325$ —     | + 0.00325         |
| 4th ————— .11635             | — $T_4 = 9.99964$ —      | — 0.00035         |

comparing the last 2, we find the difference of the natural numbers .11639 and .11635 to be 4, and the sum of the errors 360 :

$$\therefore 360 : 35 = 4 : 0.4 \text{ nearly,}$$

$$\text{or } \delta = .116354 \text{ of which the log is } 9.0657813 ;$$

$$\text{and } M = 0.2724837$$

$$\therefore \text{Log } \delta'' = 9.3382650 ; \text{ for } \delta'' = M \delta.$$

$$\text{In like manner we find Log } r = 9.9699588$$

$$\text{and Log } r'' = 0.0129150$$

This last value of  $\delta$  will give a time, which will not differ from  $T$  more than one or two seconds.

We are now prepared for the direct computation of the comet's elements.

1. To find the heliocentric latitudes  $b, b''$ .

The formulæ are  $\text{Sin } b = \frac{\delta \text{ tang } \beta}{r}$  and  $\text{sin } b'' = \frac{\delta'' \text{ tang } \beta''}{r''}$

|                                                      |                                                        |
|------------------------------------------------------|--------------------------------------------------------|
| Log of $\delta = 9.0657813$                          | Log of $\delta'' = 9.3382650$                          |
| $\text{tang } \beta = 55^\circ 16' 15'' = 0.1591490$ | $\text{tang. } \beta'' = 62^\circ 5' 32'' = 0.2760130$ |
| <hr/>                                                | <hr/>                                                  |
| 9.2249303                                            | 9.6142780                                              |
| Log $r = 9.9699588$                                  | Log $r'' = 0.0129150$                                  |
| <hr/>                                                | <hr/>                                                  |
| Sin $b = 9.2549715$                                  | Sin $b'' = 9.6013630$                                  |
| Cos $b = 9.9928580$                                  | Cos $b'' = 9.9622722$                                  |
| Tang $b = 9.2621135$                                 | Tang $b'' = 9.6390907$                                 |

$$\therefore \left. \begin{array}{l} b = 10^\circ 21' 45'' \text{ N. lat} \\ \text{and } b'' = 23^\circ 32' 17'' \end{array} \right\} \text{Heliocentric latitudes.}$$

$$b + b'' = 33^\circ 54' 2''$$

$$b'' - b = 13^\circ 10' 32''$$

2. To find the heliocentric longitudes  $l, l''$ .

$\text{Sin } L - l = \frac{\delta \text{ sin } L - \lambda}{r \text{ cos } b}$  and  $\text{sin } L'' - l'' = \frac{\delta'' \text{ sin } L'' - \lambda''}{r'' \text{ eos } b''}$

|                                                         |                             |
|---------------------------------------------------------|-----------------------------|
| $\delta = 9.0657813$                                    | $r = 9.9692588$             |
| $149^\circ 55' 15 \text{ Sin } L - \lambda = 9.7000077$ | $\text{Cos } b = 9.9928580$ |
| <hr/>                                                   | <hr/>                       |
| 8.7657890                                               | 9.9621168                   |
| 9.9621168                                               |                             |
| <hr/>                                                   |                             |
| Sin $L - l = 8.8036722$                                 |                             |

$$\begin{aligned} \therefore L - l &= 30^\circ 38' 54'' \\ \text{but } L &= 283^\circ 29' 15'' \end{aligned}$$

$$\therefore l = 279^\circ 50' 21'' \text{ Again}$$

$$\begin{array}{r} \delta'' = 9.3382650 \\ \text{Sin } L'' - \lambda'' = 9.9567378 \end{array} \qquad \begin{array}{r} r'' = 0.0129150 \\ \text{Cos } b'' = 9.9622722 \end{array}$$

$$\begin{array}{r} 9.2950028 \\ 9.9751872 \end{array}$$

$$9.9751872$$

$$\begin{aligned} \therefore L'' - l'' &= 12^\circ 3' 16'' \\ \text{But } L'' &= 293^\circ 1' 45'' \end{aligned}$$

$$\therefore l'' = 280^\circ 58' 29''.$$

Therefore, because the heliocentric longitudes are increasing, the motion is DIRECT.

$$\begin{array}{r} l'' = 280^\circ 58' 29'' \\ l = 279^\circ 50' 21'' \end{array}$$

$$\frac{1}{2} \text{ the sum, or } \frac{l'' + l}{2} = 280^\circ 24' 25''$$

$$\frac{1}{2} \text{ the diff., or } \frac{l'' - l}{2} = 0^\circ 34' 4''$$

$$3. \text{ Find the node. } \text{Tang} \left( \frac{l + l''}{2} - \Omega \right) = \frac{\sin b + b''}{\sin b'' - b} \text{tang} \frac{l'' - l}{2}$$

$$\text{Sin } b + b'' = 33^\circ 54' 2'' = 9.7464420$$

$$\text{Sin } b'' - b = 13^\circ 10' 32'' = 9.3578119$$

$$0.3886301$$

$$\text{tang} \frac{l'' - l}{2} = 7.9960700$$

$$\text{tang} \left( \frac{l'' + l}{2} - \Omega \right) = 8.3847001$$

$$\therefore \frac{l'' + l}{2} - \Omega = 1^\circ 23' 21''$$

$$\text{but } \frac{l + l''}{2} = 280^\circ 24' 25''$$

$$\therefore \text{Ascending Node} = 279^\circ 1' 4''$$

$$4. \text{ To find the inclination } (\phi). \text{Tang } \phi = \frac{\text{tang } b}{\sin l - \Omega} = \frac{\text{tang } b''}{\sin l'' - \Omega}$$

$$\begin{array}{r} l = 279^\circ 50' 21'' \\ \Omega = 279^\circ 1' 4'' \end{array}$$

$$\begin{array}{r} l'' = 280^\circ 58' 29'' \\ 279^\circ 1' 4'' \end{array}$$

$$l - \Omega = 0^\circ 49' 17''$$

$$l'' - \Omega = 1^\circ 57' 25''$$

|                                                                                                                                    |                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $\text{tang } b = 9.2621135$<br>$\text{Sin } l - \Omega = 8.1564113$<br><hr style="width: 100%;"/> $\text{tang } \phi = 1.1057022$ | <div style="text-align: right; font-size: small; margin-bottom: 5px;">check</div> $\text{tang } b'' = 9.6390907$<br>$\text{Sin } l'' - \Omega = 8.5333714$<br><hr style="width: 100%;"/> $1.1057193$ |
| $\therefore \text{Inclination} = 85^\circ 31' 3''$                                                                                 |                                                                                                                                                                                                      |

5. To find the arguments of latitude  $u, u''$ .

|                                                                                                                                                                          |                                                                                                                                                                                                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $\cos u = \cos b \cos l - \Omega$<br>$\cos b = 9.9928580$<br>$\cos l - \Omega = 9.9999554$<br><hr style="width: 100%;"/> $\cos u = 9.9928134$<br>$u = 10^\circ 23' 41''$ | $\cos u'' = \cos b'' \cos l'' - \Omega$<br>$\cos b'' = 9.9622722$<br>$\cos l'' - \Omega = 9.9997466$<br><hr style="width: 100%;"/> $\cos u'' = 9.9620188$<br>$u'' = 23^\circ 36' 53''$<br>$u = 10^\circ 23' 41''$ |
| $\cos \frac{u'' - u}{2} = 9.9971035$                                                                                                                                     | $u'' - u = 13^\circ 13' 12''$                                                                                                                                                                                     |
| $\text{cosec } \frac{u'' - u}{2} = 0.9388850$                                                                                                                            | $\frac{u'' - u}{2} = 6^\circ 36' 36''$                                                                                                                                                                            |

6. To find the true anomalies  $\theta, \theta''$ .

$$\text{tang } \frac{\theta}{2} = \text{cosec } \frac{u'' - u}{2} \left( \cos \frac{u'' - u}{2} - \sqrt{\frac{r}{r''}} \right)$$

$$\cos \frac{u'' - u}{2} = 9.9971035 \text{ Nat No. } .993353$$

$$r = 9.9699588$$

$$r'' = 0.0129150$$


---


$$2) 9.9570438$$

$$\text{Log } \sqrt{\frac{r}{r''}} = 9.9785219 \text{ Nat No. } .951748$$

$$\text{Log} = 8.6191455 = .041605$$

$$\text{cosec } \frac{u'' - u}{2} = 0.9388850$$

$$\text{tang } \frac{\theta}{2} = 9.5580305 \therefore \frac{1}{2} \theta = 19^\circ 52' 18''$$

|                                                                                  |                                                               |
|----------------------------------------------------------------------------------|---------------------------------------------------------------|
| $\cos \frac{1}{2} \theta = 9.9733386$<br>$\cos \frac{1}{2} \theta'' = 9.9518604$ | $\theta = 39^\circ 44' 36''$<br>$u'' - u = 13^\circ 13' 12''$ |
|----------------------------------------------------------------------------------|---------------------------------------------------------------|

$$\theta'' = 52^\circ 57' 48''$$

$$\frac{1}{2} \theta'' = 26^\circ 28' 54''$$

7. To find  $\pi =$  longitude of perihelion.

$$\pi = \theta - u \pm \Omega = \theta'' - u'' \pm \Omega$$

|                                                         |                                                             |
|---------------------------------------------------------|-------------------------------------------------------------|
| $\theta = 39^\circ 44' 36''$<br>$u = 10^\circ 23' 41''$ | $\theta'' = 52^\circ 57' 48''$<br>$u'' = 23^\circ 36' 53''$ |
|---------------------------------------------------------|-------------------------------------------------------------|

$$\Omega = 279^\circ 1' 4''$$

$$29^\circ 20' 55''$$

$$\pi = 249^\circ 40' 9'' = \text{long of perihelion.}$$

8. To find  $D =$  perihelion distance.

$$D = \cos^2 \frac{\theta}{2} \times r = \cos^2 \frac{\theta''}{2} \times r''.$$

|                                       |                                         |
|---------------------------------------|-----------------------------------------|
| $\cos \frac{1}{2} \theta = 9.9733386$ | $\cos \frac{1}{2} \theta'' = 9.9518604$ |
| <u>2</u>                              | <u>2</u>                                |
| $\cos^2 \frac{\theta}{2} = 9.9466772$ | <u>9.9037208</u>                        |
| $r = 9.9699588$                       | $r'' = 0.0129150$                       |
| <u>D = 9.9166360</u>                  | <u>D = 9.9166358</u>                    |
| $\therefore D = .825346$              |                                         |

9. Lastly to find the time of passing the perihelion.

$$P = D^{\frac{3}{2}} \times \theta \text{ (Tab. III. Bowditch). } P'' = D^{\frac{3}{2}} \times \theta'' \text{ (Tab. III. B.)}$$

|                                      |                              |
|--------------------------------------|------------------------------|
| $D = 9.916636$                       |                              |
| <u>3</u>                             |                              |
| 2) <u>9.749908</u>                   |                              |
| $D^{\frac{3}{2}} = 9.874954$         | $D^{\frac{3}{2}} = 9.874954$ |
| $\theta \text{ Tab. III. } 1.491470$ | <u>1.646842</u>              |
| <u>1.366424</u>                      | <u>1.521796</u>              |
| <u>23d. 250</u>                      | <u>33d. 250</u>              |
| July <u>5d. 133</u>                  | July <u>15d. 133</u>         |
| June 11d. 883                        | June 11d. 883                |

Greenwich Mn. time of perihelion passage, June 11d. 21h. 11m. 31s.

The elements of the comet by this set of observations are

|                       |                   |                                |
|-----------------------|-------------------|--------------------------------|
|                       |                   | From other sets.               |
| Asc. Node, .....      | 279° 1' 4''       | 278° 59' 32''                  |
| Inclination, .....    | 85° 31' 3''       |                                |
| Perihel. Long., ..... | 249° 40' 9''      |                                |
| — Dist., .....        | .825346.          |                                |
| — Passage, .....      | June 11d. 21h. 2. | June 11d. 23h. — June 12d. 3h. |
| Motion, .....         | Direct.           |                                |

The celebrated astronomer, Monsr. Plantamour of Geneva, gives the following elements, which I found in the London Review of July 27th.

|                    |                     |                                               |
|--------------------|---------------------|-----------------------------------------------|
| Asc. Node, .....   | 278° 59'            |                                               |
| Inclination, ..... | Omitted.            | Hind and Pape give $\frac{7}{8} 85^\circ 37'$ |
| P. Long., .....    | 249° 41'            | and $85^\circ 38'$ .                          |
| — Dist., .....     | .82424.             |                                               |
| — Pass., .....     | June 11d. 21h. 36m. | Hind gives June, 12d. 4h.                     |
| Motion, .....      | Direct.             |                                               |

We may find the comet's distance from the earth at any time, when we know  $\delta$ , by the formula, *true dist.* = *curtate dist. cos helioc. lat.*

Thus on the 5th  $\delta = 9\ 0657813$

$\cos b = 9.9928580$

$9.0729233 \therefore$  true distance = .118283

and  $.118283 \times 95,000,000 = 11,237,000$  miles, which sufficiently explains the length of the tail, and the rapidity of the motion.

I have, in another place, expressed an opinion, which I still retain, though it has not been noticed (up to July 27th,) by any European astronomer, that the comet is identical with Mechain's Comet of 1781: and that therefore its path is an ellipse, with a period of about 80 years. Mechain's Elements for the comet of 1781, are

|                |         |
|----------------|---------|
| Node, .....    | 263°    |
| Inclin.,.....  | 81°     |
| P. Long.,..... | 239°    |
| — Dist., ..... | .775    |
| — Pass., ..... | July 7. |
| Motion, .....  | Direct. |

Its near approach to the earth, and the great difficulty of computing the elements of a body, with an orbit nearly perpendicular to the ecliptic, will amply account for the discrepancies. There are indeed very considerable variations in the determinations of some astronomers at home, chiefly arising from an over anxiety to rush into print. There can be no doubt that the comet seen in the southern hemisphere in June was our comet. When seen at sea, it was rushing northwards with prodigious velocity, after passing its perihelion on the 12th of June. It did not ascend to the north of the ecliptic until the 29th or 30th.\*

I suspect too that it is the same comet, which was seen in Europe and America in the end of April and May, of which Mr. Hind gives the following very rough elements :

|                |            |
|----------------|------------|
| Node, .....    | 31°        |
| Inclin.,.....  | 79° or 80° |
| P. Long.,..... | 243        |
| — Dist., ..... | .92        |

\* If the gentleman who saw the comet had but measured its distance from two stars, his observations would have been very valuable.



— Pass, ..... June 2.

Motion, ..... Direct.

It was then approaching its perihelion slowly.

*Note.*—The foregoing computation was finished July 19th, and sent to the *Friend of India* a few days after.

W. S. MACKAY.

*Chinsurah,*  
19th September, 1861. }

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*Discovery of the New Planet "ASIA."—By N. R. POGSON, Esq.,
F. R. A. S., Government Astronomer, Madras.*

The notice of a discovery made nearly five months since, will, I fear, be deemed by many as almost too tardy to merit publication in the Transactions of the Asiatic Society. Having been requested, however, by His Excellency Sir W. Denison, to communicate the circumstances of the discovery, I have much pleasure in doing so, and by way of amends for the lateness of the intelligence, am enabled to add the elements of the planet's elliptical orbit, calculated from observations made with the equatorial of the Madras Observatory.

For many years past, when attached to the Radcliffe Observatory at Oxford, it has been my practice to devote such leisure time as my official duties permitted, to the pursuit of more entertaining branches of Astronomical science than legitimately belong to the steady routine work of a public Observatory. Amongst other objects, one which has rewarded me pretty fairly was the construction of more accurate charts of certain portions of the heavens than had been yet attempted. With a considerable amount of pleasing toil, six charts were completed in about as many years; and by subjecting the celestial spaces thus mapped to systematic scrutiny, they have realized not less than five new planets, and a dozen new variable Stars. The immediate object of this communication was the last of these discoveries, and being the first planet detected in this quarter of the globe was named "ASIA," strictly in accordance with the usual asteroidal nomenclature, which has hitherto been confined exclusively to the Roman and Grecian mythology; and peculiarly appropriate

to the occasion. Amphitrite, Europa, Doris and others of the Oceanides have been previously adopted, and I am happy to say the name Asia has been well received by my English and European astronomical colleagues. The planet was first seen on the 16th of April, as a star of about the 12th magnitude—the faintest discernible with a telescope $3\frac{1}{2}$ inches in aperture. Its planetary nature was proved the following evening, by micrometric observations, and the annexed series of positions was obtained during the following twenty-five days.

Madras Mean Time.				Right Ascension.			South Declination.			Comparisons.	Observer.		
	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>	°	'	"				
April	17	12	53	40	15	51	14.76	.....		5	P		
"	"	14	7	37	15	51	13.56	16	6	22.9	10	"	
"	"	18	11	50	39	15	50	50.72	16	1	12.7	12	"
"	"	19	13	49	27	15	50	20.72	15	55	7.0	9	"
"	"	20	11	46	44	15	49	53.93	15	49	50.1	8	"
"	"	"	13	20	12	15	49	51.84	15	49	26.6	12	R
"	"	21	11	59	5	15	49	22.97	15	43	55.3	13	P
"	"	23	12	13	6	15	48	15.72	15	31	57.3	11	"
"	"	"	13	31	56	15	48	14.04	15	31	31.4	10	R
"	"	28	10	31	4	15	45	6.30	15	0	51.8	8	"
"	"	"	11	57	33	15	45	3.26	15	0	30.4	12	P
"	"	29	9	55	49	15	44	24.56	14	54	32.8	8	R
"	"	"	11	58	23	15	44	19.78	14	54	5.5	9	P
"	"	30	10	12	56	15	43	39.05	14	47	49.7	8	R
May	1	9	46	11	15	42	54.97	14	41	16.6	8	"	
"	"	13	0	13	15	42	48.11	14	40	18.4	12	P	
"	"	2	11	34	17	15	42	4.89	14	34	6.8	9	R
"	"	"	13	3	18	15	42	1.79	14	33	42.4	10	P
"	"	3	11	12	33	15	41	17.88	14	27	31.8	12	"
"	"	"	13	4	26	15	41	13.97	14	26	56.3	12	R
"	"	11	13	16	47	15	34	17.61	13	32	3.8	14	P
"	"	12	10	15	45	15	33	30.18	13	25	58.1	18	"

The magnitude or brilliancy was carefully noted on each suitable occasion, agreeably to the standard photometric scale adopted in the Supplement of the Nautical Almanac, and was as follows:—

April 17	.....	12.0	May 1	.....	11.0
" 18	.....	11.7	" 2	.....	11.0
" 19	.....	11.2	" 3	.....	10.8
" 21	.....	11.5	" 11	.....	10.6
" 29	.....	11.0	" 12	.....	11.0

The initials P and R indicate respectively myself and my fourth native assistant C. Ragoonatha Chary, to whose skill and attachment to science I have much pleasure in rendering well merited testimony.

Owing to cloudy weather the planet could not be recovered after May 12th without a knowledge of its orbital elements, and other duties prevented me from completing the calculations required until the fine weather had broken up. From the places of April 17th, May 1st and 12th, I find the following elliptical elements:—

Epoch,	1861 May, 12.20472	Greenwich Mean Time.	
Mean Anomaly,.....	307° 16' 52.0		
Perihelion,.....	304 4 42.0	} Mean Equinox, Jan. 1.	
Ascending Node, ...	202 32 21.9		
Inclination,	5 57 17.9		
Excentricity,	10 3 10.0		
Daily Motion in Orbit, ...	947".530		
Log. Mean Distance,	0.382276		

As a verification of the accuracy of which, the residual error, or difference between computation and observation for the middle observation, is only 0".4 in latitude; while the agreement in longitude is perfect. It appears also that the mean brightness in opposition is 11.6 magnitude, and that the period of revolution is 1368 days, or about three and three quarter years.

Madras Observatory, September 21st, 1861.

PROCEEDINGS
OF THE
ASIATIC SOCIETY OF BENGAL,
FOR JUNE, 1861.

THE monthly general meeting of the Asiatic Society of Bengal was held on the 5th instant—

A. Grote, Esq., President, in the chair.

Presentations were received :—

1. From Lieut. Col. J. D. Graham, a pamphlet containing his demonstrations of a Lunar Tidal-wave in the North American Lakes.
2. From Baboo Rajendra Mallika, specimens of a cassowary and a golden pheasant.
3. From Major G. G. Pearse, Segowlec, the head and horns of a wild buffalo.

The President exhibited a relic from Nimroud, kindly lent to him for that purpose by Lady Frere. It was a royal edict in the cuneiform character from the imperial record room of that city.

He further drew attention to a large fragment of the Dhurmsala Aerolite, which His Excellency Lord Canning had sent to the Society for inspection, and which was on the table before the meeting. This piece was intended for dispatch to England, but another smaller specimen was about to be presented by His Excellency to the Society's Museum.

A letter was read announcing the withdrawal of Lieut. W. G. Alexander from the Society.

The following gentlemen duly proposed at the last meeting were balloted for, and elected ordinary Members :—

J. D. Tremlett, Esq., C. S.

Maharajah Maun Singh, Bahadur.

His Excellency Sir W. Denison, K. C. B.

Captain L. Pelly, Bombay Army.

The following gentlemen were named for ballot at the next meeting :—

Oliver R. Crockett, Esq., proposed by Mr. H. F. Blanford, seconded by the President.

J. J. T. H. Asphar, Esq., proposed by Dr. E. Goodeve, seconded by Mr. Atkinson.

J. W. McCrindle, Esq., M. A., Principal, Doveton College, proposed by Dr. J. Fayrer, seconded by Mr. Atkinson.

The Council also proposed Dr. R. Gosche of Berlin, as a corresponding member.

The following Report of the Council was submitted for the approval of the Society.

“The Council beg to recommend to the Society that the Rev. K. M. Banerjea’s offer to edit for the Bibl. Indica, the Nárada Pancha Rátra be accepted. It will fill two Fasciculi, and is a valuable work as the great text Book of the Bhágavata view of the Pantheistic doctrine of the Brahma Sutras.

They also recommend that Pundit Ramnarain Vidyáratna’s offer be accepted to complete the edition of the Vedánta Sutras, as commenced by Dr. Roer, with Sankara’s commentary and Ananda’s glossary.”

The Report was adopted.

The Council also reported that they had appointed Colonel H. Yule, as a member of their body in the place of Major Sherwill, and announced that Mr. E. C. Bayley had been added to the Philological and Coin Committees.

Communications were received :—

1. From Baboo Radha Nauth Sikdar, abstracts of Meteorological observations taken at the Surveyor General’s office in October last.

2. From Mr. T. F. Peppe, Sub-Deputy Opium Agent at Burharwa, the following notes containing an account of the fall of an Aerolite on the borders of the Tirhoot district on the 12th ultimo.

Burharwa, 27th May, 1861.

“I have not yet succeeded in getting any pieces of the Aerolite which fell near Segowlee, indeed my attention was here diverted in another direction by news which I received of another having fallen on the borders of the district on the 12th instant, in fact on the very day I received your note.

“Its fall was accompanied by a loud report, as if several guns had simultaneously burst, and was succeeded by several successive peals of thunder; as this occurred about noon, when there was no cloud or appearance of a storm, it attracted universal attention. The report, if I may so call it, was distinctly heard here a distance of some 60 miles, and opinions differed as to whether it was thunder or the report of guns.

“As far as I can learn, three pieces fell and were only partially imbedded in the soil, one at a village called Bullooah on the west side of the Gunduck, and was of a round flat shape, this was broken up by the *ahiris*, who apprehended danger from its presence.

“Another fell at a village called Peeprassee, about 3 miles from the other, and from a fancied resemblance to a *Linga* this was immediately worshipped as *Siva* or *Mahadeo*. I have not yet satisfactorily ascertained what has become of this one, but believe that it is along with the only piece remaining of the one which was broken up, now with the Bettiah Rajah, to whom I have written to enquire.

“The other which fell near a bazar called Qutaha, in the district of Purownah on the Goruckpore side, is still in the place where it fell, and the Zemindar of the place, Ishuree Pershad Rai, has had a tent pitched over it, and appointed a Brahmin to perform the ceremonies, and immense numbers of people now go to do poojah to it as *Mahadeo*, so that there is no chance of getting it at present, I fear; but the Magistrate of Goruckpore would find little difficulty in securing it, after the novelty had subsided.”

In his second letter, dated 2nd June, Mr. Peppe writes :

“Since writing you I have been able to secure two small pieces of the Aerolite of which I wrote you last week.

“I have since learned that four pieces had been found altogether, and that on reaching the ground, they were in every instance in a state of incandescence and emitting sparks precisely as iron at a white heat does.

“The two pieces which I mentioned as having fallen in the Goruckpore *elákah*, have, I have since ascertained, been sent for by the Magistrate of that district. I have written to my brother there to ascertain what became of them.

“The two pieces which I have, are bits of the pieces which fell on the Bettiah side at places about 2 miles apart, the nearest village

of any importance is 'Mudbunee,' which you will find on the map, it is on the other side of the Gunduck, i. e. the west."

3. From Major J. F. Tennant through Lieutenant-Colonel Thuillier, the following table shewing the central line and limits of annularity of the solar eclipse of July 7th, 1861.

ANNULAR ECLIPSE OF THE SUN, JULY 7TH, 1861.

Table shewing the limiting lines within which the phase is annular and also the line where it is central.

Times at Greenwich.	Greatest duration of annularity.	North Limit.		Central Line.		South Limit.	
		Latitude.	Long. E.	Latitude.	Long. E.	Latitude.	Long. E.
Sun rising at place	67.4	0° 12.6 S	85° 58.5	0° 29.3 S	86° 4.8	0° 45.5 S.	86° 11.9
h. m.							
12 22	59.8	2 24.4 N.	92 27.6	2 6.9 N.	92 27.2	1 51.3 N.	92 31.3
12 23	56.6	3 31.0 "	95 16.2	3 15.8 "	95 18.2	3 1.4 "	95 23.1
12 24	54.1	4 19.3 "	97 21.1	4 5.0 "	97 24.2	3 50.5 "	97 26.4
12 25	52.7	5 58.3 "	99 4.2	4 45.0 "	99 7.1	4 31.0 "	99 10.7
12 26	50.4	5 34.4 "	100 38.9	5 20.6 "	100 37.8	5 8.4 "	100 46.4
12 27	48.9	6 1.9 "	101 53.6	5 49.6 "	101 56.3	5 36.2 "	101 58.8
12 28	47.5	6 30.9 "	103 6.3	6 16.6 "	103 10.6	6 5.0 "	103 13.3

"The first column gives the Greenwich mean times except in the first line where the time is local sunrise.

"The second column shows the interval between the formation of the annulus of light round the moon's limb, and its rupture on the Eclipse again becoming partial.

"The central line is that along which the apparent centres of the sun and moon will be seen to coincide at the middle of the Eclipse, and the time of coincidence is that in the first column at the place denoted by the corresponding Latitude and Longitude.

"The North limit is that line where at the greatest Eclipse the moon's limb will be seen to touch the sun's internally on the south side. At the South limit they will touch on the north side. The times and Geographical places correspond."

4. From the Secretary to the Government of India, Foreign Department, the following letter and memorandum regarding a Scientific expedition which it was proposed to despatch into the Trans-Himalayan districts of Chinese Tartary.

*From the Offy. Secy. to the Govt. of India,
To the Secy. of the Asiatic Society of Bengal.*

Dated Fort William, the 29th May, 1861.

FOREIGN DEPT.

SIR,—It is in contemplation to procure permission from the Chinese authorities for the passage of a small scientific expedition into the little known territories of Chinese Tartary beyond our Himalayan frontier.

I am directed by His Excellency the Governor General in Council to communicate this information to the Asiatic Society of Bengal, and to invite the Society to afford such information and advice as may be likely to secure the greatest and most important advantages, both to science and to commerce, from the results of this expedition.

The expedition will probably be directed towards Ladák, the country north-east of Ladák, and that between Ladák and Lhasa.

A rough memorandum of the subjects upon which information is likely to prove useful is inclosed. It will probably be within the power of the Society to furnish the information thus sought, as well as further suggestions for the guidance of the expedition—all of which His Excellency the Governor General in Council will be glad to receive at as early a date as may be practicable.

I have the honor to be,

Sir,

Your most obedient Servant,

(Signed) E. C. BAYLEY,

Offy. Secy. Govt. of India.

I. GEOGRAPHY AND TOPOGRAPHY.—Beyond the general information on these subjects which may be expected from the researches of the expedition, it is of importance that particular attention be paid to the trade routes, the courses of the rivers, the heights of the mountains and the direction of the mountain chains. A sketch of the present state of scientific knowledge in regard to the Geography and Topography of the Trans-Himalayan territories would naturally be very useful to the expedition. Attention might especially be directed to the identification of the traditional *Kailas* of the Hindus, and the measurement of its height. The Asiatic Society will doubtless be able to afford much information upon this point.

II. ETHNOLOGY.—There is reason to believe that the valleys on the N. E. face of the Himalayas and the different portions of the plateau beyond, are inhabited by races of very different descent, *e.g.*, the valleys lying on the left bank of our territories just beyond the borders of Kumaon or Bussahir are inhabited by a small tribe of very different appearance from other Bhootcas; they are taller, fairer and with more prominent features, and are believed by themselves, and others of the inhabitants, to be of a totally different family from either the Bussahirees or the Tartar tribes, who inhabit the plateau beyond; attention should be paid to the physical characteristics of these various races, and any information as to their origin, migrations, dialects, the distinctive appellations of the tribes, and their sub-divisions, obtained from the traditions of the inhabitants, would be valuable. A sketch of what is already known in this respect would, if prepared by the Society, be of great use to the expedition.

III. HISTORY, ANTIQUITIES, AND RELIGION.—The expedition are not likely to obtain much *vivâ voce* information except as to the more recent history of the countries which they visit. Neither is it probable that they will meet with antiquarian remains of much value. Some of the monasteries of the larger towns, are, however, believed to be of old date, and many of them to possess libraries. It is not improbable that from these, MSS. of value may be obtainable, especially of the translations into Thibetan, of Sanscrit works on subjects relating to Buddhism or even MSS. of the original Sanscrit works themselves.

The Society might indicate the names of any works, either in Sanscrit or Thibetan, which it is of special importance to procure, but any works of ancient date, bearing on History, Religion, Philosophy or Travels, would unquestionably be desirable to obtain.

Inscriptions of value are not likely to be discovered, though the Thibetan pilgrims to shrines within the British territories frequently cover every rock in the neighbourhood with inscriptions containing religious invocations.

Any localities in which inscriptions of value are believed likely to exist might be pointed out to the expedition, and they might be instructed how to transfer impressions of any of apparent antiquity.

Collections of local traditions bearing upon the ancient religion

and the History of Thibet would, if sought from intelligent persons and carefully noted down, yield information of value.

No discoveries in Numismatics are, it is believed, to be expected, though it is believed that at one time the ancient coinage of Nipa circulated to some extent beyond the borders of that country.

So little is known, however, of this subject, and the currency of the Thibetan States has been always so limited, that beyond generally drawing the attention of the expedition to the subject, the Society will probably be able to offer them no assistance.

IV. ZOOLOGY—MAMMALIA.—The larger quadrupeds of the Trans-Himalayan plains are believed to be already in a great measure described. The Society might, however, indicate with advantage any points upon which fuller information is yet required. It is possible that some new varieties of Antelope and deer may be discovered by the expedition. Horns are occasionally brought by the Bhootea traders from the various fairs which do not seem to belong to varieties as yet identified as inhabiting the Trans-Himalayan plain.

Some discoveries may probably be looked for among the minor animals, such as the viverrine and similar races. Several varieties of these are believed to exist in the country to be visited by the expedition, the skins of some of which are said to be used as articles of trade.

There is a large flying squirrel of great beauty believed to be hitherto unnamed, but probably belonging to the genus *Terramus*; mutilated specimens of which have been occasionally brought from Kunawur, and similar localities. Good specimens of this are desiderata. When full grown, it measures nearly three feet across the extended fore-paws, and is especially distinguished by the exquisite softness and unusual length of the fur and of the tail. The general colour of the animal is a Chinchilla grey.

Aquatic animals may possibly exist in some of the larger lakes; and if so, they are probably still unknown to science.

REPTILES AND INSECTS.—It is probable from the nature of the country that few specimens of this class are likely to be made available by the researches of the expedition. Those, however, which may be discovered, are also likely to be worthy of notice, as little attention appears to have been paid hitherto to this portion of Natural History of the Trans-Himalayan regions. Specimens and information,

as to the habits of such reptiles and insects, therefore, as the expedition may be able to find are likely to be especially valuable.

FISH.—The inland lakes and rivers probably contain many fish of which little is known. Information and specimens of these will be valuable.

SHELLS AND CRUSTACEA.—The land and fresh water shells are also probably worthy of attention. The streams on the S. W. face of the Himalaya, occasionally contain a few rare Crustacea in their pools and holes.

V. ORNITHOLOGY.—The birds which the expedition may discover are not likely to be new, except perhaps some of the larger birds of prey.

But information of value is likely to be available to the expedition as to the habits and summer resorts of many migratory birds.

The Society may perhaps be able to direct the attention of the expedition to the points upon which information of the nature above described is of most value.

VI. GEOLOGY AND MINERALOGY.—The knowledge possessed by Mr. Medlicott in these branches of science will render the advice of the Society less necessary than in any others; but the Society may be in possession of facts of which Mr. Medlicott may not be aware, and which may be of value in determining the direction which his researches should take.

Information, especially as to the supposed locality of recent rocks said to exist upon the plateau of Thibet, would be valuable.

Fossils are frequently brought by the traders, and some of these may be in the Society's Museum. Lists of them and of the localities from which they are said to have been brought would be of much assistance.

An abstract of the discoveries of Col. and of Mr. John Strachey, Captain W. E. Hay, and others, of fossiliferous rocks in the Himalayan tracts within the British border would also be of use.

In a few places of the Himalayas (as in the summits and flanks of the Hungrung and neighbouring passes in Kunawur) are found isolated masses of a conglomerate, from its mineral character, apparently of an extremely recent age. On the Hungrung pass the shape of these masses would indicate that they are the remains of a deposit, the bulk of which has been swept away by denudation.

They rest there upon a limestone containing "turbinolio" and coralline fossils in considerable abundance.

Magnificent crystals of cyanide, staurotide, black tourmaline, augite and a variety of balas ruby have been procured from some of the granitic rocks which run within the Thibet border; probably further research would discover other minerals usually associated with these. Information as to the localities whence specimens of these and other minerals of the Himalayas have been obtained by the Society will be of use to the expedition.

The borax lakes and sulphur mines will form an important object of examination by the expedition; the Society would probably be able to give a sketch of the localities in which they are to be looked for, and other information as to the history of their working, &c.

VII. BOTANY.—It is probable that the more important portion of the Flora of the comparatively barren districts which the expedition will reach will not differ materially from that of the portion of the country Trans-Himalaya already explored. It is in the humbler and less remarkable portions of the vegetable kingdom that discoveries may be expected.

There may also be some productions still unknown, of value or beauty, especially on the more sheltered and better watered portions of the country. The expedition would, however, be probably best assisted in this respect by such information as the Society can afford regarding any productions of economical value of which it is of importance to procure specimens and fuller knowledge than is at present possessed.

Any further information on the above or upon other points which the Society are able to impart to the expedition will be thankfully received.

The Secretary stated that the different heads of enquiry indicated in this memorandum had been referred by the Council to the various Sub-Committees for report, but that they wished it to be understood that any information and suggestions which could be contributed by the members and others not in those Committees would be gratefully received.

5. From the Secretary, Punjab Government, a communication regarding the Dhurmsala meteorite, in reply to a letter addressed to the Lieut.-Governor of the Punjab.

The correspondence is subjoined.

To the Hon'ble Sir R. Montgomery, K. C. B.

Lieut.-Governor of Punjab.

Asiatic Society's Rooms.

Cal. 20th April, 1861.

SIR,—I am directed by the Council of the Asiatic Society to solicit your intervention to enable them to obtain more accurate detailed information than has yet reached them about the phenomena attending the fall of the great meteorite at Dhurmsala in August last. A reference on this subject has lately been made to the Society at the instance of the authorities of the British Museum, and the Supreme Government has requested us to supply all the information we have been able to collect. Before replying, we are anxious to obtain more precise information on the following points:—

1. It is stated that whilst the sound of the various reports said to have been heard lasted, “the ground trembled and shook convulsively” proof of this is much needed. Was anything upset? If so, in what direction? Could the sensation of trembling have arisen from the commotion of the atmosphere?

2. Additional evidence of the occurrence of the flame of fire, said to have been seen, and the direction of its motion.

3. Proof that the flash or flame preceded the report.

Did it precede all the reports? There are stated to have been four or five distinct reports. If so, was the length of interval noted? This would give the means of calculating the distance of the mass when the explosion took place.

4. Any additional evidence of the lights in the heavens, said to have been observed, described as being like fire balloons.

5. The actual weight of any specimens found; one is said to have been about *4 maunds*!!

6. Above all, *any and every proof* of the remarkable fact stated by more than one person, but very possibly only a repetition of the same hearsay evidence, that portions of the mass were *icy cold*, when taken up immediately after the fall, so cold that the men had to drop them immediately, their fingers being benumbed by the intensity of the cold. This point is of special interest, and calls for the most precise and distinct proof.

Very small, and some of them doubtful fragments of this remarkable meteorite have as yet reached the Society. We shall be glad to obtain as many and as large specimens as possible for communication to the various scientific bodies in Europe, who are engaged in investigating these deeply interesting cosmical phenomena.

Our Society will be under great obligation to you for any aid you can give in elucidating the actual facts of this extraordinary fall.

I have, &c.,

(Signed)

W. S. ATKINSON,

Hon. Secy. As. Society.

To the Honorary Secretary, Asiatic Society, Calcutta.

Dated Lahore, 1st May, 1861.

SIR,—In reply to your letter of the 20th April, I am directed to forward, for the information of the Society, copies of two letters from Mr. R. Saunders, Deputy Commissioner of Kangra, giving all the accounts which are obtainable of the fall of meteorites at Dhurmsala last year.

I regret that no specimens are now procurable to be furnished to the Society.

I have, &c.,

(Signed)

R. H. DAVIES,

Secy. to Govt. Punjab.

The first of these letters has already been published in the Society's Journal, No. IV. of 1860, p. 412.

The second is subjoined.

“With reference to your No. 683, dated 4th instant, I have the honor to state, that I have been making further inquiries with regard to the Meteorite that fell at Dhurmsala.

No fresh information can, however, be obtained beyond that contained in my No. 927, dated 28th July, to the orders of the Punjab Government.

I beg to append copy of a letter received from Monsieur Haidinger, Director General of the Imperial Geological Institute of Austria, dated Vienna, 14th November, 1860, on the subject of these meteoric stones.

In reply to this letter, I forwarded a copy *in extenso* of my account of the fall of the Aerolite referred to above, and begged the favour of their furnishing copies to each of the Institutions for which specimens were requested

I packed a box with 14 specimens of the Aerolite and despatched this to the Private Secretary of His Excellency the Governor General, with a request that he would, after taking out certain specimens which were intended for His Excellency the Governor General, forward the box to Vienna, in the manner directed.

One of the specimens was, as will be observed from the letter, intended for the British Museum.

I have, however, now sent the only remaining two specimens* I could procure to Lahore for transmission to the Secretary of State for India, either for presentation to the British Museum or the Museum attached to the late India House, or for the acceptance of Her most Gracious Majesty Queen Victoria.

The specimen now sent is the largest of any that has been despatched from Dhurmsala, and being beyond the weight authorized for Banghy parcels, I was under the necessity of forwarding it to Jullunder by coolies and thence by Government Bullock Train to Lahore.

When worked up into handles for walking sticks, riding whips, the metallie substance is clearly visible.

As to the precise form of the Aerolite, no positive information could be obtained, for it was found in fragments, and its intense coldness has been mentioned in the report before submitted.

The original of the letter from Vienna, together with a printed paper giving the falls of former meteorites, and an account of them has been already forwarded to His Excellency the Governor General in India.

The specimens for Lahore have been forwarded under separate covers."

The Secretary read some extracts from a report from Major H. Green, Political Agent at Khelat, communicated by the Government of India, giving an interesting account of the supposed origin and present condition of some of the Belooch tribes.

Mr. Obbard drew the attention of the meeting to a series of specimens of soil from the bed of the Hooghly, which he had brought for exhibition.

* No. 1 of the fragment that fell at Bowarna.

No. 2 of the large stone that fell at Dhurmsala.

He remarked that the collection was at present very imperfect, and that his only object in noticing it now, was to indicate the result which he wished to realize.

It was his hope that with the use of the microscope, by Geological analogy, the original loci of these different kinds of detritus might be determined and that thereby light might be thrown on the vexed question of the deterioration of the Hooghly; an enquiry which was most interesting both in a commercial and scientific point of view.

An examination of the small collection on the table would shew that almost every specimen differed essentially from all the rest.

A conversation ensued, in the course of which several members remarked on the great interest which would attach to this enquiry.

Mr. Cowell read a short paper comparing the Persian version of the legend of Gyges' ring, as found in the Persian poet Nizámí, with the well known story in Plato's Republic.

Thanks were voted to Mr. Cowell for his interesting paper.

The Officiating Librarian submitted the usual monthly Report.

LIBRARY.

The following additions were made to the Library since the last meeting.

Presented.

Selections from the Records of the Government of Bengal, No. 36. Parts 1 and 2.—Containing papers relating to Irrigation in Bengal and the Maghasani Hills as a Sanatorium.—BY THE BENGAL GOVT.

Selections from the Records of the Government of India (Military Department) No. 1.—Containing Report on the nature and extent of the Sanitary establishments for European troops in the Bengal, Madras and Bombay Presidencies.—BY THE GOVT. OF INDIA.

A pamphlet containing demonstration of a Lunar Tidal wave in the North American Lakes. By Lieut.-Col. J. D. Graham.—BY THE AUTHOR.

The Oriental Baptist for May 1861.—BY THE EDITOR.

The Calcutta Christian Observer for May 1861.—BY THE EDITOR.

Journal of the Agricultural and Horticultural Society of India, Vol. XI. Part IV.—BY THE SOCIETY.

Ninth Annual Report of the British Indian Association for 1860. Pamphlet.—BY THE ASSOCIATION.

Petition against the Income Tax, of the Zemindars of Bengal, Behar and Orissa to the Imperial Parliament.—BY THE SAME.

History of Commerce with India before the existence of the East India Company, being a lecture delivered at St. Paul's School, February 5, 1861, by E. B. Cowell, Esq. M. A.—BY THE AUTHOR.

Proceedings of the Royal Society of London, Vol. XI. No. 43.—BY THE SOCIETY.

Proceedings of the Royal Geographical Society of London, Vol. V. No. 1.

Journal Asiatique Cinquième Série. Tome XVII. No. 65.—BY THE PARIS ASIATIC SOCIETY.

Zeitschrift der Deutschen Morgenländischen Gesellschaft. Band XV. Heft. 1.—BY THE SOCIETY.

Exchanged.

The Athenæum for March, 1861.

The Philosophical Magazine, No. 140, for April, 1861.

Purchased.

Revue des Deux Mondes for March and April, 1861.

Comptes Rendus, Tome 52, Nos. 9 to 12.

The Annals and Magazine of Natural History, Vol. 7, No. 40.

Abhandlungen für die Kunde des Morgenlandes, Band II. No. 2.

Revue et Magasin De Zoologie, No. 2 of 1861.

The American Journal of Science and Arts, Vol. XXXI. No. 92.

Deutsches Wörterbuch, Dritten Bandes, fünfte Lieferung.

Zoological Sketches, Part 13. By Joseph Wolf, with notes by P. L. Sclater

The Literary Gazette, Vol. VI. Nos. 143 to 146.

The Edinburgh Review for April, 1861.

The Westminster Review for April, 1861.

Mason's Burmah.

LALGOPAL DUTT.

FOR JULY, 1861.

The monthly general meeting of the Asiatic Society of Bengal was held on the 3rd instant.

A. Grote, Esq., President, in the chair.

Presentations were received :—

1. From Baboo Rajendra Mallicka, specimens of a Welsh Goat and a Gayal.

2. From M. Garcin de Tassy, a copy of a work containing his description of the monuments of Delhi.

3. From the Government of Bengal, a copy of "General Report on the Administration of British India for 1859-60."

4. From Mr. E. B. Cowell, a work entitled "Bibliographie Japonaise" being a catalogue of works in the Japanese language, by M. Leon Pages.

5. From M. Joseph Stabile of Milan, a copy of his work, containing "Description de Quelques Coquilles Nouvelles ou peu Connues" and another entitled "Prospetto Sistematico-Statistico dei Molluschi Terrestri E Fluviali Viventi Nel Territorio Di Lugano."

6. From Mr. H. Collie, a specimen of a Boa-constrictor.

7. From Baboo Bhobany Prosad Dutt, Honorary Secretary Raja Radha Kant Testimonial Committee, a memorial portrait of the Rajah.

Read letters from Rev. W. Ayerst and Major W. E. Warrand, expressing their desire to withdraw from the Society.

The following gentlemen, duly proposed at the last meeting, were balloted for and elected ordinary members :—

Oliver R. Crockett, Esq. ; J. J. T. H. Asphar, Esq. ; and J. W. McCrindle, Esq., M. A. ;—Dr. R. Gosche, of Berlin, was also balloted for and elected a corresponding member.

The following gentleman was named for ballot at the next meeting :—

Nawab Mahommed Khazim Ali Khan Bahadur, of Rampore, near Moradabad ; proposed by Mr. Atkinson, seconded by the President.

Communications were received :—

1. From the Under-Secretary to the Government of India, Home Department, a copy of two letters from the Superintendent of Port Blair, reporting further intercourse with the aborigines of the Andaman Islands.

2. From the Under-Secretary to the Government of India, Foreign Department, a copy of a letter with enclosure from the Commissioner of the Tenasserim and Martaban Provinces, regarding three Andaman aborigines now at Moulmein.

3. From Lieutenant-Colonel A. Fytche, a paper entitled "A Note on certain Aborigines of the Andaman Islands."

4. From Baboo Radhanauth Sikdar, abstracts of Meteorological observations taken at the Surveyor General's Office in November and December last.

5. From the Under-Secretary to the Government of Bengal, a copy of a report relative to a very severe storm that passed over the district of Sylhet on the 6th March last.

6. From Lieutenant A. Duff, Deputy Commissioner, Thyet Myo, through Mr. W. T. Blanford, a paper containing an account of the Nat-Mee or the Spirit-Fire, a burning hillock in the Province of Pegu.

The paper was read as follows :—

“ I had frequently heard vague rumours of a burning hill in the Kamruah township, but believed that if such a thing really had any existenee, it was situated in the Arraeen hills, and was probably a volcano similar to that near Thyouk Phyo. In a recent tour with a friend down the valley of the Punnee stream at the village of Pun, where we bivouacked as usual, a number of cultivators from the adjoining villages came in to talk about their cultivation, &c.; and I overheard some villagers from Nat-Mee say, in reply to a question from some one—“ Yes, it is still burning” (or shining).* I asked what was referred to, and was informed that it was the Spirit Fire from which the village of Nat-Mee† got its name; that it was a place with a heap of stones out of which fire issued; that generally about the change of the year (Burman) the fire was most manifest, but that sometimes it was not to be seen; that in such cases the person visiting the place had merely to deposit some light inflammable substance near the heap of stones, make a genuflexion towards it, and say—‘ Oh great lord! manifest thyself to me thy slave,’ when the spirit would instantly send fire out of the stones and burn up the substance deposited.

“ During my various rambles through different parts of Burmah, I had heard all manner of wild stories of Pagodas emitting fire, &c., &c.; and these stories were frequently declared to be fact by people living only a few miles distant from the scene of the marvel; so that it was only on arriving at the very spot that one could clearly ascertain that such a story had no more foundation than that of the three black crows of immortal memory. When, therefore, my informants came to the statement that the fire *might* not be visible if I went to see it, but certainly would if the proper address were made to the Nat or Spirit, I must confess that I began to look upon the whole thing as a myth; but on talking it over with my companion we resolved that, as the village of Nat-Mee lay in our proposed route

* The Burmese word used might mean either.

† From Nat, a spirit; and Mee, fire.

for the next day, we certainly should go and see whatever was to be seen.

“Next morning, after a pleasant ride of about four miles down the valley of the Punnee, we approached the village of Nat-Mee. ‘Well, where is the fire?’ we ask. ‘Oh it is not here; it is over there the other side of the stream’ is the reply. Belief in the fire goes down instantly to a degree considerably below zero. However, we cross the stream to a small suburb of Nat-Mee called Thyatas; we pass this; we meet some villagers, and our guide asks them—‘Is it still burning?’ ‘Don’t know’ is the reply. Belief in fire goes down into the bulb of our mental thermometers. However, we insist on going to the spot, and are led off the road across some cultivation, till we come to a belt of jungle with a foot-path through it. Here we have to dismount, and walking on for about a hundred yards, we come to a little hillock up which we are led. On the top of this hillock is a large heap of stones, and going round to the opposite side of it from that we had approached by, we see the Spirit-Fire. Yes, there it is. Out of the stones in two or three places comes a bright flame, flickering and burning; at a little distance from the heap of stones, where there are some cracks in the ground, more flame. In this instance, the marvel has proved true. There is nothing in the appearance of the hillock itself, or the heap of stones, differing from any other hillock or any other heap of stones in this part of the country; no appearance of boiling lava, violent upheavals, or any of those convulsions with which one is accustomed to associate the idea of subterranean fire. The ground and the stones were not even hot, except in the places where the fire was actually burning; the soil was gravelly, and at one place where the flame was issuing from a crack, I stirred up the gravel with a stick. The effect produced I can only compare to that produced by stirring up a plum-pudding in which brandy is burning. The flame spread itself and flickered about the gravel just as the burning brandy does about the pudding; but just as in that case the pudding is not burnt, so in this the gravel did not become extremely hot, and could be handled, though some of the stones in places where the fire came steadily were all but red-hot. Query—What was the substitute for the brandy in this case? There was at times a slight simmering noise, but not so loud as that of a boiling kettle. We remained on the spot for some time and then proceeded to our

next halting place, where I gathered from the inhabitants the following particulars regarding this strange phenomenon. The oldest inhabitant I could get hold of, who had been at Nat-Mee for some 60 years, remembered no difference in the hillock or heap of stones from their present condition. He believed that the latter had been collected there by people who came to see the fire, long ago, each heaping up one or two on the spot. And the appearance of the cairn strongly bears out this opinion. The flames used to burn steadily all the year round, and even in the rains never went out. They could not be extinguished by water. For the last eight or nine years, however, they have been more fitful, only burning for two or three months every year at the change of the Burman year. They had been burning for about six weeks when we saw them. They never were known to do any harm, to make much more noise, or to extend over much more space than when we saw them; but everybody knew that if all the fires in the village were not put out once a year and relit from this, the village would be burnt. Unfortunately, neither my companion nor myself are geologists, but the conclusion we came to regarding the phenomenon was that it was some inflammable gas issuing from the earth. There was no apparent sign of any recent volcanic convulsion—no tradition of any such; while a very slight explosive force would derange the heap of stones and scatter them in all directions. Yet, as far as we could ascertain, the heap had been much in its present condition from time immemorial. I picked up on the spot a tradition ascribing the names of all the old villages in the neighbourhood to what had taken place in days of yore with the Spirit of the Fire. If good for nothing else, it serves to show that the fire must have been much in its present condition when these villages were founded, whenever that may have been; and I annex a translation of it. Although unable to give any scientific description of this phenomenon, perhaps these notes may draw the attention of some one capable of doing so, to it. The distance of Nat-Mee from Thayet Myo is about 30 miles. The road is good in the dry weather; and in the latter half of it there are numerous villages.”

THE LEGEND OF NAT-MEE OR THE SPIRIT-FIRE.

Translated from the Burmese.

“Long, long ago there lived in the village now called Nat-Mee a man who gained his living as a blacksmith. When his time was

come he died and became a Nat ; but still he loved his old home and hankered after his old occupation ; so he established the Spirit-Fire on a hill near the village, and there continued his old trade ; hence the village came to be called Nat-Mee. Whenever a villager wanted a *dha* or an axe, or a spade, he took the iron to the fire, and depositing it there said ‘Oh my lord, make this iron into a *dha*,’ or an axe, &c., as the case might be, and returning for it next day, he would find his iron fashioned into the article he wanted, whether *dha*, axe, or spade, but no man ever saw the spirit at his labour.

“At last, one day, a man of the Khyen race brought a *dha*, and depositing it by the fire with a piece of iron said—‘Oh my lord ! weld me on an edge to this *dha*’ and went his way. Now the Khyen was a man of a curious disposition ; so next morning he got up very early, and climbing the hill, hid himself in the jungle near the fire. When it got light he peeped out and saw the spirit in the form of a man wearing a red *putse* and a red turban, working at the *dha*. So the Khyen called out—“Oh my lord ! have you not finished my *dha* yet ? Let me have it quickly, I pray you,” but the Nat being enraged at being discovered at his labours by a prying Khyen, took the *dha* out of the fire, red-hot as it was, and easting it at him, hit him on the cheek ; and the Khyen in great fear fled from the spot, and so great was his fear that he never stopped to examine his wound nor even felt it, till he had run about a *dein** and a half ; and then he stopped for a little and rubbed his cheek with his hand, whence that spot was called *Pa-Bwoot* (cheek-rub) and is so called to this day.

“But the Khyen was too terrified to stop ; so he ran on for about a mile further, and there sitting down, was seized with a violent fit of trembling ; hence that spot was called *Toon* (*Tremble*) even unto this day. And when the trembling was over, the Khyen got up, and though his fear urged him to fly, the fatigue he had undergone and the pain of his wound rendered his steps slow and uncertain ; but he struggled on for about a *dein* further, and there he was obliged to stop ; and the blister on his cheek burst, and his cheek swelled up and became one great sore, and he was unable to move for many days ; so he remained in that place and hence it was called *Pouk-Poo-Ga* (burst-hot-swollen). After this the Nat never again would labour for the villagers ; but still his fire burns near his old home,

* About 3 miles.

and once in every year every fire in the village is extinguished and rekindled from the Spirit-Fire ; for there is an old tradition handed down from time immemorial, that whosoever of the villagers neglects this tribute of respect to the Spirit of the Fire, his house and all that he has will inevitably perish in flames ere a year goes by."

"Note. The villages referred to above are all now in existence. I have written the Burmese names above, and the meaning of each separate syllable in English, below them."

Mr. Oldham remarked that, in all probability, the phenomenon so admirably described by Lieut. Duff was due to a small and slight exudation of petroleum which had taken fire, and had been ignited at the changes of the year, as stated, by the burning of the adjoining jungles. There were several such small outbursts of petroleum along this range of hills, and several of them were constantly on fire. The heap of stones described by Lieut. Duff was clearly the result of heaping up by visitors.

The Officiating Librarian submitted the usual monthly report.

LIBRARY.

The following accessions were made to the Library since the meeting in June.

Presented.

Description des Monuments De Delhi en 1852. Par M. Garcin De Tassy, Paris, 1861.—BY THE AUTHOR.

Prospetto Sistematico—Statistico dei Mollusehi Terrestri E Fluviali Venti Nel Territorio Di Lugano. Dell' Ab. Giuseppe Stabile—Milano, 1859.—BY THE AUTHOR.

Description de Quelques Coquilles Nouvelles Ou Peu Connues.—Par M. L'Abbé Joseph Stabile.—BY THE AUTHOR.

General Report on the administration of the several Presidencies and Provinces of British India during the year 1859-60, Vols. 1, 2 and 3, with Appendices.—BY THE BENGAL GOVT.

Bibliographie Japonaise ou Catalogue des Ouvrages Relatifs Au Japon. Par M. Leon Pages, Paris, 1859.—BY MR. E. B. COWELL.

The Annals of Indian Administration, Part 2, Vol. 5.—BY THE BENGAL GOVT.

Kitábo' L-Boldán of Al-Ja Qübbí, Edited by A. W. T. Juynboll, Lugduni—Batavorum, 1861.—BY THE BATAVIAN ACADEMY.

Vividhartha Sañgraha, No. 73.—BY BABOO KALIPROSSONO SINGH.

On the Introduction of the Cinchona plant into India. By Clements R. Markham, Esq. F. R. G. S. (From the Transactions of the Medical and Physical Society) Pamphlet.—BY THE AUTHOR.

The Famine in the N. W. Provinces of India: how we might have prevented it, and may prevent another. By John Dickinson, F. R. A. S., F. R. G. S., Pamphlet.—BY BABU RAJENDRA LAL MITRA.

The Oriental Baptist for June and July, 1861.—BY THE EDITOR.

The Calcutta Christian Observer for June and July, 1861.—BY THE EDITOR.

The Transactions of the Royal Irish Academy, Vol. XXIV. Part 1, Dublin, 1860.—BY THE ACADEMY.

Memoranda on the Progress of the Trigonometrical Survey in Kashmir. Pamphlet.—BY THE PANJAB GOVT.

Abstract of a paper on Kalidasa.—BY BABU R. L. MITRA.

Calcutta Review for March, 1861.—BY THE EDITOR.

Selections from the Records of the Bengal Government, No. 37.—BY THE BENGAL GOVT.

Exchanged.

The Athenæum for April, 1861.

The Philosophical Magazine, No. 141 for May, 1861.

Purchased.

Über Das Passivum, von H. C. von Der Gabelentz.

Revue de Zoologie, No. 3 of 1861.

Journal Des Savants for Mareh, 1861.

Comptes Rendus, Tome LII. Nos. 13 to 16, with Index to Tome LI.

The Natural History Review for April, 1861.

Revue des Deux Mondes, Tome XXXII. for 15th April, 1861.

The Annals and Magazine of Natural History, Vol. 7, No. 41.

The Quarterly Review for April, 1861.

The Literary Gazette, Nos. 147 to 150.

Catalogue of the Acanthopterygian Fishes in the collection of the British Museum, Vols. 1 and 2. By Dr. A. Günther.

Catalogue of Apodal Fishes in the British Museum Collection. By Dr. Kaup.

Catalogue of the Batrachia Salientia in the B. M. Collection. By Dr. A. Günther.

Catalogue of Halticidæ in the B. M. Collection. By the Rev. H. Clark, M. A., F. L. S. Part 1. Containing descriptions of Physapodes and Gedi-podes.

Guide to the Systematic Distribution of Mollusca in the British Museum, Part 1. By John Ed. Gray.

List of the specimens of Birds in the B. M. Collection. By G. R. Gray, Part III. Section II. Psittacidæ.

Catalogue of Hymenopterous Insects in the Collection of the B. Museum. By F. Smith, Part V. Vespidae, Part VI. Formicidæ and Part VII. Dordlidæ and Thynnidæ.

Catalogue of the specimens of Neuropterous Insects in the B. M. Collection. By Dr. H. Hagen, Part I. Termitina.

List of the British Diatomaceæ in the B. M. Collection. By the Rev. W. Smith, F. L. S. &c.

List of the specimens of Homopterous Insects in the B. M. C. By F. Walker, Esq. F. L. S. &c.—Supplement.

Catalogue of the specimens of Amphibia in the B. M. C. Part II. Batrachia Gradientia, &c.

Catalogue of Mazallan Shells in the B. M. C. collected by F. Reigen, Described by P. P. Carpenter.

Catalogue of Colubrine Snakes in the B. M. C. By Dr. A. Günther.

Catalogue of Auriculidæ, Proserpinidæ and Truncatellidæ in the B. M. Collection. By Dr. Louis Pfeiffer.

Catalogue of the Birds of the Tropical Islands of the Pacific Ocean in the B. M. Collection. By G. R. Gray, F. L. S., F. R. S., &c.

Catalogue of the Mammalia and Birds of New Guinea in the B. M. C. By J. E. Gray, Ph. D., F. R. S., and G. R. Gray F. L. S., &c.

List of the specimens of Lepidopterous Insects in the B. M. C. Part 21. By F. Walker, Geometrites.

LALGOPAL DUTT.

JOURNAL
OF THE
ASIATIC SOCIETY.

No. IV. 1861.

Decipherment of an Inscription from Chedi, with a brief Statement of the Historical and other Indications therefrom derived. By FITZ-EDWARD HALL, Esq., D. C. L.

Alike by way of confirmation, and on other grounds, the present inscription possesses interest.

Some years ago, in giving an account of two similar relics, discovered near Jubulpore, I was at some trouble to deduce, that the circumjacentcies of that place were included, of old, in the kingdom of Chedi.* For deduction, on this point, I am now prepared to substitute affirmation.†

Further, the Kokalla of Chedi, mentioned in several inscriptions found in the west, I formerly hesitated, for want of complete evidence, to identify with the Kokalla of Chedi of whom I was then writing. Here, also, fresh data enable me, as will be seen, almost to assert that which before was but impliedly suggested.

* See the *Journal of the American Oriental Society*, Vol. VI., pp. 499—536. The reader of this paper should have those pages before him.

Possibly we have Chedi in the "Tehi-ki-t'o" of Hiouen-Thsang, which M. Julien hesitatingly represents by "Tehikdia," but positively deems to be one with Chitor. Hiouen Thsang reached "Tehi-ki-t'o" after travelling about a thousand *lis* N. E. from Ujjayini. The error of the Sinologer begins with taking west for east. Subsequently he adopts the conclusion of M. L. Vivien de Saint-Martin, who, following Sir Henry Elliot, traces "Tehi-ki-t'o" to Jajháotí, on the river Ken. See *Voyages des Pèlerins Bouddhistes*, Vol. III., pp. 168, 408, 442; and *Biographical Index to the Historians of Muhammedan India*, Vol. I., p. 37, second foot-note.

† Lakshmana, a Kulachuri chieftain, is, in the inscription now printed, twice called Lord of Chedi; namely, in the fifty-sixth and fifty-ninth stanzas.

When previously treating of the medieval rulers of Chedi, I gave their names as follows :

Yuvarāja.*
 Kokalla.†
 Gángeya.
 Karnā.
 Yas'ahkarnā.
 Gayakarnā.
 Narasinha.
 Jayasinha.
 Vijayasinha.
 Ajayasinha.

Each of these persons, with one reservation, was son of his immediate predecessor. Jayasinha was brother of Narasinha. Ajayasinha is heard of only as heir apparent.

The names of kings,‡ the first of the list excepted, drawn from the inscription appended to these remarks, are :

Lakshmaṇa.
 Kokalla.
 Mugdhatunga.
 Keyúrarvarsha.
 Lakshmaṇa.§
 S'ankaragaṇa.
 Yuvarāja.

In this series, as in the preceding, the succession passed from father to son ; only Yuvarāja was S'ankaragaṇa's younger brother.||

We here have introduced to us a new line, descended from Kokalla, that bore sway in Chedi ; the other line being that which proceeded

* The name of the person so titularly styled was Lakshmaṇa, as we know from Colonel Wilford. See the *Asiatic Researches*, Vol. IX., p. 108.

† That Kokalla's father was Yuvarāja appears from a grant on copper. See this Journal, for 1839, p. 489, seventh and eighth stanzas.

‡ His name is also seen spelled Kokkala and Kokkalla. Where the first occurs, only a single *l* would quadrate with the metre. The doubling of the *k* is of no prosodial significance, and probably is a miscript in both places. See the *Journal of the Bombay Branch of the Royal Asiatic Society*, Vol. IV., first facsimile facing p. 110.

§ See stanzas 12, 18, 24, 46, 64, 67.

|| He was familiarly known, we are told, as Yuvarāja. The reason must have been, that he was for a long time heir apparent. See the forty-sixth stanza.

|| So it is stated in the sixty-seventh stanza.

through Gángeya.* Whether he was elder son, or whether Mugdhatunga was, is not ascertained. However this may have been, it is tolerably clear, that, immediately after the time of Kokalla, Chedi underwent partition.

Kokalla's grandson's grandson, Gayakarna, married a granddaughter of Udayáditya, sovereign of Dhárá; and the Kṛishnarája whom Kokalla is said to have defeated in the south,† was, not impossibly, that lady's ancestor.‡ Again, the Bhoja whom he is recorded to have vanquished in the west,§ was, without much question, one of the two kings of Kanauj who bore that appellation. These kings will be spoken of in my next paper.

Of Mugdhatunga's exploits we learn nothing, further than that he wrested Páli from the lord of Kosala.||

Keyúrarvarsha wedded a lady, Nohalá by name, of whose family a few particulars are specified. Her father was Avanivarman, son of Sadhanwan, son of Sinhavarman. Their clan was the Chaulukya. The Chaulukyans, it is related, arose in this wise.¶ Drona, son of

* Other issue of Kokalla were S'ankaragana, Arjuna, and Mahádevi. S'adruga was, possibly, still another child of his; but I am disposed to suspect, that S'adruga, if not a misdecipherment, was the proper name of S'ankaragana, called Raṇavigraha also.

Mahádevi married a chieftain named Kṛishna, or Akálarvarsha. Fruit of this union was Jagadrudra, or Jagattunga, who had for wives his two cousins german, Lakshmi and Govindámbá, daughters of S'ankaragana. The rest that I heretofore wrote of the domestic history of Jagadrudra was based on misapprehension. Indra, son by Lakshmi, married Dwijámbá, granddaughter of Arjuna, his grand-uncle through both parents.

† See the seventeenth stanza.

‡ Vide p. 197, *supra*.

§ See the seventeenth stanza.

|| See the twenty-third stanza. Kosala—since there is no good ground for the ordinary spelling, Kos'ala—was once, to all appearance, a most extensive kingdom. But time and change seem to have abridged, by little and little, its ancient limits, until it became restricted, for centuries before its extinction, to the vicinity of some point of the Vindhya mountains. On the authority of an unpublished inscription, Kosala at one time answered, with more or less of exactness, to the modern Chhattisgarh. It was, undoubtedly, the Páli of that principality, which Mugdhatunga is said to have snatched from its master. See the *Asiatic Researches*, Vol. XV, p. 504.

The late Professor Wilson, in his Translation of the *Vishnu-purána*, pp. 478, 479, has written: "There will be nine kings in the seven Kos'alas." The original of this is: सप्तकोसलायां तु नवैव भूतयो भविष्यन्ति. Only in the Páuránika nomenclature do we encounter this "tract embracing the seven Kosalas;" to render the Sanskrit more strictly. What was meant by it remains to be settled.

¶ Other accounts of their origination are met with; particularly in the inscriptions published by Mr. Wathen. What follows is from the pen of Mr. Walter Elliot:

Bharadwája, becoming, on one occasion, incensed at Drupada, took water in his hand,* in act to curse him. Some of it fell to the ground; and from it the Chaulukyas derived their origin.†

Queen Nohalá erected a temple to S'iva, and gave it in charge to Is'waras'iva, disciple of S'abdas'iva, who came after Pavanas'iva, son of Madhumati. On Is'waras'iva she bestowed two villages, Nipáníyá and Vipátaka; and she likewise set apart, for the behoof of the temple, Dhangata, Pátaka, Poṇḍí, Nágabalá, Khailapátaka, Vídá, Sajjákali, and Goshṭhapáli.‡

Lakshmaṇa was son of Keyúrarsha, by Nohalá. Like his grand-sire, Lakshmaṇa waged hostilities against Kosala, and overcame its chief; if the words of an Indian eulogist may be taken literally. Odra, or Orissa, he is also reported to have invaded, and to have despoiled its king of an effigy of Káliya,§ wrought in gold and precious stones. This effigy he consecrated to S'iva, at the famous temple of Somes'wara, or Somanátha, in Gujerat, where he had before dedicated a car.||

Nohalá's temple, from which doubtless our inscription came, is again spoken of, with its incumbents, and their spiritual precursors.

"In one of the inscriptions, the origin of the family is deduced from 'Brahm, Manusputra (or Atri), Mandavi or Mandarvya, Hariti, Háríti Pancha Sikhu, who was making a libation to the sun, at the Sri Sauddhya, when the Chalukyas sprang from the spray of the water poured out. In this race were born Vishnu Verddhana, Vijayaditya, and Satrya Sri, lord of Ayodya, &c.'

"In another, the descent is brought from Brahma, through Budha and Ila, to Paruvas, 'from whom came Hariti the fire-tufted, making illustrious the Somavansa, and progenitor of many royal races, conspicuous among which was the Chalukya vansa, in which was born Satya Sri, the lord of Ayodhya, from whom the race was denominated the Satya Sri Kula.'" *Journal of the Royal Asiatic Society*, Vol. IV., p. 8, foot-note.

This extract abounds with errors. I have not undertaken to set them right.

* Chaulukya is here referred to *chuluka*, a word incorrectly defined, as to one of its senses, by Professor Wilson, "the hand hollowed to hold water." It means a handful of water.

† If Chaulukya be the right word, it is often found misspelt.

Chullí denotes, in Hindí, what Professor Wilson understood by *chuluka*. But *chungal* is not, as has been asserted, "a handful of anything dry, as *chullí* is of anything liquid." It means as much as can be grasped between the contracted fingers and thumb. See Sir H. M. Elliot's *Supplemental Glossary*, Vol. I., pp. 143, 144.

‡ See from the thirtieth stanza to the thirty-eighth, both inclusive.

§ See stanzas 40-45.

§ Káliya or Káliya is the name of a huge serpent which Kṛishṇa, the divinity, is reputed to have subdued. It is the custom to make fancied representations, in miniature, of this monster, and to hang them about the neck of images of S'iva. See the *Bhágavata-purána*, Book X., chapters 16, &c.

|| See stanzas 46 and 59-62.

One Rudras'ambhu was a devotee at Kadambaguhá. Among his disciples was Mattamayúranátha, who was religious guide to a chieftain called Avanti.* A line of holy personages is named, as having followed Mattamayúranátha's successor Dharmas'ambhu: Sadás'iva, Mádhumateya or Sudháman, Chúdás'iva, and Hṛidayas'iva. The last was in the service of Rájá Lakshmaṇa, who entrusted to him the temple aforesaid. From Hṛidayas'iva it passed into the custody of Sádhuṛinda, disciple of Aghoras'iva.†

S'ankaragaṇa and his younger brother are dismissed, by the inscription-writer, with nine stanzas of vague encomium.‡

Equally in inscriptions from the west, and in the one under abstract, which was discovered not far from the Narmadá, we encounter the very uncommon names of Kokalla and S'ankaragaṇa,§ where the kings of Chedi are in question. There can scarcely, then, any longer be doubt, that it is one and the same royal family which all those memorials have in reference.

The first three kings of our inscription are panegyricized, in it, we are told, by S'rinivása, son of Sthiránanda; and the remaining three, by Sajjana, son of Shíra.|| The compiler and supplementor of their labours seems to have been Rájases'ekhara. If this was the dramatist, a matter of some curiosity, in a literary point of view, now approaches its solution.¶

Towards its conclusion, the inscription is much worn. Something is wholly abraded; and much more is impracticable of confident decipherment. The names of Tripurí, Saubhágypura, Lavaṇanagara,

* His full name was Avantivarman. The meaning of the forty-ninth stanza I could never have made out rightly, but for the aid of another inscription, in which we read of Kadambaguhá, the town of Mattamayúra, and its master as just specified. Avantivarman gave to an unnamed monastic a piece of ground in Mattamayúra; and the monastic, from that time forward, was called Mattamayúranátha,—a title, more properly, of his benefactor. See this Journal for 1847, pp. 1080—1084; and Sir H. M. Elliot's *Biographical Index, &c.*, Vol. I., p. 38, fourth foot-note.

† See stanzas 48—58. The pious folk here remembered, most likely enjoyed but a local celebrity. An Aghoras'iva is quoted in the *Saiva-dars'ana-sangraha*, in the chapter on the tenets of the Saiva sectaries. Sadás'iva is an appellation not at all unusual. Quite probably, Sádhuṛinda is not a proper name.

‡ Stanzas 63—72.

§ See the *Journal of the Royal Asiatic Society*, Vol. III., p. 95, twelfth and fourteenth stanzas; also the *Journal of the Bombay Branch of the Royal Asiatic Society*, Vol. IV., p. 111. At p. 203 of Vol. III., Part II., we read of one Buddharája,—as he should have been called,—son of a S'ankaragaṇa.

|| Perhaps, Dhíra. See stanzas 77, 78.

¶ This topic I shall recur to in my next contribution to these pages.

and Durlabhapura are, however, perfectly legible; and so are those of the transcriber for engraving, Tunái, son of Vira,* and of the engraver, Nonna, son of Sangama, artificer. But the most important loss, by much, is that of the date, which was dynastic.† I hazard the conjecture, that it corresponded to one of the early years of the twelfth century.

The inscription is in thirty-three lines, and covers a surface measuring six feet and five and a half inches by three feet and one inch. Its stone has a raised edge all the way around. At present this stone is at Jubulpore. Some twenty years ago it was carried thither, I am informed, from Bilharí, which lies about fifty miles distant, near the road to Mirzapore. There is a local tradition, that Bilharí bore, in by-gone days, the name of Pushpavati. Its inhabitants still show ruins of one palace attributed to Karṇa, and of another said to have been built by a Rájá Lakshmaṇa.‡ In the case of Karṇa, popular memory may, thus, have been faithful for the space of eight hundred years.

Mainly from want of leisure, I have not translated the inscription in detail. Apart from the facts of history which it is the vehicle of imparting, its merits are none at all. Its Sanskrit, almost throughout, is, in a high degree, involved, ungainly, and affected, besides being, not seldom, incorrect. Of its three writers, the first, at least, appears to have been keenly conscious of his awkwardness; for it is only justice to take him at his word. He says: "Though I possess not beauty of language, it will accrue to me from memorializing this most worshipful lunar family, of celebrated eminence. Analogously, mark! albeit naturally produced of a dark colour, do not, indeed, the streams, exuding in rut from the temples of the black elephant, acquire the lustrous hue of the milky ocean, when brought into contact therewith?"§ Once more: "Alas! what, forsooth, are we, to delineate, with tasteless babble, the virtues of these magnates;

* Called *karaṇika*, or scribe. He seems to have been son of Síruka, the Káyastha.

† A patent issued by Karṇa, of Chedi, was dated in the year 2 of his own era, according to Colonel Willford. See the *Asiatic Researches*, Vol. IX., p. 108.

‡ Less trustworthy, of course, and yet deserving of a note, are the traditions, that Vikramáditya and Bhartrihari were born at Bilharí, and that the same place witnessed the loves of Mádhavánala and Kámakandala.

§ Sixth stanza.

when even the adorable goddess of eloquence would, methinks, evidently be confounded by the enterprise!"*

For material aid in connexion with the ensuing pages, I am indebted to an ingenious and most intelligent young pandit, Vishnu S'ástri Áthlye, my constant helper in uncluing the gyptic perplexities which so embarrass the Indian antiquary.†

INSCRIPTION.

अम । नमः शिवाय ।

पायाद् वः स समस्तमङ्गलनिधिः शम्भोजटाजूटको
यस्मिंस्त् लोललसङ्गमखड्गलन्मन्दाकिनीवारिभिः ।
गाढग्रन्थिनिपीडितोरगपतिप्रस्कारफुल्लत्फणा-‡
भीमव्याहृतवत्क्षमारुतदृतेः श्वेतातपत्रायितम् ॥ १ ॥
अपिच ।

अथाद् वञ्चन्द्रचूडस्य लोचनार्चिष्णतः शिखा ।
मित्रमेघ स्मरस्योति दग्धं विद्युमिवोद्गता ॥ २ ॥
यं खेलाय घडाननः शिशुतया कृत्वा गृहं मार्गति
ग्रथो यश्च दुरोदरैः पुरभिदो देव्या समं दीव्यतः ।
केलीकोपकथासु येन तनुते ह्येतिक्रियां पार्वती
पाथाद् वः स जटावनैककुसुमं शर्वः सुधादीधितिः ॥ ३ ॥
दिक्षु प्रेङ्गाभियोगप्रवलितवलनाविभ्रमाकाखडचण्डैर्
दोर्दण्डानां प्रकामप्रथिमभिरनिलैर्दूरमुत्सारितासु ।
किञ्च प्रस्कारचारी नमदवनिवशाद् व्योम्नि याते महत्ताम्
अथादव्याहृतेच्छं त्रिपुरविजयिनस्ताखडवाडम्बरो § वः ॥ ४ ॥
वंशेऽत्र सोमसम्भूतौ वाचं निक्षिपता मया ।
हन्त हस्तैरुपक्रान्ता मोहेन वियतो मितिः ॥ ५ ॥
वाचामुज्ज्वलिमाऽपि नाऽस्ति यदि मे तत् कीर्त्यमानोन्नतेर्

* Tenth stanza.

† There are still at Jubulpore two undeciphered Chedian inscriptions. One of them is less illegible than the other; but both are too nearly worn out ever to be read in their entirety. The later, dated in the year 931 of an unknown era, exhibits the names of King Gayakarna, of S'as'idhara, pandit and poet, and of the engraver Námadeva, son of Mahídihara. Of the earlier, dated in 926, I have made mention in the *Journal of the American Oriental Society*, Vol. VI., p. 533.

‡ The original has -पतिः. Erasure of the *visarga* seemed to be demanded.

§ Corrected from -डम्बरं.

अस्मादेव महीयसः शशभृतो वंशात् स सम्यक्त्यते ।
 यद्वा पश्य निसर्गकालिमभुव* श्यामेभदानच्छटाः
 क्षीरोदन्वति किं न सङ्गतिभृतस्तच्छायतां बिभ्रति ॥ ६ ॥
 नेत्रादत्रैर्धरित्रीधवलनसुहृदां धाम धाम्नामुदञ्चल्-
 लोकालोकां †यदापःप्रभवमतलिनध्वान्तविध्वंसहेतुः ।
 सोऽयं सोमाभिधानस्तिलकयति कलामौलिमस्यैव शम्भोर-
 अस्मादेव प्रवृत्तः किमपरमयमप्यन्वयो हैहयानाम् ॥ ७ ॥
 अस्मिंश्च वन्द्यतमतां गमिते बुधाद्यैर्
 आद्यैर्दपैर्दपतिरर्जुन इत्युदारः ।
 आसीद् द्विघद्विपिनकर्तनकीर्तनीय-
 कीर्तिच्छटाच्चुरितदीर्घदिगन्तरालः ॥ ८ ॥
 यद् वक्षस्तटाडनातितरलत्रुद्यत्प्रविप्रोच्छलज्-
 ज्वालामालिकरालितेन करिणा देवाधिपः क्वाऽप्यगात् ।
 लीलोल्लालितशार्वापर्वतपतेस्तस्याऽपि लङ्कापतेर्
 यद्वैरथ्यवसायिनो यदभवत् ख्यातिप्रमाणं हि तत् ॥ ९ ॥
 दत्तात्रेय इति प्रकामकमलालीलायितानां पदं
 यो देवः ससुतं प्रति श्रुतिवचः प्रीत्या यमन्वग्रहीत् ।
 के वा तद्गुणवर्णने वयमहो किं फल्गुभिर्जल्पितैर्
 मन्ये साऽपि च वाग्पुर्भगवती तत्र स्फुटं मुह्यति ॥ १० ॥
 अथ ततस्ततसत्पुरुषव्रतव्रततिपर्वततः कति नाऽभवन् ।
 तरुणतारकराजपराजयव्यसनकीर्तिभुवः‡ पतयो भुवः ॥ ११ ॥
 तेष्वेवं सम्भवत्सु क्रममनु मनुजाश्चर्यतामादधानो
 धन्यानामेकसीमा समुपनतमहीमण्डलाखण्डलाभः ।
 जातः कौकिलदेवो दलदहितलतादाहदावायमानो
 मानोत्तंसस्य यस्य त्रिभुवनवलयव्यापनोऽभूत् प्रतापः ॥ १२ ॥
 भुवनविजयहेतोर्मुक्तमर्यादयादस-
 सदनलभितलोलैर्यद्भ्रूलैः संवलद्भिः ।
 अतलिनतरभारभस्यदुर्वीविषीदत्-
 फणफलककलापो भोगिभर्ता बभूव ॥ १३ ॥

* On the stone is -भुवो.

† I have supplied the *visarga* after the third syllable,

‡ Not -व्यसनिकीर्तिभुवः, as engraved.

श्यामाशङ्किभिराकुलैर्विजघटे चक्राङ्गयानां द्वयैर्
 अम्भोदागमविभ्रमेण विदधे लास्योत्सवः केकिभिः ।
 भग्नालोकमकाण्ड एव च दृष्टा मान्द्ये न लेभे पदं
 यत्सेनारजसि द्रमादवनितस्तारापथे लुप्यति ॥ १४ ॥
 वेलावनप्रणयिसैन्यभरे च यत्र
 मज्जद्भिराकुलकुलाद्रिनिभैरिभेन्नैः ।
 सस्मृन्तमन्दरगिरेः समयस्य तस्य
 कालाद् बहोः स्मरणमाप निधिर्जलानाम् ॥ १५ ॥
 यतश्च वैन्यं* तटमाददाने
 दानेद्भसेनागजभङ्गनेन ।
 अमञ्जुसिञ्जानशकुन्तचक्रं
 चक्रन्द दुःखादिव वृक्षजालम् ॥ १६ ॥
 जित्वा कृत्स्नां येन पृथ्वीमपूर्वं
 कीर्तिस्तम्भाद् बन्धमारोप्यतेऽसि ।
 कौम्भोद्भवां दिश्यसौ कृष्णराजः
 कौबेर्यां च श्रीनिधिर्भोजदेवः ॥ १७ ॥
 बभूव तस्मादथ मुग्धतुङ्गस्
 तुङ्गस्त्रिलोक्यामपरो न यस्मात् ।
 दिशश्च यः किञ्च विजेतुकामः
 कामस्तु शत्रुर्न भुवं विलेभे ॥ १८ ॥
 शय्या सङ्गामलक्ष्म्याः परबलपरिघः पल्लवः कोपवह्न्याः
 प्रेयो दर्पस्य मित्रं सुचरितसलिलस्येन्द्रनीलप्रखालः ।
 शाखा शौर्यद्रुमस्य प्रसरणसरणिः शाश्वती साहसानाम्
 असीद् यस्याऽसिरेवं प्रधानपरिकरारम्भिणः प्रीतिपात्रम् ॥ १९ ॥
 वरुगद्देतालवर्गत्रुटितनिजशिशोधारिघावत्कबन्धं
 डात्कुर्वद्भुक्तिडिम्बं मुखविलविलसत्सम्मुखेष्वामुखेष्कम् ।
 मांसग्रासाभिलाषखनदशिवशिवाभैरवाऽऽरावरौद्रं
 रौद्रं यो धाम† बिभ्रत्प्रतिसमरमिति द्वेषिचक्रं चकार ॥ २० ॥
 उपविपिनभुवो निधिर्जलानाम्
 अधिवसता कटकेन यस्य यातुः ।

* What does this word signify?

† A suppliant on conjecture. Two syllables are here quite lost.

अवचयति वलदधूकराय-

द्विगुणितविद्रुमपल्लवा बभूवुः ॥ २१ ॥

इह विहितविलासा वीचयो वारिराशेरु

इह स वसति वायुः केरलीकेलिकारः ।

इह हरति भुजङ्गी सौरभं भूरुहाणाम्

इति मलयसमीपे यद्विचाराः प्रचेरुः ॥ २२ ॥

विजित्य पूर्वाम्बुधिकूलपालीः

पालीः समादाय च कोसलेन्द्रात् ।

निरन्तरोद्वासितवैरिधामा

धामाधिकः खड्गपतिर्य आसीत् ॥ २३ ॥

गौडीगाढमनोमनोरथकरः कर्णाटकान्ताकुच-

क्रीडाशैलतटीविहारहरिणो लाटीललाटाङ्गदः ।

काश्मीरीविहितस्मरयतिकरस्तस्मात् कलिङ्गाङ्गना-

सङ्गानयसनी स नीतिनयनः केयूरवर्षोऽभवत् ॥ २४ ॥

आश्रापालपराजयाय जनितचैलोक्यशङ्कापदं

सैन्यैर्यस्य सुशान्तकेलिकलनैर्दत्तप्रयाणैरपि ।

न प्रोद्भूतिमवाप पांसुपटलं भूयो गृहीतद्विषद्-

बन्दीवन्दवहद्विलोचनपयःपूरस्रुतायां भुवि ॥ २५ ॥

यः संयति प्रकटपाटितकुम्भिकुम्भ-

मुक्ताफलप्रचयवाहमुवाहदेवः ।

भूयो निपीतदृढपीडनवेमवान्त-

विद्वेषिकीर्तिकर्णकीर्णमिवाऽसिदण्डम् ॥ २६ ॥

आकैलासादनलसलसत्पावतीकेलिबन्धोरु

आ च प्राचः शिखरिवरतो भास्वदुद्भासभूमेः ।

आरात् सेतोस्तदनुपयसामाप्रतीचोऽपि पत्युरु

यत्सेनानामहितनिहितानन्ततापः प्रतापः ॥ २७ ॥

प्रेङ्खत्तिप्रखुरप्रघातविगलत्कीलाललोलोल्लसद्-

वेतालीकरयन्त्रपीडनवशभ्रश्यत्कपालास्थिभिः ।

यस्तस्तार सविस्तरं रणभुवः कोपेत्कटाभिद्रवद्-*

दृप्तद्वेषिशिरोभिरम्बरचरीनेत्रत्रिभागार्चितैः ॥ २८ ॥

* A *repha* has been removed from over द्र.

देवो रुद्रावतारस्त्रिभुवनभुवनोत्तमनो देव एव
 त्यागो देवः प्रमाद्यन्नपतिनियमने नैगडं दाम देवः ।
 इत्थं सद्गन्दिष्टन्दैरविरलविलसच्चाटुवादं वदद्भिर्
 यस्याऽस्थानस्थितानामसमसुहृदां विव्यथे चित्तवृत्तिः ॥ २६ ॥
 भरद्वाजो नाम च्युतकलुषदोषः समभवत्
 य एकः सर्वेषामुपशमधनानामधिपतिः ।
 तदीयात् तेजस्तः ह्यतकलशवासाद् यदभवत्
 स वै भारद्वाजस्त्रिभुवनचमत्कारिचरितः ॥ ३० ॥
 त्रैलोक्यावधि यस्य कीर्तिलभितं लक्ष्मीञ्च वाञ्छावधिर्
 यत्कोपः प्रलयोपपन्नमहिमा श्रापेन चापेन च ।
 वरुणं वा नयविक्रमैकजलधेः किं तस्य यस्याऽभवल्
 लीलाखर्वितशार्वगर्वमहिमा शिष्यः सुभद्रापतिः ॥ ३१ ॥
 कोदण्डताण्डवनपण्डितबाहुदण्डम्
 उद्दण्डकाण्डभरखण्डितपाण्डुसैन्यम् ।
 संवीक्ष्य विक्षतविपक्षपराजयाशः
 सत्याद्रितः सतपसोऽपि सुतश्चचाल ॥ ३२ ॥
 अथाऽऽक्षेपात् तेन द्रुपदविपदर्थोद्धतधिया
 यदात्तं श्रापान्मस्तरलितकराबद्धचुलुकम् ।
 पुमानाऽऽसीत् तस्मिन् विजय इव साक्षादनु च तं
 कुलं चैलुक्यानमनगुणसीम प्रवृत्ते ॥ ३३ ॥
 विभवति च *विसर्पच्छौर्यसौन्दर्यवर्य-
 द्धितिधरपरिपाटीसूत्रिते तत्र गोत्रे ।
 रक्षितचटुलचापाकृष्टिह्यष्टाहितश्रीर्
 अभवदवनिवर्मा विश्वविख्यातकर्मा ॥ ३४ ॥
 पितामहो यत् खलु सिंहवर्मा
 पिता च यदोरवरः सधन्वा† ।
 जगत्पतीवाऽतिशयोऽमुनैव
 महानुभावत्वमतोऽपि यत् तु ॥ ३५ ॥
 यस्य त्यागः सकलजनतापास्तदारिद्र्यमुद्भो

* Unauthorizedly, the stone simply combines the त् and श् of this compound, instead of substituting च्च.

† Amended from सधन्वः.

वेलाबन्धुत्तितिघरदरीचारितारिः प्रतापः ।
 ईष्टे स्पष्टं स यदि गणनां तद्गुणानां विधातुं
 वाचां धेनुर्ननु भगवतो भारती यस्य वश्या ॥ ३६ ॥
 रुद्राणीमिव भूभृतां परिवृष्टे लक्ष्मीमिवाऽम्भानिधिः
 कालिन्दीमिव भास्करः स भगवान् ज्योत्स्नामिवाऽत्रेः सुतः ।
 वैदेहीमिव जानकः क्रतुविधिः ओनोहृत्तेत्यद्भुतं
 कन्यानाम ललाम तां स सुषुवे सामन्तचिन्तामणिः ॥ ३७ ॥
 भर्तुः पुलोमतनयेव मरुद्गणानां
 छायेव दद्यतमसां महसां च पत्युः ।
 देवस्य सा रतिरिवेक्षुशरासनस्य
 केयूरवर्धनृपतेर्दयिता बभूव ॥ ३८ ॥
 देव्या तथा मदजलच्छटयेव दन्ती
 बालप्रवाललतयेव तटः प्रयोधेः ।
 पुष्यश्रियेव च तरुस्तडितेव मेघः
 शोभां स कामपि बभार नरेन्द्रचन्द्रः ॥ ३९ ॥
 निर्मापितं सुहृतसङ्गतये तयेदम्
 अम्भङ्गघाग्रशिखरखलितोष्णरश्मि ।
 देवस्य मन्दिरमुमाप्रणयैकबन्धोस्
 * त्यानाकृति खयशसामिवचक्रवालम् ॥ ४० ॥
 आकाशयानक्रमखेदितानाम्
 अन्धोऽधिनाथस्य तुरङ्गमाणाम् ।
 फेनाम्बुभिर्निव्यनिषिच्यमाना
 मन्ये समुद्धान्ति न यत्पताकाः ॥ ४१ ॥
 विटङ्गभागेषु वृहत्सु यस्य
 वर्षासु तुङ्गामलसारकस्य ।
 आश्लेषवत्यो नवमेघमालाः
 पारावतालीतुलनां वहन्ति ॥ ४२ ॥
 आसीन् माधुमतेयः
 पवनशिवस्तमनुजयति शब्दशिवः ।
 ईश्वरशिवः पुनाति च
 तस्याऽन्तेवासितां सुहृती ॥ ४३ ॥

* This letter is doubtful.

तस्मै तपोनिधानाय निपानीयाविपाटकौ ।
 दत्तौ विद्याधनत्वेन ग्रामावग्राम्यथा तथा ॥ ४४ ॥
 धङ्गटपाटकपोखीनागबलाखैषपाटको वीडा* ।
 सज्जाकली च दत्ताः स्मरारये गोष्ठपाली च ॥ ४५ ॥
 ख्यातः श्रीयुवराजदेवनृपतिस्तस्यामभूद् भूपतिः
 श्रीमल्लक्ष्मणराज ऊर्जितमहा भाखानिदाऽभ्युन्नतः ।
 भूभृत्तुङ्गशिरोभिरङ्घ्रिचयो यत्सेविताः श्रीश्रिवाः
 कामं यः कमनीयसुन्दरगुणैर्नयैर्जिगाय स्मरम् ॥ ४६ ॥
 यस्याऽऽहवे दृढनिपीडितखङ्गकोटि-
 निर्दारितारिकरिकुम्भसमुद्भवेन ।
 वीरश्रियः क्षितितले विततं चतुष्कं
 मुक्तादलेन ननु कीर्तिवधुश्चकार ॥ ४७ ॥
 किञ्च ।
 सा कदम्बगुहा मान्या यत्राऽऽसीत् सिद्धसन्ततिः ।
 तस्याः पुनरभूद् वन्द्यो रुद्रशम्भुर्मुनीश्वरः ॥ ४८ ॥
 तत्र प्रभावमहनीयतमस्य तस्य
 शिष्योऽभवज् जगति मत्तमयूरनाथः ।
 निःशेषकल्मषमघीमपहृत्य येन
 सङ्क्रामितं परमहो नृपतेरवन्तेः ॥ ४९ ॥
 तस्माद्भूद् भुवनमखलतामवाप्तो
 भूपालमौलिमणिकान्तिभिरर्चिताङ्घ्रिः ।
 श्रीधर्मशम्भुश्चितामलकान्तकीर्तिः
 शैवागमाम्बुनिधिपारमितस्तपोभिः ॥ ५० ॥
 अस्मात् सदाशिवः शिष्यस्तपोराशिरभूत् नृपेः ।
 यस्य पादद्वयं वन्द्यमर्चितं श्रेखरांशुभिः ॥ ५१ ॥
 अस्माद्भून् माधुमतेयनामा
 शिष्यः सुधामा फलमूलवृत्तिः ।
 तपांसि तेजांसि च यत्र वासम्
 अनन्यसङ्क्रान्तिगुणेन चक्रुः ॥ ५२ ॥
 अस्माच् चूडाशिवः शिष्यो वन्दनीयतमोऽभवत् ।

* All grammar is set at defiance, in this line, in the colligation of the names of places.

कर्मजालमलं येन नीतमस्तं मुमुक्षुणा ॥ ५३ ॥
 अथ सकलगुणानामाकरस्तस्य शिष्यो
 हृदयशिवसमाहो यद्यशोऽद्याऽपि वर्णम् ।
 नृपमुकुटनिविष्टैर्यस्य मार्णिक्यचक्रैर्
 अद्यत चरणमूलं कान्तमेकान्तवन्द्यम् ॥ ५४ ॥
 विद्यानां निलयेन येन सुधिया सत्यव्रतेनाऽधिकं
 श्रीमन्माधुमतेयवंशविदिता कीर्तिश्चिरं वर्धिता ।
 किञ्च क्ष्मा क्षमयाऽम्बुदः समतया मर्यादयाऽम्भोनिधिर्
 वैराग्येण जितस्मरः स भगवान् कस्याऽऽस्पदं न स्तुतेः ॥ ५५ ॥
 किं स्तयतेऽसौ मुनिपुङ्गवोऽथवा
 श्रीचेदिचन्द्रो नृपतिः कृतादरः ।
 सदृत्तभूतप्रहितैरुपायनैः
 प्रादुर्भ्य भक्तिं विधिना निनाय यम् ॥ ५६ ॥
 श्रीमल्लक्ष्मणराजोऽपि तस्मै सुतपसे स्वयम् ।
 मठं श्रीवैद्यनाथस्य भक्तियुक्तः समार्पयत् ॥ ५७ ॥
 स्त्रीकृत्याऽपि मूनिर्भूयो मठं श्रीनैहृलेश्वरम् ।
 अघोरशिवप्रियस्य साधुवन्दस्य दत्तवान् ॥ ५८ ॥
 अथ स विहितकृत्यश्चेदिनाथः समर्थः
 करितुरगसमग्रः शक्तसामन्तपत्तिः ।
 दिशमतिशयरम्यां सम्प्रतश्चे प्रतीचीम्
 अहितजनितभीतिर्दुर्निवारप्रचारः ॥ ५९ ॥
 समरकृतविकारान् विक्रमेण प्रहृत्य
 प्रणतनृपतिदत्तोपायनैर्वर्धिताक्ष्णः ।
 हृदयनिहितवित्तरर्थिनां पूरिताशो
 जलनिधिजलखेलं सैन्यचक्रं चकार ॥ ६० ॥
 निमज्ज्य यो रत्ननिधौ श्रीमान् सोमेश्वरं शनैः ।
 अभ्यर्च्य काञ्चनैः पद्मैरयोऽन्यत् तु न्यवेदयत् ॥ ६१ ॥
 जित्वा कोसलनाथमोड्रनृपतेराप्तस्तु यः कालियो
 रत्नस्वर्णमयः स येन विहितः सोमेश्वराभ्यर्चनम् ।
 दत्त्वा यः करिवाजिशुभ्रवसनखक्चन्दनादीन् पुनः
 संसारश्रमशान्तयेऽतिविनतस्तुष्टाव तुष्टः प्रभुः ॥ ६२ ॥
 असारं संसारं य इह मनुते कोऽपि नृपतिस्

त्वदङ्घ्रियानत्या विगलिततमास्तत्त्वनिरतः ।
 न तस्य श्रीभूर्भयो विक्रतिद्धतये जन्मविरहाद्
 इति ध्यानाविष्टः शिवमहसि चित्तं विहितवान् ॥ ६३ ॥
 श्रीशङ्करगणस्तस्मादभूद् भूमीश्वरो महान् ।
 यत्पादद्वन्द्वमद्वन्द्वं द्विषद्भिरपि सेवितम् ॥ ६४ ॥
 सङ्घीऽसङ्घविपक्षपक्षदलनव्यासङ्गि खङ्गव्रतं
 यस्याऽऽसीत् दृढसाहसस्य सततं दानं जनानन्दकृत् ।
 रूपेणाऽप्रतिमो मनोभवभवं दर्पं जहारोद्धतं
 यः सर्वत्र च सर्वकालमवनीनाथः स्तुतः कोविदैः ॥ ६५ ॥
 यत्पादद्वयपद्मसद्म विततं भूतेरभूद् भूषितं
 भूपानां नमतां किरीटविकटप्रान्तस्वरत्नांशुभिः ।
 वक्षोरत्ननिधिं समाश्रितवती लक्ष्मीः क्रमेणाऽऽगता
 वीरश्रीरपरैव यस्य नृपतेः कौक्षेयधाराश्रया ॥ ६६ ॥
 तस्य श्रीयुवराजदेवन्टपतिर्भाता कनीयानभूद्
 भूपैर्यच्चरणारविन्दपतितैर्भङ्गैरिवाऽङ्गस्थितम् ।
 यः सत्यव्रतसत्त्वसूक्तिवसतिः श्रीविक्रमैकाश्रयः
 प्रायस्तस्य न सज्जनोऽपि सकलान्वक्तुं गुणान् शस्यति ॥ ६७ ॥
 दंष्ट्राकोटिविपाटनोयवदनः क्रूरस्वरो भासुरो
 * नेत्रप्रान्तविकीर्णकोपखधिरः पादप्रचारायुधः ।
 येनाऽऽक्रम्य भुजेन भूमिपतिना लाङ्गलबद्धक्रमो
 दैत्यो व्याघ्रवपुर्हृतोऽतिभयदः शस्त्रीर्भृता पाणिना ॥ ६८ ॥
 कन्दर्पोऽभिनवः† पुरन्ध्रिनयनप्रीतिप्रदोऽप्यन्यथा
 यः कालः करवालकोटिविहितस्थूलेभकुम्भस्थलः ।
 चित्रं यच्च सरस्वतीकृतरतिः श्रीकण्ठपूजापरण्
 चातुर्वर्ण्यविचारचारुचतुरो यश्चाऽर्घ्यचिन्तामणिः ॥ ६९ ॥
 यस्योत्तुङ्गजेन्द्रमज्जनगलद्दानाम्बुभिर्मिश्रितं
 रेवावारि विविक्ततिक्तमुचितस्नानेन तन्वीजनः ।
 सम्प्राप्योरुनितम्बताडनवप्रयस्तास्तवीचीचयं
 सर्व्वाङ्ग‡ स्मरसौरभेण महता निर्याजमायोजितः ॥ ७० ॥

* The व is in place of a letter omitted by the engraver.

† While the vowel of भि is legible, its consonant is entirely rubbed away.

‡ Pieced out from the initial sibilant, the *repha*, and the *anusvāra*.

रामाणां कुचमण्डलेषु नियतं द्वारप्रकारक्रमात्
 सम्पूर्णं शशिमण्डले च विमले ज्योत्स्नाच्छलेनोज्ज्वलम् ।
 मन्ये मानसवारि यस्य वितते हंसावलोविभ्रमाद्
 भ्रान्त्याऽश्लेषमुमापतेस्तु वसतौ विश्रान्तिमागाद्यशः ॥ ७१ ॥
 सम्पूज्य देवमीशानं विभवैः स्वैर्यथोचितैः ।
 यथागमं यथाशास्त्रं स्तोत्रं विहितवान् नृपः ॥ ७२ ॥
 अविचलितमनोभिर्यैस्वमीशं क्षितीशैर्
 विभवविहितद्वैरिज्यसे ते ह्यतार्थाः ।
 य इह ह्यतविकारा* मन्मथैकान्तचित्ता
 भवति वरद तेषां सम्पदुन्मादहेतुः ॥ ७३ ॥
 समदकरिघटाभिः किं किमङ्गाङ्गनाभिर्
 मदनशयनलीलां भावयन्तीभिराभिः ।
 कनकतुरगवासोरत्नजातैर्न ह्यत्यं
 न हि भवति भवानीवल्लभस्याऽर्चनं चेत् ॥ ७४ ॥
 भवति नृपतिवंप्रे जन्म पृथ्वी च भोग्या
 श्रुतमुचितविचारश्चारुरूपप्रभावः ।
 समरविजयसम्पत्तस्य यो निःप्रपञ्चं
 चरणयुगुलमलं संश्रितः शङ्करस्य† ॥ ७५ ॥
 किमिह ‡ ब्रह्मभिरन्यैर्नाथ सर्वस्य हेतुर्
 भवतु भवति नित्यं भक्तियोगो ममैकः ।
 सकलसुखविशेषाद् यत्र पीयूषवर्षः
 स्वयमनुभवगम्ये जायते त्वत्प्रसादात् ॥ ७६ ॥
 भूपत्रययशोराशिवर्णनं प्रथमं ह्यतम् ।
 श्रीमता श्रीनिवासेन श्रीस्थिरानन्दसूनुना ॥ ७७ ॥
 भूपतीनां त्रयाणां तु कीर्तिकीर्तनमुज्ज्वलम् ।
 विहितं सज्जनेनाऽथ सुधिया धीरसूनुना ॥ ७८ ॥
 पत्तनमण्डपिकायां लवऽ * * * * * * * * * * ।

* The वि has been restored by guess.

† Of this word the final letter is lost on the stone.

‡ By the fifth symbol of this word, र, a blank has been replaced.

§ Here, at the end of the thirtieth line, the abrasure of the stone gets to be serious; and it continues so in the final characters of the two lines following.

* * * * * द्वसिकाघागके च घाडघोडसिका ॥ ७६ ॥
 तैलस्य मासि मासे दिनमनु च युगायुगे च पौरस्तु ।
 यूगफलमरिचशुण्ठीप्रभृतिषु भाखेषु भरकपौरस्तु ॥ ८० ॥
 वीथीं प्रति च कपर्दी द्यूतकपर्दास्तु शाकवार्ताकम् ।
 रसवणिजामादायस्तृणपूलकधीमरादि यत्किञ्चित् ॥ ८१ ॥
 दत्ते करीचतुष्टयमङ्गुतुरङ्गो द्वयं च पौराणाम् ।
 यदहदन्यद् दानं किमपि च विद्याधनं तदुद्दिष्टम् ॥ ८२ ॥

यत्र * * * * * कीर्तयः प्रवर्तन्ते

यत्र च श्रीनोहलेश्वरमठश्रीमदघोरशिवाचायामभवत् ।

क्वचि * * * ततः क्वचिदपि च शाकाद्यवहतिः

क्वचिन् मूलाहारः क्वचिदपि स कन्दांश्च बुभुजे ।

परं ज्योतिः शैवं विगलितरजस्कांश्चतमसं

विचिन्वन् नो यातोविषविषयवेगस्य कलनाम् ॥ ८३ ॥

तेनेयं प्रशस्तिः सङ्गतिमानीता श्रीचिपुरीसौभाग्यपुरलवणनगर-
 दुर्लभपुरविमान * * * * * विष्णु * * भिः काष्ठदृषः
 प्रत्यहमथरक्षितः समानेयः देव * * * * * चारावचारुदारुणि ।

सुस्मिष्टवन्तघटना विस्मितकविराजशेखरस्तुत्या ।

आस्तामियमाकल्पं क्वतिश्च कीर्तिश्च पूर्वा च ॥ ८४ ॥

कायस्थश्रीसीरुकस्य ।

करणिकवोरसुतेन तुनार्इनाम्ना प्रशस्तिरालिखिता ।

सत्सूत्रधारसङ्गमतनूजनोन्नेन चोत्कीर्णा ॥ ८५ ॥

स्वकोय * * * * *

INDEX TO THE METRES OF THE INSCRIPTION.

No. of stanza.

Name of metre.

1, 3, 6, 9, 10, 12, 14, 24, 25, 28, 31, 37, }
 46, 55, 62, 65, 66, 67, 68, 69, 70, 71. } *S'ardulavikrīḍita.*

2, 5, 44, 45, 48, 51, 53, 57, 58, 61, 64, 72, }
 77, 78. } *Vaktra.*

4, 7, 19, 20, 29. *Sragdharā.*

8, 15, 26, 32, 38, 39, 40, 47, 49, 50. *Vasantatilakā.*

As for the last line of all, the thirty-third, not only are its concluding letters irrecoverable, but equally are about nine letters in two places near its beginning.

From the opening of the seventy-ninth stanza, onward to the termination of the inscription, I can by no means claim for my decipherment unerring accuracy. The personal and other proper names are, by good hap, satisfactorily clear, as some compensation for general uncertainty.

11.	<i>Drutavilambita.</i>
13, 22, 34, 54, 59, 60, 73, 74, 75, 76.	<i>Máliní.</i>
16, 18, 23.	<i>S'ivá.</i>
17.	<i>S'áliní.</i>
21.	<i>Pushpitágrá.</i>
27, 36.	<i>Mandákrántá.</i>
30, 33, 63, 83.	<i>S'ikhariní.</i>
35.	<i>Upendravajrá.</i>
41.	<i>Indravajrá.</i>
42.	<i>S'ubhá.</i>
43, 79, 80, 81, 82, 84, 85.	<i>Aryá.</i>
52.	<i>Satl.</i>
56.	<i>Indravans'á</i>

Saugor, July 25, 1861.

ADDENDUM WITH REFERENCE TO THE FIRST NOTE AT PAGE 317.

Hiouen-Thsang speaks of a kingdom whose name M. Julien transliterates, from the Chinese, into *Tchi-ki-t'o*, and then into *Tchi-tchi-to*. On the former he remarks: "Le second signe se prononce ordinairement *tchi*. Je le trouve pour *ki* dans *Avalókitéçvara*." At first he gives Chikhda, with an expression of doubt, as the Sanskrit word which it is designed to represent; and he identifies it, absolutely, with Chitor. But Hiouen-Thsang reached *Tchi-tchi-to* after travelling about a thousand *lis* N. E. from Ujjayiní; and neither would the direction nor would the distance take him to Chitor. Finally, without committing himself about the word, M. Julien concludes, that the place intended is Jajháoti,—a modern corruption of nobody knows what.

All this is most unsatisfactory. Hiouen-Thsang, as his itinerary has come down to us, not unfrequently mistakes, alike in respect of names, bearings, and distances. In fact, he opens, with all fairness, a wide door for speculation.

Chedi, we have no ground to question, was a flourishing kingdom in the seventh century; and its extent northerly, from its capital, near Jubulpoor, may have been considerable. The Chinese pilgrim does not tell us, as to *Tchi-tchi-to*, that the capital of that kingdom was visited by him.

Now, does not *Tchi-tchi-to*, contain, almost from M. Julien's own data, the elements, in combination, of Chedi, and of Chaidya; denominating, respectively, a country and a people? *Tchi=che, chai* or *di*: and *to=da, dhya, or dyá*; whence it is but just to infer, that it might have stood for *dya* also. Nothing is here asserted; but, considering how often Hiouen-Thsang is detected in blundering, one can scarcely tax with temerity the suggestion, that Chedi; or Chaidya, is somehow meant by *Tchi-tchi-to*.

Furthermore, since *tchi=ki, ke, cha, che, chi, chī, ṭa, ta, ṭi, ti, ṭī, tī, tya*, &c. &c. why may it not replace *ki* and *ka* as well? *To* is acknowledged to answer to *ta* and *ṭa*. From *Tchi-tchi-to* we may, therefore, without taking any very great license, extract both Kíkṭa and Kíhaka, real names of countries.

M. Julien certainly merits well of the republic of letters for his translation of Hiouen-Thsang. And yet it is difficult to accept the award, that his method is one of "mathematical certainty;" as it has been called in the *Saturday Review*, Vol. XI., p. 247. Grounds for dissent from this eulogy are even given to us by M. Julien himself, in his treatment of the word just discussed: and additional arguments to the same effect are not far to seek. I will adduce a few.

The substitute offered for the word *Pou-lo-ki-che*, the name of a king of Maháráshṭra, is Purakes'a, followed by a mark of interrogation. Subsequently, in place of Purakes'a, the translator proposes Pulakes'a, with this note: "Ce mot n'est pas expliqué. La transcription Poulakêça s'appuie sur de bons exemples." Still there is no professed certainty. We see, that, at first, the chances seemed to be in favour of *r*, as against *l*. And, after all, the final vowel is likely to be *i*, not *a*. Pulakes'a, as a name, is, indeed, possible. But Pulakes'i—nominative of Pulakes'in—is the appellation of a king actually mentioned in inscriptions from Western India. Let it be granted, that *Hie-li-k'i-che* is for Harikes'a. Still we lack full proof as to *Pou-lo-ki-che*: for, if *che=s'i*, it may well stand for *s'i* likewise; and, moreover, the slight difference, to the ear, between a short vowel and a long may have been lost, in this instance, on a foreigner. Or, if we assume a mistake of ignorance of Sanskrit, or one of heedlessness, we are not without reason for it. Except for one or other of these suppositions, how are we to account for such an error as Rájavardhana for Rájyavardhana? There is no way of escape here; for the word—the name of a

king of Kanauj—is translated into Chinese by “increase of the king,” not “kingdom.” We know, from the *Harsha-charita*, that Rájyavardhana had a sister Rájyas’rí.

Take, again, *Sou-lou-k’in-na*. M. Julien is positive, that this group of syllables stands for Srughna,—a region of whose position there is no warrant for any unhesitating assertion. It is just as likely, equally on graphical grounds, and on geographical, that the territory meant is S’ríkaṇṭha. In the first place, S’ríkaṇṭha would as naturally be softened into four syllables as Srughna into the same number. That Hiouen-Thsang was capable of mistaking the dental sibilant for the palatal, we see in his Subhavastu for S’ubhavastu, Sítá for S’ítá, &c. &c. The element *s’rí*, before being submitted to transliteration, was probably lengthened and dentalized—nearly as we hear it vulgarly uttered in the present day—to *sarí*. For the *sa* of Támrasavana, we have, in Chinese, *sou*. *Lou*—see *Méthode*, &c., pp. 148, 149—is equivalent to *l’i*, *l’í*, and *ra*. Why not to *rí* also? *K’in* is the same as *kam* in *kambala*, and *kin* in *kinnara*; and *kaṇ* is here a sort of medium. As for *na*, if, among its vagaries, it takes the place of *ḍa* in *Chañḍa*, it is no very violent supposition, that it may do duty for *ṭha*. The fact is, that M. Julien has to deal, in *Sou-lou-k’in-na*, with combinations which ill authorize him to pronounce as if it could infallibly be read into Srughna.

With reference to *Po-ni* there is also deficiency somewhere. M. Julien allows us to elect between Bání, Bhani, and Bhaní, in the Sanskrit. In his *Méthode*, &c., p. 175, he leaves it to be gathered, that *Po-ni* acts for *bání*, “language;” but he gives no authority. On his own showing, *Po-ni* may likewise be for the correct Sanskrit *vání*, or for *pání*, &c. &c. And why has he not translated the Chinese renderings of *Po-ni*, *Ming-liao* and *Pien-liao*? Professor Lassen puts Bāṇin, and adds: “Dieses ist die richtigere Herstellung dieses Namens; Bāṇin bedeutet auch Redner; die gewöhnliche Form ist Vāṇin; in der Lebensbeschreibung lautet er Bhaṇi.” *Indische Alterthumskunde*, Vol. III., p. 673, second foot-note. In truth, as I have shown, we should read Bhaṇḍin. See my Preface to the *Vásavadattá*, p. 52.

So long as M. Julien has to do with Chinese barbarizations of significative words from the Sanskrit, and is aided by analytical or other translations of them, he may be followed with full reliance.

FACSIMILE OF AN INSCRIPTION

on a

BRASS VASE FROM WARDAK.

Handwritten cuneiform script, 1st line.

1st Line

Handwritten cuneiform script, 2nd line.

Handwritten cuneiform script, 3rd line.

Handwritten cuneiform script, 4th line.

2nd Line

Handwritten cuneiform script, 5th line.

Handwritten cuneiform script, 6th line.

Handwritten cuneiform script, 7th line.

3rd Line

Handwritten cuneiform script, 8th line.

Handwritten cuneiform script, 9th line.

Handwritten cuneiform script, 10th line.

Handwritten cuneiform script, 11th line.

Handwritten cuneiform script, 12th line.

4th Line

Translation of a Bactrian Inscription from Wardak in Afghanistan.—By *Bábu RÁJENDRALÁLA MITRA.*

In Mr. Edward Thomas's excellent edition of James Prinsep's *Essays on Indian Antiquities* (Vol. I. p. 163) occurs the facsimile of a Bactrian inscription found in one of the topes of Kohat in the district of Wardak. Mr. Masson, who discovered it, states with reference to the locality where it was found, that the topes are "situated on the course of the river, which, having its source in the Hazrajat, flows through Loghar into the plain east of Kabul, where it unites with the stream passing through the city. They are distant about thirty miles west of Kabul. There are five or six topes, strictly so called, with numerous *tumuli* I found that three or four of these structures had been opened at some unknown period. In the principal tope an internal cupola was enclosed, or rather had been; and one of those unexplained tunnels or passages led from it towards the circumference. I directed certain operations to be pursued, even with the opened topes, and pointed out a number of *tumuli* which I wished to be examined, as they were very substantially constructed: the results proved successful, in a great measure, and comprised seven vases of metal and steatite, with other and various deposits."* The inscription itself was found punched on one of the brass vases which, from the circumstance of having been thickly gilt, was in an excellent state of preservation, and shewed the dotted legend with great distinctness. In shape the vase was very similar to the ordinary Indian *lotas* or water vessels of the present day.

Adverting to the perfect legibility of the record, Mr. Thomas remarks: "Though it offers this immense advantage over the parallel inscription on the Manikyála stone, it has its corresponding drawbacks in the new and unknown forms of many of its letters, and the little care that has been taken to mark the nicer shades of diversity of outline which, in many cases, constitute the only essential difference between characters of but little varying form. As it shares the present reproach of being unintelligible in its language, we are of course deprived of any data whereupon to found conjectures as to the values of the unknown characters, and, with very limited exceptions, we are equally denied any aid towards supplying, by the tenor

* *Ariana Antiqua*, pp. 117—118.

of reognised words, the deficiency in the due fashioning of the letters of which they should be composed." "But as all incertitude invites a corresponding degree of license in purely tentative readings, I may be permitted to refer to some isolated words that seem independently to convey their own meaning. Such for instance as विहर for विहार *vihāra*, 'a monastery,' a standard term in Buddhist phraseology: and one that may be seen to occur in the side-legend on the Manikyāla stone. The title of भगवण् *Bhagavan* may also be doubtfully indicated, as likewise the शरिर for शरीर *sarīra* 'relic:' which has also been previously met with. The Mahārājārājādhirāja's name I read preferentially as Hoveshshandra, but the final compound is altogether an arbitrary assignment, and the rendering of the *ve* is similarly open to correction. However to spare my readers any further comment upon such doubtful materials, I may add, that though I can offer but little recommendation for my transliteration, I may venture to invite the attention of those who would follow up the study to the copy of the original inserted in the plate, which I have done my utmost to give accuracy to."* I quote Mr. Thomas's remarks in full to shew the little advance that had been made by him in decyphering the monument under notice. His invitation remained unattended for three years, when Mr. E. C. Bayley took it up and brought his profound knowledge of Indian antiquities to bear upon the puzzling record. His perfect familiarity with the numismatic palæography of this country, his conversancy with the peculiarities of the Pali and its sister dialects, and his general scholarship, enabled him at once to perceive the language and character of the monument, and to explain several of its difficult passages. His translation of the entire document, however, did not prove satisfactory to him, and it was therefore placed at my disposal for farther examination. In taking up a task which had thus already passed through the hands of two such distinguished antiquarians, I felt extreme diffidence; and if I have too largely taken exceptions to their decyphering in the following remarks, they are due entirely to the advantage I have had of consulting the results of their researches, and not to any want of appreciation of their value, and I take this opportunity thankfully to acknowledge the great assistance I have derived from their labours in preparing the following transcript and translation. In reading the characters, I

* Prinsep's *Indian Antiquities*, loc. cit.

have depended entirely upon the alphabets supplied by Mr. Thomas in his essay on Bactrian writing, and by Professor Wilson in his reading of the Kapur di giri inscription, and taken Mr. Bayley's transcript for my guide with regard to compound letters. I do not, nevertheless, wish to submit my reading as other than tentative. In decyphering documents of which the characters are, to some extent, unknown, the letters most carelessly written, the vowel marks frequently omitted, and the language corrupt,—in short of which the language, character and grammar are all, more or less, doubtful,—a great deal is done by guesses, of which some may be happy, but others must be wrong; I keep myself therefore fully prepared to surrender my version, whenever further research will suggest another better fitted to suit all the requirements of the monument.

The record opens with the word *sam*, the usual abbreviation for *samvat*, the era when it was inscribed, and the year is indicated by the figures which follow; but the nasal mark under the sibilant is peculiar. It bears no resemblance to its counterpart in the Kapur di giri inscription, where it is indicated by a triangular mark resembling an arrow-head placed under the letter, or to the semi-circular mark or the dot elsewhere used; but if allowance be made for the carelessness with which the characters are punched on the urn, and the fact of their having been formed by a series of dots and not by lines, the difference is not sufficient to justify any doubt as to the accuracy of the reading.

The figures which follow are three in number, of which the first two are exactly alike. There is little, however, to aid us in ascertaining their values. The first figure looks like 1, and the other two may be compared to the modern Sanskrit 3, which together, reading from the right, would amount to 331. This, however, did not at first sight appear to me to be satisfactory, as I knew that there was a Sanskrit inscription some time ago found at Mutra and recorded during the reign of Huviska, the prince named in the monument under notice, which bore date the 417* Samvat; and it was natural to expect that the century alluded to in the two documents should be the same. As Kaniska and his brother Huviska reigned before the commencement of the Christian era and contemporaneously with Vikramaditya, the Samvat alluded to by them, I thought, must refer to other than

* So read by Mr. E. C. Bayley.

that of the last named prince. Further, as the princes named, although Tartars by birth, were staunch Buddhists by profession, I supposed that it would not be unreasonable to assume that they had adopted, with his religion, the era of their patron saint and reformer, and the century of Huviska would therefore be the 5th and not the 4th. According to the most recent calculations* Buddha died 477 years before Christ, and the Tartar princes Kaniska and his brothers Huviska and Juska lived between 42 B. C. and 18 A. C., consequently their age after the Nirvána should be 441 to 497. Col. Cunningham places the accession of Huviska 41 years and 9 months before Christ,† or 436 years after the Nirvána, which would very closely accord with the date of the Wardak record, if its figures be taken for 441. That the era of Buddha (*Buddhakála*) was at one time current in India, as it is to this day in Ceylon, there can be no question, and that a zealous follower and prince should adopt it at a time when the religion of Śákya was at its culminating point, was certainly not improbable. No doubt this mode of arguing would have the appearance of postponing facts to theories, but it would not, I thought, be deemed illegitimate in cases where the value of figures has to be deduced from our knowledge of the contents of the documents in which they occur, and by a calculation of probabilities; though the result must, in such cases, remain open to future correction.

There are serious objections, however, to this reading of the date, and the most important of them appears to be the fact that the ciphers used are identically the same as those found in Sanskrit inscriptions of the 1st century before Christ, which necessitates our reading them from the left to right, and thereby removes the possibility of the first two figures being of the same value. Messrs. Bayley and Thomas take the date for 133, reading from the left to right. Col. Cunningham, I understand, follows the same mode of reading, but by assigning different values to the figures, makes them stand for 377. If, as no doubt is the case, all the ciphers used in Indian writing are nothing more than contractions of words or modifications of their initial letters, *a priori*, the argument in favour of reading them always from the left, whether they be found in Arian or Semitic records, would be strong, and yet there is nothing absolutely to

* Müller's History of Sanskrit Literature p. 263 et seq.

† Numismatic Chronicle, Vol. VI. p. 18.

forbid their being written differently from left to right and right to left according to the genus of the characters with which they are associated. As long, therefore, as an inscription is not found in which the ciphers are given with their values in words, as in Dr. Burn's Guzerat plates, it would be impossible to come to a correct determination of the question at issue, and we must, consequently, leave the settlement of the date of our inscription for future research. The second and the third figures occur in Col. Cunningham's Eusofzye inscriptions, and the first occurs in them as well as in the Muttra inscription.

The first letter after the figures is an *m*, but the next is uncertain. Mr. Thomas takes it to be a ऋ and Mr. Bayley a स or a ष. Apparently it is a compound letter, but a स supplies the meaning best: मस *masa* for मास *māsa* 'a month;' the substitution of a short for a long vowel and even the omission of vowel marks not being of much concern in Bactrian writing. May be the two letters *masya* stand as an abbreviation of *māsasya* "of the month." The next word is *aphtha* according to Mr. T. and *athva* according to Mr. B. I feel disposed to take it for *aṭha* "eight," which with the *chitriyasa* after it, would mean "on the 8th of the month of Chaitra." The first letter of the last word, should, according to modern Sanskrit, be read *chai* for *chaitra*, the month in which, on the day of the full moon, the moon is in the constellation *chitrā*, but the non-prolongation of the vowel is not positively objectionable. In Col. Cunningham's Eusofzye inscription the word is written *chitrasa*. The word *aṭha* being placed between *māsa* and *chaitra* might mean "the 8th month chaitra," but if the *aṭha* be joined in *samāsa* with *chaitra*, the difficulty would be overcome. According to Mr. T. the *chai* should be read *mi*.

The next two letters are very doubtful, Mr. B. reads them *vrchi* and Mr. T. *stehi*; neither of which supplies any meaning. In the position in which they appear in an oriental writing, they are expected to represent either the name of the day of the week, or the day of the moon's age. I think they are the initial letters of *Vrihaspati* or 'Thursday'; although the vowel mark, not having been prolonged below the horizontal stroke of the *v*, looks more like *e* than *i*. This, however, is not of much consequence, as we occasionally see that the *i* is not prolonged. The ciphers which follow ought to represent the moon's age. The first

of them is similar in form to what has been read as 1 by Messrs. Bayley and Thomas, and 3 by Col. Cunningham, and the second is like a \times which they unanimously take for 4, which would make the ciphers stand for 34—43 or 14—41, as we read from the left or right, and adopt the valuation of Messrs. B. and T., or C. Now as the moon's age cannot exceed 15 according to the usual mode of reckoning, and even if the waxing and wane were counted together would not exceed 30, either the ciphers do not represent the higher figures, or they cannot stand for the moon's age. By accepting Messrs. T. and B.'s valuation and reading from the right, the ciphers might be made to stand for the fourteenth lunation, but in the Eusofzye inscription above alluded to, the name of the month is followed by two crosses thus "*mitti* \times \times ," which if taken for the lunation would be absurd. It is possible that the five letters between *chitrassa* and *mitti* which are yet undecyphered, might show us that the two crosses in the record are not intended for the lunation, while there being nothing unintelligible before or after the ciphers in the Wardak inscription, they might be the representatives of the moon's age. As long, however, as we have not the means thoroughly to determine the values of the ciphers, it would be a waste of time to argue upon the subject.

The words *imena gatrigena* after the date, are distinct. Then follow *samagusa putra Ugamategasya*, the former of which may be *pamagusya putra* and the latter *Nagamanegasya* or *Vagamategasya*. If the facsimile in Thomas's Prinsep may be relied on, and there is not the least doubt of its accuracy, the *y* after the last two words and the *t* in the middle of the last, are undoubted; while the initial letter of the last word is very unlike an *n*.

Next follow the words *iya* "this," *khasavamri shekhala siga* (for *sringa*) "on the peak of the Khasavamri hill" (*sekhala* for *sekhara*) and *Ugamatega vihāra* "the monastery (*vihāra*) of Ugamatega or Vagamatega."* Messrs. B. and T. read the second word differently. B. makes it *khaba dharmasatasa siga* and the latter *khannagravana siga*, but the facsimile does not support their readings. The *sa* of *khasa* and the *kha* of *sikhala* are however doubtful; the *kha* is particularly so, but more from its diminutive size than from its contour. The use of the *l* for *r* in *shekhala*, and *siga* for *sringa*, are well known Pali peculiarities which need no comment.

* Note "Khaba" = "Khamba" = "Sthamba.—E. C. B.

The subsequent word of four letters is unintelligible ; from the letter *mri* I feel disposed to take it for an obsolete participle of *nirmán* 'to build.' The two letters after it, *bh* and *ga* are distinct. They, no doubt, make with the letter following *Bhagava*,* though the last is peculiar and seems to be joined to the next, *kha*. Assuming it to be distinct, we have after it *khasasya kshīna sarira*, which together means, "the relic of the body of Bhagaván Khasha," or rather "the emaciated or reduced (*kshīna*) body of Bhagavan." Mr. Bayley reads *Sákya* for *Khasa*. Mr. Thomas's transcript of it—*Bhaga-a-naya-shtra satita patidhaveli* is perfectly unintelligible.

The last word of the line is *paridharetī*, the verb of the sentence. In Sanskrit the root *dhri* in the active voice, becomes *dharati* when meaning "to fall," *dhriyate* in the sense of 'remaining' or 'continuing,' and optionally *dharati*, *dharate* or *dhárayati* 'to keep' or 'to hold,' the passive form being *dhriyate* or *dharyyate*, and the causal *dhárayati*. In the active voice in the Prakrit, *dharati* becomes *dharedi*. What the intermediate Páli form was, is not known, but judging from the nominative of the sentence under examination being in the 3rd or instrumental case, I am disposed to believe the Bactrian Pali form of the passive to be *dhareti*. If this be admitted, the words of the first line put together would mean: "By this Gatriga, the Ugamatega monastery on the peak of the Khasavamri Hill, belonging to Ugamatega (or Vagamatega or Nagamanega) the son of Samagu (or Pamagu) was made to hold the relic of Bhagavan Khasa."

The first word of the second line is distinct enough ; but the letter following it is a puzzler ; it looks very unlike any Bactrian letter that I know of. Mr. T. reads it *shu*, while according to Mr. B. it is *ku*, which with its successors *sa* and *la*—the last doubtful—makes the word *kusala*. Mr. T. does not attempt to read the next letter. Mr. B. takes it for a *ṭ*, which with the following letters *lena* would represent *kusaláṭalena* "by unsbaken blessings," but, as the letter has been above met with before *sarira*, where *khi* appears to be the probable reading, for the sake of consistency I must here take it for a *khi* and make the passage *kusalákhilena* "by innumerable blessings." The word is in the instrumental case, and cannot be in concord with what follows unless we take the sentence to be elliptical. If the

* The Burmese vocative of Bhagavan is Bhagava. We have it here in *samása* with *khasa*.

ellipsis be filled up with the words "the fruit that may be produced by this &c." are as the Sanskrit grammarians would have it, *anena (imena) yat falam jítam tat*. The next clause *Mahárájá rájátrája Huvishkasya agabhagae bhavatu*, is, I think, undoubted; but Mr. B. reads *Maharájá-tirgá* dropping one *rája* (evidently a *lapsus pennæ*) and Mr. T. has something very different. The meaning of the sentence depends entirely upon the word *agabhagae*. Mr. B. takes it to mean "an expiation for sin," but upon what authority I am not aware of. Neither *aga* nor *bhaga* means "sin" or "expiation," and the Buddhist liturgy does not afford us any information regarding an expiatory ceremony of the name of Agabhaga. The Sanskrit word *agha* means 'sin,' and *bhaga* might be taken for *bhanga* 'to break,' but as the Bactrian alphabet has a character for *gh*, it would not be reasonable to suppose that *g* would be substituted for it in words that require the former. Farther, if the compound word be intended to mean "an expiation for sin," it would be a question why should the "expiation" be prayed for the king and royal personages only, and parents and relatives be left to content themselves with a different blessing, as we see they are, in a different part of the document? The most natural radicals for *agabhaga*, it strikes me, would be *agra* 'first,' 'foremost,' 'chief,' 'prime,' and *bhaga* for *bhága* 'a share,' and the two together mean 'the first share' or 'royal tithe.' The last word with the affix *dheya* means the 'royal revenue.' If this explanation be correct, the meaning of the whole sentence would be: "May the reward that is produced by this repository of innumerable blessings (relic deposit) prove (as it were) a royal tithe or a first offering to Huvishka, the great king and king of kings." I think, however that *bhaga* here stands for *bhága* "fortune," and the sentence is an invocation for the good fortune of the sovereign. Mr. B., mistaking the meaning of the verb *bhavatu*, has translated this and the following sentences in the past tense.

The next sentence runs thus *mátápítá náme pushae bhavatu*, the only letter doubtful being the *tá* of *pítá*. Mr. B. explains *pusha* to be "a religious offering," but upon no satisfactory authority. I feel, therefore, inclined to take the word in its radical sense of 'nourishment,' 'protection' or 'prosperity,' and translate the whole phrase "may it be to the prosperity of the name of (my) mother and father;" the word *náme*, however, is not in grammatical concord unless *náme* be equivalent in Bactrian Pali for the Sanskrita *námná*. This is followed

by seven other clauses of very much the same construction, invoking diverse blessings for different individuals. The first runs as follows 'bhr̥ḍta náme hasphanimategasya p̥ushaë bhavatu' "may it be to the prosperity of (my) brother Hasphanimatega." The second *Suchyami bhushana tigamitrasya bhr̥átigana pushae bhavatu* means, "may it be to the prosperity of the brothers of Tigamitra, the ornament of Suchyami," the doubtful word being the first—*suchyami*. The third clause prays for the successful "control of the royal revenue" "or control over good fortune,"—*Agabhagaparisásana*, in behalf of Ugamatega (or Vagamatega) who is described as a *mahisachya*, but what the purport of that epithet is, it is difficult to divine. It might stand for *mahá* and *suchi* the "highly pure," or more probably for *mahá sach̥iba* 'the great minister.' The fourth prays that the offering might prove conducive to the moral improvement of mankind. It begins with the letters *s, th, s, re* and *na*,—the *th* and *re* being very doubtful. Mr. B. takes the *th* for *rv*, which reading I wish very much to adopt, though opposed by Mr. Thomas and somewhat by the form of the letter. The *re* I take to be a *tv* ill-formed by an illiterate scribe or engraver. The word would then be *sarva satvena* which followed by *áryagati ehinae bhavatu* would as aforesaid mean, "may it be to the following of the árya course of life by all mankind." The fifth has a long string of names of objects most of which are unintelligible. For all of them (*sarvena*) prosperity (*pusha*) is invoked. The sixth is not so obscure, it prays for "control over good fortune" *agabhaga parisásana*, in behalf of those who observe the *abasatha* or the four months' penance during the rains i. e. the clergy, including their "domestics," *parivára*, as also "such men" (*satvasañgha*) as are 'capable of noble conduct' *mahisacharyarhana*. The seventh invokes "good fortune," *agabhaga*, for one Mistugra—but the word not put in the dative as it is in most of the preceding passages.

The fourth or the last line is unconnected with the above, and written in a different style. It records that the "vihára" in which the relic was deposited "was the asylum," *patigaha* for *pratigraha* 'the accepted gift,' "of the houseless" *asanthánana*, "of the great congregation," *mahásanghigana*. The compound consonant *ngh* is the only letter which appears peculiar in this line. The *mahásanghas* were the great sectarians who adopted the doctrine of Ráhula, the son of Buddha.

The historical facts deducible from this record are of considerable importance. We learn from it ; 1st, that the well known Tartar prince Huvishka of Kashmir had extended his dominion to the west many miles beyond Kabul. To the south, the Muttra inscriptions informs us, that his arms extended to as far at least as that city ; 2nd, that in his western dependency the prevailing religion was Buddhism ; 3rd, that the Buddhism most common then was most probably of the form adopted by the Mahásanghas ; 4th, that the people of the country at the time used a form of the Pali for their vernacular and had their months and days named after the Hindus ; 5th, that although the language of the people was the Pali, their personal names were either other than of that language, or compounds partly Pali and partly foreign.

TRANSCRIPT OF THE WARDAK INSCRIPTION.

- (१) सं ४४१ मस अठ चित्रीयस त्रेहि १४ । इमेन गत्रिगेन सम-
गस्य पुत्र उगमतेगस्य इय खशवन्नि सेखल सिग उगमतेग
विहार विष्णुनिर्मि (?) भगव खशस्य खिनशरिर परिधरेति
- (२) इमेन कुशलाखिलेन महाराज राजातिराज ऊविष्कस्य अग-
भगए भवतु, माता पिता नामे पुशए भवतु, भ्रात नामे हस्काणि-
मतेगस्य पुशए भवतु, शुचमि भूशन तिगमिचस्य भतिगन
पुशए भवतु, महिशच्य उगमतेगस्य अग भग परिशाशन
- (३) भवतु सर्वसत्वेन आर्य गतिचीणए भवतु, अतिय नवु गपश्व
वश अश्वगघा अत्र अवर अजड स्यलशुग शशै विगअतु पुत
सर्वेण पुशए भवतु, महिशचय्यार्हन सत्वसङ्गेन अवषतिगनस्य
परिवरच अगभग परिशाशन भवतु, मिस्तुयस्य च अगभग
भवतु
- (३) एष विहार असंथानन महासङ्घीगण पतिगह

TRANSLATION.

San, 441 (?); the 8th of the month of Chaitra, Thursday, the 14th (?) lunation. This Ugamatega* monastery (vihāra) on the peak of Khasavamri hill, raised by Ugamatega, the son of Samagu—has been made by Gatriga, to hold a relic of the body of Bhagavan Khasa. May the fruit of this depository of innumerable blessings (relic deposit) be conducive to the good fortune of Huvishka the great

* This proper name I take to be that of the place.—E. C. B.

king and king of kings! May it be to the prosperity of (my) parents! May it be to the prosperity of (my) brother Hasphanimatega! May it be to the prosperity of the brothers of Tigamitra the ornament of Sacyami! May it ensure, to the highly pure (or the great minister) Ugamatega, control over good fortune! May it prove conducive to the moral improvement of mankind! May it be (unintelligible)! May it ensure control over good fortune to those who observe the autumnal fast *abasatha*, as also to their domestics and such pious congregations as are capable of noble conduct! May it ensure good fortune to Mistugra!

This vihára is the asylum of the houseless of the great congregation.

Note on the above.—By E. C. BAYLEY, Esq. C. S.

I have but little material to add to the remarks of Babu Rajendra Lal Mitra. My own share in the task of decipherment has not been large and did not extend to any extent beyond the two first lines, and even on those two lines I confess myself in one or two places, notwithstanding that Babu Rajendra Lal's assistance has been rendered, still very dubious of the rendering attempted.

I wish, however, to explain on one or two points the reason which induced me to adopt particular opinions, to some of which I am still inclined to adhere.

In the first place I wish to say that the reading of the ciphered dates on the Muttra, Wardak and Eusofzye inscriptions given as those adopted by Col. Cunningham and myself are at present almost purely conjectural.

But the Muttra and Wardak inscriptions both contain the name of the same king Huvishka (in all probability the Hushka of the Raja Tarangini and the Ocerki of the Indo-Scythians) and are *probably** nearly contemporaneous. There is, I think, if this be the case, little doubt that both cannot have reference to the same æra.

* I say "probably," the Wardak inscription referring personally to the king Huvishka is certainly of his date or near it—the illustrative inscription speaks of the Vihar of the great king Huvishka and *may* possibly be of a later date, but as it is inscribed on an subeysal part of the main buildings it is not likely to be so.

My reason for saying this is, that though one inscription is in the Arian and the other in the square Indian character, yet they both employ the *same* kind of cipher to express the date of the year, thus the figure which I take to express the cipher "1" is associated in the Wardak inscription with the figure which I understand as the cipher "3," and in the Muttra inscription with those which I read as "4" and "7," and the ciphers which I take to be "3" and "4" occur together on one of the Euzofzye inscriptions of Col. Cunningham.

Expressed therefore in the same class of ciphers, it is to be presumed that the date is to be read the same way, and if this is the case, the numbers are so widely differing that they cannot by any probability refer to the same æra.

It is by no means necessary that they should do so, different æras certainly prevailed in different localities, and the localities of Wardak and Muttra are so far apart, that the presumption is decidedly against the æras being identical.

It is, however, just possible but not probable that the mode of reading the ciphers may have followed the reading of the letters with which they were associated. If so, the Wardak date might be read from right to left and the Muttra one from left to right.

In such case I would render the Muttra date as 417 still, and the Wardak date as 331, and the date of the month on Sunahar as 14.

In respect of the double "4" on the Eusofzye inscription in the place of the month to which Babu Rajendra Lal refers, I think it may possibly be explained by a practice which certainly obtains on the Muttra inscription of Huvishka, and one or two others found with it of writing in *abstract* the *number* of the month and *number* of the day of the month, as is customary in commereial and official correspondence of the present day, as for example for the 1st of January to write /1/1/, and the double four may consequently stand for the fourth day of the fourth month.

But the subject is one full of difficulty, and I merely give the above remarks briefly to exemplify this, and to show why I cannot accept the version of the date which is given above by Babu Rajendra Lal.

The æra in the Wardak and Muttra inscriptions may be that of the Nirvana of Buddha, the Seleucidan æra or some other yet unidentified.

As to the word "Vrehi," it is I fear so clear, that it can hardly read otherwise, but it very probably is some local contraction or corruption of Vrihaspati as Babu Rajendra Lal supposes.

The proper name read "Ugamatega" occurs twice. I think the first letter cannot without violence be read otherwise than "va" or vá.

The words before "Bhagavat" which Babu Rajendra Lal omits as unintelligible, seem to me to contain some play upon the root "mri" and perhaps may be some epithet like "dead but undying" applied to the "Bhagavat" or "Sarira."

I wish very much that I could give my adhesion to Babu Rajendra Lal's reading of the second word of the second line,* but I do not think that the letter read as "kh" can by any possibility be so accepted, the general meaning, however, of the passage cannot be much altered by any substitution of the word.

As to the words "aga bhaga," "pusa" and "bhavatu," I have to explain that I had read the latter not as "bhavatu" but as "ebhavutu," supposing a corrupt form of conjugation.

I think it will be found that, in the Manikyala inscription, a still greater deviation from the Sanskrit mode of conjugating the verb "to be," exists, but I cheerfully accept the "bhavatu" as read by Babu Rajendra Lal, transferring the supposed initial "e" to the preceding nouns as the sign of their oblique form.

As to "aga bhaga," my reason for reading it as an expiation for sin was, as Babu Rajendra Lal surmises, an impression that the first syllable was a corruption for "agha," the latter I supposed might represent the Hindu "Bhagut lena" to work out or expiate; however "aga bhaga" if it can be taken in the sense of good fortune is doubtless far better reading, so also for "pusa," for which I was obliged to coin a meaning in the absence of any satisfactory one available to me in Wilson's (first) Sanskrit Dictionary, the only one at the time available to me.

* It occurs also quite clearly in the Manikyala inscription.

The word occurs in the inscription on the steatite vase found by Mr. Masson at Bimaran and figured by Jas. Prinsep, as from the brass cylinder found at Jelalabad.

The second version of the inscription, that on the lid, I read as sira (for sri) Vichitrassa, Nirvedhata putrassa, nananehi, Bhagavátassa Sarirchi.

The fourth word is evidently the substantive of the sentence and is some such word as "gift" or "offering."

The sentence on the lid is the abbreviated form of that on the box and on the latter just preceding the name Vichitrassa the word "pusa" occurs.

"Hasphimatega" I read "Hashtwanammatega."

I cannot see that the first word of the second clause of the third one can read anything except "sarvassa," there is no resemblance to "th" in the second letter.

With the above exceptions and explanations, I am disposed to accept Babu Rajendra Lal's version and to join with him in putting it forward not as a finished decipherment, but as an attempt to assist the enquiries of other students.

To those who study the Manikyala inscription, it will be manifest that the inflexions are many of them the same as those of the Wardak inscription, and as the name of Kanishka occurs in it, it is probably of nearly the same date, but the ciphers which I would read 441 or 144, add a fresh complication on the question of dates, and I think prove conclusively that the "æras" employed at Wardak and in Upper India *must* have been different.

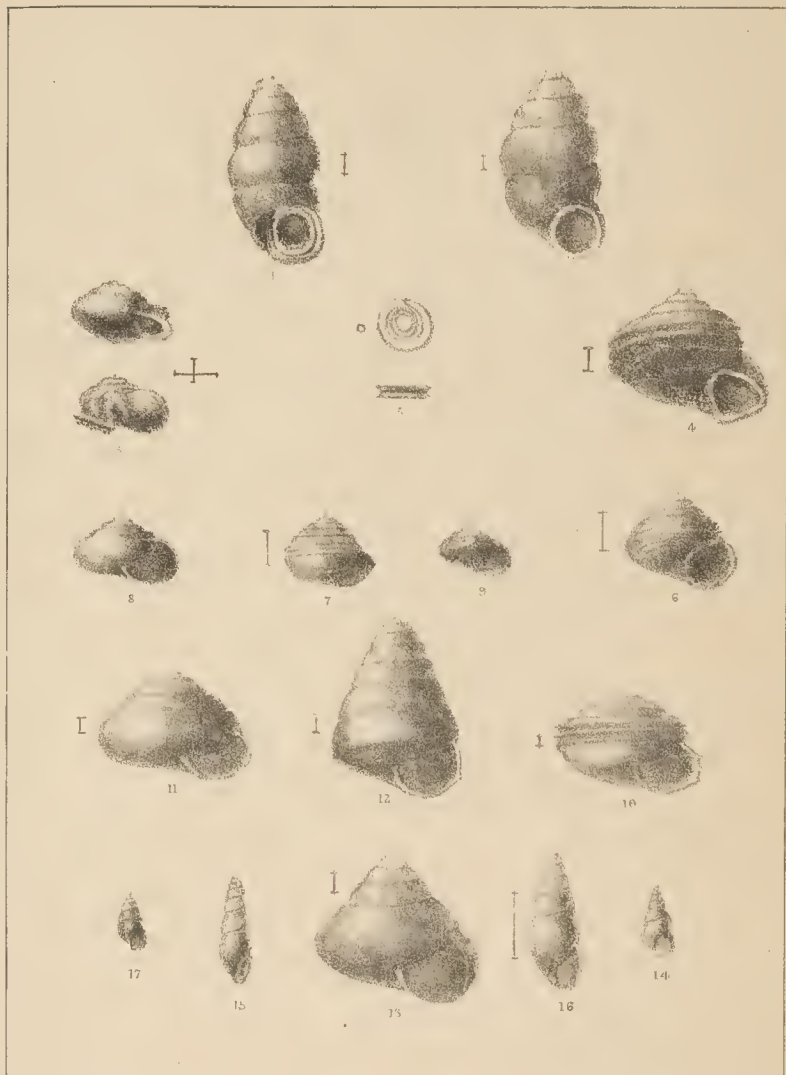
P. S.—Since writing the above I have seen Mr. Trumpp's paper (Journal Roy. As. Soc.) on the Kafir language.

He gives I see "s'iga" as the pronoun "that," and "Imena" would be the oblique form of the pronoun "I" in that form of Praerit. I prefer, however, to take it from the context as the oblique form of "iya" which seems to be the pronoun "this."

But I am on further consideration inclined to give up "Gatrigea" as a proper name and to take the concluding verb of the first clause as in the *active* sense, which, as it is not in any pure Sanscrit form, may easily be allowed.

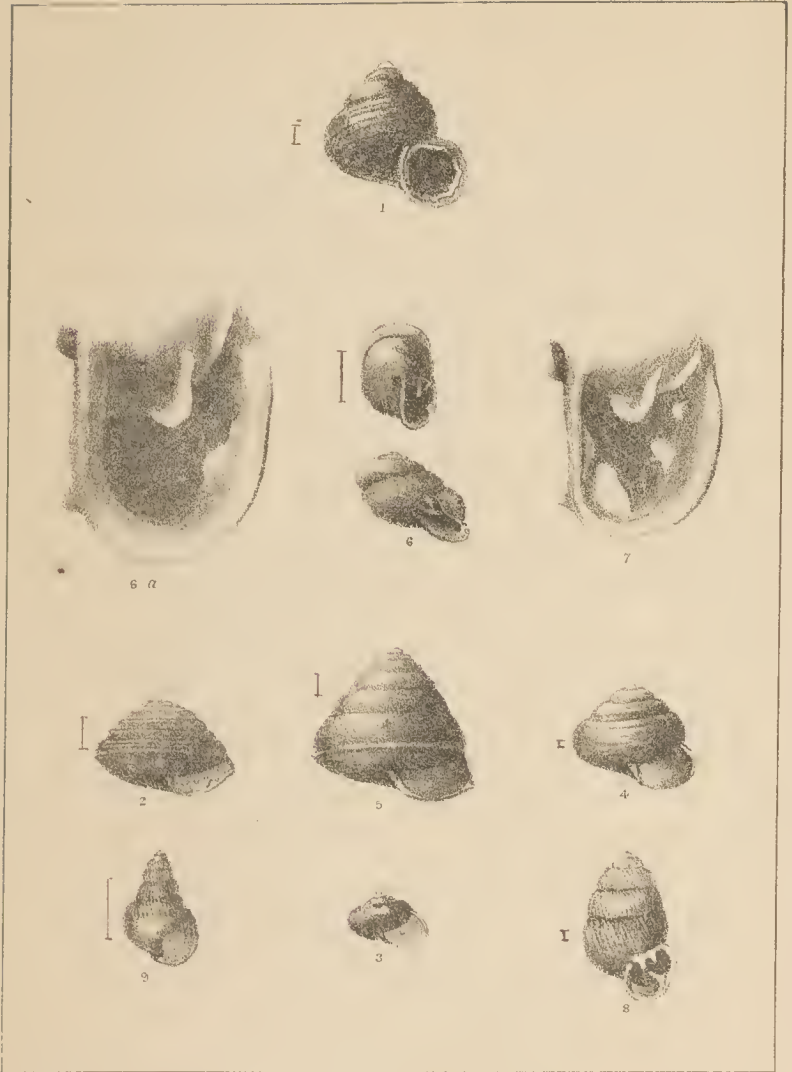
I would therefore read the first clause thus—

"Imena gatrigeno Samagusa putra Vagamitegaso iya khaba dharmā-



H. F. Blanford, del.

LITH BY H. M. SMITH, SURV. GENL.'S OFFICE, CALCUTTA, 1861.



H.F. Sanford, del.

LITH: BY H. M. SMITH, SURV: GENL'S: OFFICE, CALCUTTA, 1861.

satasa siga Vagamitega Vihar Mritwa-vrimri Bhagavat S'akyadanna s'arir paridhareti or patidhareti."

And I would suggestively translate "In this "gatrige"* the son of Sama Gusa of (the village of) Vagamitega has placed this pillar (of religion and virtue? ?), and that monastery of Vagamitega for the relics of the divine S'akya."

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*Contributions to Indian Malacology, No. II.—By MESSRS.*

WILLIAM T. and HENRY F. BLANFORD.

Of the shells described in this paper, a portion were obtained by ourselves, partly from the Nilgiris, and partly from the plains of Southern India: the remainder are from two very interesting collections, made by Messrs. King and Foote, of the Geological Survey of India, chiefly upon the ranges of hills known as the Shevroys, the Kolamullies, the Patchamullies and the Karlyenmullies, the first and fourth being about 6000 ft. high, and lying a few miles east and north of Salem, the second but little lower, and about 40 miles N. W. of Trichinopoly and the third to the north of Trichinopoly and not exceeding 3000 ft.

We have to regret the loss of a third collection, which was made by Mr. King at the base of the Anamullies, the highest range in Southern India, lying S. W. of Coimbatore and of the Nilgiris. The vessel, on board of which the shells were forwarded, was lost on her way from Madras and Calcutta, and Mr. King has not been able to obtain any more specimens.

The Kolamullie collection has yielded new species both of *Alycaeus* and *Diplommatina*, and, from the presence of several Nilgiri forms, has proved of great interest. We trust that the result will induce further researches to be made among the hill groups of Southern India: the Anamullies and other Southern ranges will unquestionably largely reward any collector. From their neighbourhood, Mr. Benson has lately described† the largest Indian *Helix* yet discovered, *H. Basileus* B., which measures nearly 3 inches in diameter, and where so fine a species has been long overlooked, we may be certain that many of small size remain undescribed. The whole of the peninsula South

\* Possibly "cross way," this is the position in which topes are usually found and in which they should be regularly placed.

† In the Ann. and Mag. Nat. Hist. for February, 1861.

of the Cauvery requires examination, and we are convinced that many novel forms may yet be obtained from the Western ghats.

We would especially call attention to the more minute species, and above all to any forms belonging to the genera *Alycæus*, *Diplommatina*, *Opisthostoma*, *Cyathopoma*,\* or *Jerdonia*.† The fresh water shells also deserve notice. A peculiar species of *Neritina*, *N. Perotteti*, is, so far as we are aware, confined to the feeders of a single stream on the Nilgiris, the Pykara, and we learn from Dr. Jerdon that he once obtained in the neighbourhood of Mercara, but subsequently lost, a few specimens of another peculiar species, which he was never able to find again elsewhere. Probably other species also may be found.

No. 1.—*Diplommatina Kingiana*, n. s. Pl. 1. fig 2.

Testa dextrorsa, subrimata, ovato conica, glabra, tenuis cornea; spira conica, apice obtusa, sutura impressa. Anfr.  $5\frac{1}{2}$  convexi; antepenultimus major, ultimus parum angustior, antice ascendens. Aper-tura subverticalis, circularis, plicâ columellari nullâ; peristoma subduplex, incrassatum expansum; internum continuum.

Long. vix 2, Diam. 1, Aper. diam.  $\frac{2}{3}$  mm.

vel „ .08 „ .04 „ .026 unc.

Hab. in Montibus Kolamullies dictis, prope urbem Trichinopoly, Indiæ meridionalis: teste W. King.

This little species is a near ally of *D. Nilgirica*, Blanf. Pl. 1. fig. 1., but amply distinguished, both by its smaller size, and by the absence of the basal keel of the Nilgiri species. The two together form a well marked section of the genus, characterized by a circular mouth and smooth whorls.

No. 2.—*Alycæus Footei*, n. s. Pl. 1. fig. 3.

Testa aperte umbilicata, depressa, solida, ad anfractos intenos striata, ad ultimum costulato-striata, ad spatium inflatum crebre costulata; spira vix elevata, apice obtusula; sutura parum impressa. Anfr. 4 convexi; ultimus ad latus mediocriter gibbosus, deinde constrictus, prope aperturam descendens; spatium constrictum longum,

\* *Cyclotus floccinctus*, Bens. and *C. Malabaricus*, Blanf.

† *Cyclostoma trochlea*, Bens.; the operculum is peculiar; double and externally calcareous.

medio tumidum, striatum, costam validam retro recumbentem; peristomatis marginem dextrum ad basin attingentem, gerens; tubulus suturalis juxta constrictionem oriens, medioeris,  $\frac{1}{5}$  peripheriæ subæquans. Apertura perobliqua, circularis, undata; perist. duplex; interno breviter porrecto, continuo; externo late expanso. Opere. ?

Diam. maj. 6, min.  $4\frac{1}{2}$ , Alt. 3, Ap. Diam.  $1\frac{3}{4}$  mm.

vel „ 0.24 „ 0.18 „ 0.12 „ 0.07 unc.

Habitat in montibus Kolamullies dietis: teste W. King.

This shell is nearly allied to *A. Expatriatus*, Blanf. of the Nilgiris, but distinguished principally by the possession of a recurved ridge upon the constriction, somewhat similar to that in *A. hebes*, Bens. and *A. gemmula*, Bens. Other differences are, the flatter suture and more oblique mouth, caused by the greater descent of the last whorl in *A. Footei*, while the swelling at the side of the last whorl is somewhat greater, and the constriction more marked.

From *A. hebes* and *A. gemmula*, the present species is easily distinguishable by its flat spire, besides other characters of sculpture, &c. The ridge on the constriction in *A. Footei* lies back on the top of the whorl, and meets the peristome at the base of the right margin: in the other two species, the ridge is more at the side, and meets the peristome at the bottom.

All the specimens sent are somewhat weathered.

A variety of *A. expatriatus*, Blanf. was also obtained by Mr. King from the Shevroys, a group of hills about 40 miles N. of the Kolamullies. It only differs from the Nilgiri form in size, measuring in its two diameters  $5\frac{1}{2}$  and  $4\frac{1}{2}$  mm. instead of  $4\frac{1}{2}$  and  $3\frac{3}{4}$ . It is curious thus to find the same species on two hill-groups separated from each other by at least 100 miles, while a distinct species occurs on a third small table land but 30 miles from one of the others.

No. 3.—*Cylophorus malleatus*, n. s. Pl. I. fig. 4.

Testa anguste umbilicata, trochiformis, oblique striata, liris spiralibus supra et infra eineta, solidiuscula, epidermide fusca induta, sub epidermide albida; spira conica, apice acuta, sutura impressa. Auf. 5 convexi; ultimus rotundatus in veteribus exemplis descendens et fere solutus. Apertura parum obliqua, circularis, superne subangulata; perist-rectum, simplex, breviter adnatum, margine columellari recedente, dextro supra antice porrecto. Opere. ?

Diam. maj.  $6\frac{1}{2}$ , min.  $5\frac{1}{2}$ , axis  $6\frac{1}{2}$ , ap. diam. 3 mm.  
 or       "       0.26   "   0.22   "   0.26       "   0.12 unc.

Habitat in montibus Shevroys; teste W. King.

This appears to be a representative of the Cingalæse group, comprising *Cyclophorus halophilus*, *B. C. orophilus*, *B. C. flammens*, Pfr. &c. It differs from all except *C. orophilus* and *C. conulus* in being spirally lirate, and from these two in several characters of spire, aperture, epidermis, &c.\*

Some specimens of the same or of a closely allied species were found by one of us in Neddiwuttom Ghat on the Nilgiris. They were, however, much smaller, the largest specimen procured, only measuring in its 2 diameters,  $4\frac{1}{3}$  and 4 mm. axis  $4\frac{1}{2}$ . A specimen of the same small form also occurs in Mr. Foote's collection from the Kalryenmullies.

All the small conical species of *Cyclophorus* with thin peristomes are classed by Dr. Pfeiffer under *Leptopoma*,† a conclusion with which we cannot agree, for if they are removed from *Cyclophorus*, we are unable to perceive why *C. caeloconus*, Bens. should remain in that genus. *C. malleatus* and *C. halophilus* at least, and probably others, not only resemble *C. caeloconus* in every essential character of the shell, (except in having a slightly more elevated spire,) but they have the peculiar character in common with it, of the last whorl in aged shells,‡ descending irregularly near the aperture, so rapidly, that in some specimens the last part of the whorl is nearly solute. This is especially seen in *C. caeloconus*, B. But if *C. caeloconus* be also classed with *Leptopoma* why not *C. ravidus*, B.; a depressed form utterly distinct in generic character from the typical *Leptopomas* of S. Eastern Asia and the Asiatic Islands. The *halophilus* group is classed by Benson under *Cyclophorus*.

A few immature specimens of a depressed *Cyclophorus* from the Kolamullies probably belong to *C. ravidus*, B.

A shell not distinguishable from *C. caeloconus*, B. abounds in parts of the low country in the neighbourhood of Trichinopoly, and especi-

\* We judge so from the descriptions, as we have not specimens of the shells for comparison.

† Monographia Pneumonopomorum, vid. p. 120 and supp. pp. 76, 77.

‡ These shells appear to increase slowly after they have arrived at a stage of growth at which they may be considered as adult, as is the case also with some *Helices* and other mollusks.

ally at the village of Cullygoody where it was found abundantly in piles of stones (limestone), together with *Helix Semifusca* Desh. and another species, *C. involvulus*, Mull., was found by Mr. King at Verdachellum and elsewhere.

A solitary specimen of *Pterocyclos bilabiatus* had been obtained by us from the Kolamullies before Mr. King's specimens were collected. It is of the same variety as that originally described, and has a nearly flat spire. The variety from the foot of the Nilgiris, and which occurs, by no means rarely, at the foot of the Coonoor Ghat, shews several distinctions, the spire being considerably elevated (depressly subturbinate) and the wing and undulations of the peristome much more largely developed. The epidermis also is thinner. In the absence, however, of a series, we are not certain that the species are distinct.

No. 4.—*Jerdonia? Kolamullicense*, n. s. Pl. I. fig. 4.

Testa aperte umbilicata, depresso-turbinata, albido-cornea, transverse striata, rubcola; spira conoidea, apice acutiuscula, sutura impressa. Anfr. 4 convexi, ultimus rotundatus, costis 5 filiformibus circumdatus, aliis 7 crebris, striis verticalibus decussatis, in umbilico ornatus, quarum ima ad marginem basalem angulatam umbilici carinam præstat. Apertura circularis, obliqua; perist. rectum, simplex, continuum, superne ed at latus dextrum valde antice porrectum, margine columellari recedente. Umbilicum perspectivum, conicum. Operc. ?

Diam. maj.  $2\frac{3}{8}$ , min.  $2\frac{1}{8}$ , Axis 2, Ap. diam. 1 mm.  
vel „ 0.10 „ 0.09 „ 0.08 „ 0.04 unc.

Habitat in montibus Kolamullies; teste W. King.

Only 4 specimens of this very singular species were found by Mr. King, and of these but one was in fresh condition, while three were imperfect. In the absence of the operculum, it is difficult to decide upon its generic affinities: in many of its characters however and especially in the spiral costulation, the horny texture, the shape of the mouth generally, and that of the umbilicus with its basal keel, it so closely resembles the more turritid *C. trochlea*, Bens. from the Nilgiris, that we have little hesitation in referring it to the same group, which we propose to separate as a subgenus under the name of *Jerdonia*.\*

\* *C. trochlea* is classed by Dr. Pfeiffer as a *Cyclostomus*. As we have since obtained the operculum, which is peculiar but many-whorled and concentric,



The sculpture within the umbilicus recalls that of *Cyathopoma filocinctum*, B.

No. 5.—*Cyclotus Kalryenensis*, n. s. Pl. II. fig. 1.

Testa umbilicata, elevato—conica, albida, spiraliter lirata, epidermide pallide corneâ, induta; spira conica, apice subaeuta; sutura profunda: anfr. 5 rotundati: ultimus cylindraceus. Apertura parum obliqua eircularis: peristoma duplex, externum expansum, internum porrectum labio dextro erenulato, acutum, continuum: umbilicus perspectivus. Opereulum concavum externe testaceum, aufractuum marginibus lamella spirali, ad anfractus externos elevatâ, incurvata, munitis.

Alt. .... 2 mm.

Diam. maj ..... 2,5 ditto.

Diam. min. .... 2 ditto.

Apert. diam. .... 0,8 ditto.

Hab. apud summos montes Kalryen, Ind. Mer.

This is a third form of the little group, endemic to the hills of S. India, of which *Cyc. malabaricus*, Blanf. and *Cyc. filocinctus*, Benson are the other members. It is most closely allied to the latter, from which it differs in its much smaller size and its more elevated spire. The only specimen which retains its opereulum is considerably weathered, so that it is doubtful whether the lamellæ of this appendage have not been in some measure destroyed. If not, the species is characterised by the farther difference, that the lamellæ are lower, and less cyathiform than in either of its nearest congeners. All the specimens having lost the greater part of their epidermis, we are unable to say whether this be hirsute as in *Cyc. filocinctus*.

No. 6.—*Helix bilirata*, n. s. Pl. I. fig. 7.

Testa perforata, globosa, turbinata, solidiuscula, cornea, transverse striata; spira conoidea, apice obtusula Anfr. 7 angusti, sensim aequaliter; superiores carinâ unâ supræmedianâ muniti, ultimus ad peripheriam acute biarinatus, subtus tumidus. Apertura subverticalis, angulato lunaris, perist. reatum, marginibus distantibus, columellari brevi, verticali, reflexo.

Diam. maj. 6, min. 5, axis  $4\frac{1}{2}$  mm.

vel ,, 0.24 ,, 0.20 ,, 0.18 unc.

Hab. in montibus Shevros et Kolamullies; teste W. King.

we are enabled to correct this, and to shew that its relations are with the *Cyclophorus* group of operculated land shells.



This species apparently approaches the Ceylonese *H. mononema*, B. in character, but differs in its rounded base and less elevated spire.

No. 7.—*Helix Todarum*, n. s. Pl. I. fig. 8.

Testa perforata, subdepressa, fulvo-cornea, tenuis, nitida striata; spira depresso conica, apice acuta. Afr.  $5\frac{1}{2}$  sub-planulati, sensim accrescentes, ultimus haud descendens, subtus convexus, radiato-striatulus. Apertura vix obliqua, late lunaris: peristoma rectum, tenue, margine eolumellari breviter reflexo.

Diam. major 14, min. 12. Alt. 8 mm. Apertura 6 mm. alta, 7 lata.  
vel „ 0.52 „ 0.48 „ 0.32 „ 0.24 „ 0.28 unc.

Hab. prope Pykara et Neddiwuttom, in montibus Nilgiris.

Near *H. Perrotteti*, Pfr. from which shell, however, the present appears to be distinguished by its higher spire and larger size. It, however, differs somewhat in measurement, and *H. Perrotteti*, also probably varies in size, as some specimens obtained upon the Nilgiris and apparently belonging to that species, measure, in their diameters, 13 and 11 mm. and 7 in height.

*H. Perrotteti* is also included in Messrs. King and Foote's collection, but it is smaller than the type, and measures only 6 and 5 mm. in its diameters, axis 3 mm.

No. 8.—*Helix mucosa*, n. s. Pl. I. fig. 9. Pl. II. fig. 3.

Testa imperforata, conoideo-globosa, tenuissima, pallide interdum subviride luteo-cornea, oblique striata; spira breviter conoidea, apice aequiusecula, sutura marginata. Anfr. 4-5 convexiusculi, rapide accrescentes, ultimus major, non descendens, subtus convexus, ad peripheriam subcompressus. Apertura magna, obliqua, late lunaris; peristoma rectum, tenue, margine eolumellari brevissime appresso reflexo, perforationem claudente.

Diam. maj.  $9\frac{1}{2}$ , min. 8. Alt. 6 mm. Ap. 5 lata 4 alta.  
vel „ 0.38 „ 0.32 „ 0.24 „ 0.2 „ 0.16 unc.

Habitat haud raro in montibus "Nilgiris," prope Pykara, ad Coonoor Ghat, et ad Seegoor Ghat.

This shell appears to be allied to *H. Acalles*, Pfr. with which we have not met, but differs in the absence of both perforation and carination. It recalls somewhat in its general shape the Burmese *H. honesta*, Gould, from which, however, it is markedly distinct in size colour, sculpture, perforation, &c.

The above is the measurement of a very large specimen: in the majority the larger diameter does not exceed 8 to  $8\frac{1}{2}$  mm.

Were it not for the characters of the animal, some doubt might arise as to whether this species should not be referred to *Vitrina*. The characters, however, of the mollusk are decidedly Helicoid, but peculiar. The posterior portion of the foot is long, tapering and abruptly truncated at the end, where it carries a mucus pore, partly covered above by a small projecting lobe. The colour of the body is greenish yellow, the edges of the foot being reddish brown, and the centre of the bark pure yellow.

*II. mucosa* is tolerably common at the edges of sholas, and crawling on the sides of stones in jungle, and was found in especial abundance at the side of the road leading down the Seegoor pass, where it is accompanied by *Cyathopoma filocinctum*, B. and *Helix fastigiata*, Hutt.

Mr. Foote has lately sent us a variety of this shell from the Kalryen group of hills (to the East of the Shevroys), which differs from the Nilgiri specimens, in having a more distended mouth and somewhat more depressed whorls. It is figured at Pl. II. fig. 3 and its dimensions are as follow:—

|                      |            |
|----------------------|------------|
| Height, .....        | 7 mm.      |
| Major diam.....      | 10 ditto.  |
| Minor ,, .....       | 7.5 ditto. |
| Height of apart..... | 5 ditto.   |

No. 9.—*II. Euomphalus*, n. s.\*

Testa medioeriter umbilicata, subturbinata, depressa, fulvo-cornea, tenuis, oblique striata; spira conoidea, apice obtusa, sutura valde impressa. Anfr. 4 rotundati, sensim accrescentes, ultimus vix descendens, subteres. Apertura obliqua, rotundato lunaris; peristoma simplex, rectum, marginibus distantibus, sinistro haud reflexo. Umbilicum perspectivum.

Diam. maj. 2 lin.  $1\frac{3}{4}$ , alt. 1 mm.  
vel ,, 0.08 ,, 0.07 ,, 0.04 unc.

Hab. rarissime prope Pykara montium Nilgiris. This shell in its form somewhat resembles a minute *II. tapcina*, Bens. with more rounded whorls, deeper sutures, and a non-expanded lip.

\* No figure is given of this shell, as the specimen forwarded by my brother for that purpose, was unfortunately crushed before it reached me.—H. F. B.

No. 10.—*Helix tricarinata*, n. s. Pl. I. fig. 10.

Testa aperte perforata, depresso turbinata, tenuis, pallide cornea, oblique striatula, subtus obsolete decussata. Spira conoidea, apice planulata, perobtusata, sutura impressa. Anfr. 4 convexi, superne carinis duobus filiformibus cincti; ultimus tribus medianis, non descendens, subtus rotundatus. Apertura subverticalis, rotundato-lunaris; peristoma rectum, acutum, marginibus distantibus, sinistro non reflexo.

Diam.  $1\frac{2}{3}$  Alt. 1 mm.

vel „ 0.06 „ 0.04 unc.

Hab. prope Pykara ad summos montes Nilgiris.

Distinguished from its congeners by the possession of three spiral ridges at the periphery of the last whorl, besides other characters.

No. 11.—*Helix tertia*, n. s. Pl. I. fig. 11.

Testa perforata, depresso turbinata, tenuis, pallide cornea, striatula; spira conoidea, apice obtusa, sutura impressa. Anfr. 6 angusti, convexi, ultimus haud descendens, subtus rotundatus. Apertura subverticalis, rotundato lunaris; peristoma simplex, marginibus distantibus, columellari reflexiusculo.

Diam. maj.  $2\frac{1}{2}$ , min.  $2\frac{1}{4}$ , Alt.  $1\frac{3}{4}$  mm.

vel „ 0.1 „ 0.09 „ 0.07 unc.

Hab. raro ad Pykara: necnon ad Neddiwuttom in montibus Nilgiris.

The above 3 species have some similarity in general characters, although well distinguished from each other. *H. tertia* being distinguished by its higher spire, narrow perforation, and more numerous and closely wound whorls. *H. bullula*, Hutt. and *H. humilis*, Hutt. of the Western Himalayas, together with some small Cingalese Helices appear to belong to the same group. All three of the above species occurred at the edges of sholas, in company with *Jerdonia trochlea*, B. sp. *Diplommatina Nilgirica*, Blanf. and *Cyathopoma Malabaricum*, Blanf.

No. 12.—*Helix aspirans*, n. s. Pl. I. fig. 12.

Testa vix perforata, elevata, pyramidalis, vix striatula, tenuis, cornea. Spira turrita, apice obtusa, sutura parum profunda. Anfr. 7 convexiusculi, lente crescentes, ultimus non descendens, basi convexus, carinâ obtusâ, prope aperturam evanescente, circumdatus. Apertura subverticalis, tranverse lunato, semicircularis; peristoma

tenue, rectum, marginibus distantibus, columellari breviter reflexiusculo.

Diam. 2, Alt. 3 mm.

vel „ 0.08 „ 0.12 unc.

Habitat raro prope Pykara.

This shell has some characters in common with *H. fastigiata*, Hutt. of the Western, and *H. Barrackporensis*, Pfr. of the Eastern Himalaya, but differs from both in its much more elevated spire which is peculiar and very characteristic. It is a rare form and only one perfect specimen was met with.

We are informed by Mr. Benson that he received a shell undistinguishable from *H. fastigiata*, Hutt. from the Nilgiris. A shell closely resembling the Himalayan species and possibly identical, was found by us in both the Seegoor and Neddiwuttom passes, and in the former place, was not rare.

No. 13.—*Helix injussa*, n. s. Pl. I. fig. 13.

Testa vix perforata, trochiformis, pertenuis, pallido-cornea, superne peroblique, infra radiatim striata; spira conica, apice acutiuscula. Anfr.  $5\frac{1}{2}$  vix convexiusculi, ultimus non descendens, subtus tumidus, ad peripheriam angulatus, angulo antice evanescente. Apertura obliqua, transverse rotundato-lunaris: peristoma simplex, acutum, margine columellari subverticali, superne brevissime reflexo.

Diam. maj.  $3\frac{1}{4}$ , min. 3, Alt.  $3\frac{1}{4}$  mm.

vel „ 0.13 „ 0.12 „ 0.13 unc.

Hab. raro in Coonoor Ghat, montium Nilgiri.

The Sikkim and Landour *H. rimicola*, Bens.\* is the nearest form to *H. injussa* with which we are acquainted. The Nilgiri shell has a higher spire, and is considerably smaller in size. From the comparatively large *H. infula*, Bens. *H. injussa* may be easily distinguished by the absence of the peculiar sculpture of that species, as well as by its fewer whorls† and smaller size.

No. 14.—*Helix daghoba*, n. s. Pl. II. fig. 2.

Testa anguste perforata, depresso conoidea, oblique striata spiraliter sulcata, carinata, suturæ impressæ. Anfr. 7-8 lente accrescentes

\* Ann. and Mag. Nat. Hist. for April, 1859.

† All the full grown specimens of *H. infula* which we possess have 7 whorls. This shell is tolerably abundant on Banyan trees (*Ficus indica*) in the Botanical Gardens, Calcutta. We have also met with it in Orissa.

subconvexi, ultimus non descendens valde carinatus, infra convexus, lævis, ad umbilicum vix impressus. Apertura subrecta, depressa sucuiformis. Peristoma acutum ad umbilicum reflexum, intus 2 dentibus palatalibus munitum.

|                  |            |
|------------------|------------|
| Alt. ....        | 3 mm.      |
| Diam. maj. ....  | 6 ditto.   |
| „ min. ....      | 5,3 ditto. |
| Apert. alt. .... | 1,6 ditto. |

Habitat in montibus Patchamullies et Kalryenmullies, Ind. Mer. Teste R. B. Foote.

This shell is nearly allied to *H. retifera*, Pfr. which it resembles in form and the spiral sculpture. It is distinguished from that species by its minute umbilicus and by the form, number and position of the internal teeth, which in *H. daghoba* are small and compressed, but not lamelliform, and are situated very near the edge of the peristome. The specimens received from Mr. Foote are all bleached, and we are unable to say whether the living shell is covered with a hairy epidermis like *H. retifera*.

No. 15.—*Helix febrilis*, n. s. Pl. II. fig. 4.

Testa angustissime perforata, globoso-turbinata, spiraliter lirata. Spira subelevata, convexa, apice obtusâ, suturis valde impressis. Anfr.  $4\frac{1}{2}$  convexi : ultimus non descendens, ad peripheriam subdepressus infra planate rotundatus, lævis. Apertura obliqua, oblonga. Peristoma rectum, acutum, ad basin expansiusculum, columellari breviter reflexo, marginibus remotis.

|                  |            |
|------------------|------------|
| Alt. ....        | 1,25 mm.   |
| Diam. maj. ....  | 1,5 ditto. |
| „ min. ....      | 1,3 ditto. |
| Apert. alt. .... | 0,6 ditto. |

Habitat apud montes Kalryenmullies, Ind. Mer. Teste R. Bruce Foote.

This species bears a general resemblance to *H. tricarinata* above described, but is readily distinguishable by its higher spire, the absence of the characteristic triple carination, and the flatness of its basal surface. The two specimens received from Mr. Foote are both much weathered, and have lost their colour and much of the sharpness of their ornament.

No. 16.—*Helix lychnia*, Benson.

A shell, undistinguishable from the species above quoted, was found by one of us, wedged in the bark of a tree, in a shola between Pykara and Seegoor on the Nilgiris. This may appear surprising, as the original specimens were obtained by Dr. Bacon from Singapore, and the species has not, we believe, been met with in any part of the vast area extending between these distant localities. We can however furnish a parallel instance of equally wide range, in the case of the nearly allied shell *II. castra*, Benson, which has been found in Tenasserim, the Khasia Hills, Sikkim, the hills of Balasore in Orissa, and quite lately by one of ourselves in the neighbourhood of Kandy in Ceylon.

No. 17.—*Helix Barrakporensis*, Pfr. Pl. II. fig. 5.

In a former paper, we noticed the discovery by one of ourselves of *II. Huttoni*, Pfr. in the Nilgiri hills, we have above mentioned the further occurrence of *II. castra*, Benson, *II. fastigiata*, Hutton and *II. lychnia*, Benson, the former in Ceylon, the latter in the Nilgiris, as instances of hill shells common to both sides of the great Gangetic valley. A fifth species is *II. Barrakporensis*, Pfr., which we have lately received from Mr. R. Bruce Foote, who found it on the Kalryenmullay group of hills near Salem. The specimen drawn with the camera lucida is figured at Pl. II. fig. 5.

No. 18.—*Streptaxis Footei*, n. s.?

vel *Str. Perotteti*, var. *Footei*? Pl. II. figs. 6, 6 a.

Testa anguste umbilicata, depresso pyriformis, tenuiseula, glabra, cerco-albida; depressissime-conoidea apice laterali. Sutura submarginata. Anfr.  $5\frac{1}{2}$  convexiseuli, penultimus latere dextro inflatus, ultimus latere sinistro, infra planatus, pone peristoma subtus constrictus medio indentatus. Apertura oblonga, perobliqua: paries aperturalis lamellis 2 subparallelibus, mediana intrante munitus: peristoma tenue, expansum, reflexum, margine dextro valde sinuato, intus 1-dentato.

|                  |       |
|------------------|-------|
| Alt. ....        | 5 mm. |
| Diam. maj. ....  | 6 „   |
| Apert. alt. .... | 3 „   |

Hab. apud Shoolamullay, montium Patehamullay, Ind. Mer. ad alt. 3000 ped. Teste R. B. Foote.



It is difficult to say whether this little shell should be regarded as a distinct species, of the same group as *Str. Perotteti*. Petit, and *Str. Watsoni*, nob. or whether the three should be considered as varieties of the same species. The differences between such specimens of the three forms as we have obtained are indeed sufficiently striking, and such as are usually treated as indications of specific distinction. While the typical *Str. Perotteti*, has the peristome furnished with 3 teeth and *Str. Watsoni* with from 3 to 5, one of the specimens of *Str. Footei* received from Mr. Foote possesses but one tooth, viz. on the outer lip, while another, a distorted shell, has 2 palatal teeth. The latter species is moreover smaller than the first mentioned and larger than the second. On the other hand, it is clear that the number and development of the teeth alone cannot be regarded with certainty as a specific character, for we find that both *Str. Perotteti* and *Str. Watsoni* vary to some extent in this respect as well as that before us. Several minor differences which are perceptible when single specimens of the three *Streptaxes* are compared, are found to vary in shells undoubtedly of the same species, such as the size of the umbilicus, the depth of the sutural notch in the peristome, the striation of the whorls, &c. On the whole we think it more probable that the Patchumullay shell is a local variety of *Str. Perotteti* than a distinct species.

No. 19.—*Ennea Salmensis*, n. s. Pl. II. fig. 8.

Testa rimata, ovato-oblonga, oblique striata, fulvida: spira elevata, conoidea, apice obtuso: sutura impressa; Anfr.  $4\frac{1}{2}$ : superiores convexiusculi, inferiores subplanati, ultimus pone aperturam medio excavatus,  $\frac{2}{5}$  longitudinis subequans, antice arcuatim ascendens, juxta suturam et infra compressus. Apertura reniformis: columella recedens superne callosa. Dentes parietales 2 compressi. Peristoma expansum, labio externo flexuoso excavato 1 dentato.

|                  |         |
|------------------|---------|
| Long. ....       | 1.6 mm. |
| Diam. maj. ....  | 1 "     |
| Apert. alt. .... | 0.6 "   |

Hab. apud montes Kalryen, Ind. Mer. Teste R. B. Foote.

This little shell belongs to a type distinct from that of *Ennea Pierrei* and the other S. Indian species, and is more nearly allied to the Cuttack sp. *E. seriola*. From this it is distinguished by its more conoidal form and the possession of two well developed parietal, and

one palatal tooth, whereas the Cuttaek shell has but one minute parietal tooth. Moreover, the mouth is smaller and more constricted. Two specimens were received from Mr. Foote, both somewhat weathered.

No. 20.—*Bulimus prætermissus*, n. s.

Testa perforata, oblongo conica, tenuis, nitida, striata, lutea albida, varie rufo vel fusco spiraliter fasciata et transverse strigata, plerumque uni vel trifasciata, interdum unicolor albida. Spira conica, apice acutiuseula plerumque nigra. Anfr. 7 convexiuseuli, ultimus  $\frac{2}{5}$  longitudinis subæquans, basi rotundatus. Apertura vix obliqua, subovalis; peristoma simplex, rectum, margine columellari verticili, fornicatim reflexo.

Long. 19, diam. 10, mm. Ap. 8. alta.  $5\frac{1}{2}$  lata.

vel „ 0.76 „ 0.4 une. „ 0.32 „ 0.22 „

Olim in Orissa, nuper prope Salem inventus.

This species is intermediate between *B. mavortius*, Reeve and *B. punctatus*, Anton, on the one hand, and *B. Bengalensis*, Lam. on the other. It resembles the two first named in form, but differs from both in the absence of the transparent spots on the whorls. It is less solid than *B. mavortius* and broader in proportion to its length than *B. punctatus*. From *B. Bengalensis* it is distinguished by its small mouth, and by less tumidity.

It varies considerably in marking, of which we have the following varieties.

1. Yellowish white throughout; apex the same.
2. Yellowish white with a single brown stripe round the lower portion of the last whorl; apex white.
3. Upper whorls transversely obliquely striped with pale reddish lines; last whorl purplish, with a dark brown stripe round the lower portion. Apex black.
4. Yellowish white, two pale reddish brown lines round the lower portion of the last whorl, the upper running along the suture above. The upper part of the whorls obliquely striped with interrupted streaks of the same colour. Apex black.
5. Three rather broadish and irregular brown stripes around the last whorl; two on the upper ones, becoming purplish black near the apex; apex black.

6. 3 stripes of dark brown on the lower whorl, 2 on the upper ones. Apex black. Similar to the marking in *B. Bengalensis*.

We have no specimens with more than 3 stripes around the last whorl.

7. Whorls obliquely and undulately striped with brown, one stripe round the lower part of the last whorl. Suture near the top purplish black; apex black.

Specimens of *B. prætermisus* were first found by ourselves 5 years ago in the tributary mehals of Cuttaek, in Orissa; and were by us long considered as a variety of *B. Bengalensis*. The first six varieties came thence, No. 7. which is rather more highly coloured, occurs amongst the shells sent from S. India by Mr. King, who found it on detached hills, N. E. of Conaniputty, in the Salem district.

No. 21.—*Bulinus orbis*, n. s. Pl. I. fig. 14.

Testa subperforata, oblongo turrata, cornea, tenuis, oblique striatula; spira conica, apice obtusiuscula sutura impressa. Anfr. 7 convexi, ultimus  $\frac{1}{3}$  longitudinis subæquans. Apertura obliqua, rotundato-ovalis; peristoma simplex, reetum, marginibus convergentibus, dextro arcuato, ad anfr. penultimum valde antice porreeto, columellari breviter reflexo, perforationem subtegente.

Long. 10, diam. 5, ap.  $3\frac{1}{4}$ , alta.  $2\frac{1}{2}$  lata.  
vel „ 0.40 „ 0.20 uue. 0.13 „ 0.10 ditto.

Hab. ad Cullygoody prope urbem Trilhinopoly, Indiæ meridionalis.

We are not acquainted with any Indiau type of *Bulinus* to which the shell can be compared. Its horny texture, elevated, conical spire, and rounded mouth, with the upper margin of the thin peristome running to a considerable distance forward along the penultimate whorl, form a very peculiar combination of characters.

No. 22.—*Spiraxis hebes*, n. s. Pl. I. fig. 15.

Testa imperforata, turrata, cornea, rugoso striata; spira subulata, apice perobtusata, sutura albido marginata. Anfr. 7 parum convexi, ultimus  $\frac{1}{3}$  longitudinis subæquans, basi rotundatus. Columella parum callosa, vix subtorta, brevis. Apertura fere verticalis, elongato ovalis; peristoma simplex, rectum, margine dextro superne arcuato.

Long. 15, diam. 4 mm. ap.  $4\frac{1}{2}$  alta. 2 lata.  
vel „ 0.60 „ 0.16 unc. „ 0.18 „ 0.08,

Hab. in montibus Nilgiris.

The above are the dimensions of the largest specimen found. It is however possible that this shell may attain a greater size. The sole Indian species to which it appears to be related is *Sp. (Bul.) gracilis*, Hutt, from which, however, it may be easily distinguished by its very obtuse apex, less numerous whorls, &c.

No. 23.—*Achatina paupercula*, n. s. Pl. I. fig. 16.

Testa turrito-oblonga, solidula, nitidula, fulvo cornea, impresso-striata; spira turrita, lateribus vix convexis, apice obtusa, sutura sub-marginata, Anfr. 7, parum convexi, ultimus  $\frac{1}{3}$  longitudinis sub-æquans. Columella valde arcuata, basi antice truncata. Apertura ovali-pyriformis; peristoma rectum, intus vix labiatum, marginibus callo junctis.

Long. 9 diam.  $3\frac{1}{2}$  mm. ap. 3 alta. 2 lata.  
or „ 0.36 „ 0.14 unc. 0.12 „ 0.08 „

Hab. in montibus Kolamullies, Patchamullies et Shevroys, teste W. King et R. B. Foote.

The nearest ally to this small species appears to be the Darjiling *A. crassula*, B. From this it is mainly distinguished by the shape of the spire which is more convex at the side, by its smaller breadth compared with its length, and by its more marked and slightly marginate sutures.

*A. paupercula* is probably common upon the Shevroys. All the specimens however found by Mr. King at that locality are bleached, two specimens from the Kolamullies alone retaining their original texture.

No. 24.—*Achatina Tamulica*, n. s.

Testa turrita, tenuis, pellucida, nitida, cornea, striatula; spira regulariter attenuata, apice obtusa; Anfr. 10 convexi, ultimus  $\frac{1}{4}$  longitudinis paulo superans, rotundatus; columella valde arcuata, oblique truncata. Apertura parum obliqua, subovalis; peristoma simplex, tenue, marginibus callo tenuissimo junctis.

Long. 20, diam. 6 mm. Ap.  $5\frac{1}{2}$  alta. 3 lata.  
vel „ 0.8 „ 0.24 unc. „ 0.22 „ 0.12 „

Hab. prope Trichinopoly ad Cullagoody, &c.

Near *A. Shiplayi*, Pfr. but distinguished by the smaller number of whorls, more obtuse apex, &c.

No. 25.—*Achatina Mullorum*, Pl. I. fig. 17.

Testa turrito-oblonga, solidiuscula, pallide cornea, diaphana, subre-

mote leviter striata; spira turrata, apice obtusa, sutura impressa. Anfr. 6 convexi, ultimus  $\frac{1}{3}$  longitudinis subæquans, basi rotundatus. Columella brevis, arcuata, vix callosa, oblique truncata. Apertura fere simicircularis, verticalis; peristoma rectum, obtusum, marginibus callo tenui junctis.

Long.  $7\frac{1}{2}$ , diam. vix 4 mm. ap.  $2\frac{1}{2}$  alta.  $1\frac{3}{4}$  lata.

vel ,, 0.3 ,, 0.16 unc. ,, 0.1 ,, 0.07 ,,

Habitat ad urbem Madras.

Var  $\alpha$  Anfractus ultimus nitidior, tumidior.

This is one of the group of small Indian *Achatinas* comprising *A. gemma*, Bens. and *A. scrutillus*, B. From these two shells the present species is distinguished by its conical spire with straight and not convex sides, its paler colour and sculpture. Both varieties were found abundantly crawling on banks, in a garden at Nungumbankum, a suburb of Madras.

An *Achatina* distinct from any of the above and probably new is figured at Pl. II. fig. 9. Two specimens of this shell were received from Mr. Foote, who found it on the Kalryenmullies. It is characterised by a strong oblique costulation on the upper part of the whorls, the lower part being smooth. Like most of its associates it is thin, and of a pale horny brown. We refrain from naming it being doubtful whether it be a full grown shell, though both the specimens received are of the same size and form.

The complete list of species, from the Kolamullay, Patchamullay, Kalryenmullay and Shevroy hills respectively, contained in Messrs. King and Foote's collections is the following. Those marked with *N* occur also in the Nilgiris.

1.—*Kolamullay Hills.*

*Cyclophorus ravidus* ? B. *N.*

\**Pteroryclos bilabiatus*, var. Sow, *N.*

*Alycæus Footei*, n. s.

*Cyclostoma* (*Jerdonia* ?) *Kolamulliensis*, n. s.

*Diplommatina Kingiana*, n. s.

*Helix bilirata*, u. s.

H. *Tranquebarica*, Fabr, var. (*N.* ?)

H. *Maderaspatana*, Gray. *N.*

\* Obtained by ourselves but not included in the collection from this locality.

*H. Semifusca*, Desh.  
*H. Perrotteti*, Pfr. *N.*  
*Achatina paupercula*, n. s.  
*Ennea Pirriei*, Pfr. *N.*

2.—*Patchamully Hills.*

*Helix daghoba*, n. s.  
*H. Perotteti*, Pfr. *N.*  
*Streptaxis Perotteti*, Pfr. var. *Footci*, nob.  
*Achatina paupereula*, n. s.  
*A. Shiplayi*, Pfr. *N.*  
*Cyclophorus involvulus*? or *Cyc. Jerdoni*. (Young shell.)  
*Pterocyclos bilabiatus*. Sow. *N.*

3.—*Kalryenmully Hills.*

*Cyclophorus malleatus*? n. s. *N.*  
*Cyelotus Kalryencensis*, n. s.  
*Pterocyclos bilabiatus*, Sow. *N.*  
*Helix daghoba*, n. s.  
*H. mucosa*, n. s. *N.*  
*H. Perotteti*, Pfr. *N.*  
*H. Barrakporensis*, Bcns.  
*H. febrilis*, n. s.  
*Ennea Salemensis*, n. s.  
*Achatina Shiplayi*, Pfr. *N.*  
*Achatina*, n. s.?

4.—*Shevroy Hills.*

*Cyclophorus malleatus*, n. s. *N.*  
*Alycæus Expatriatus*, Blanf. var. *N.*  
*Helix retifera*, Pfr. *N.*  
*H. maderaspatana*, Gray. *N.*  
*A. paupereula*, n. s.  
*Ennea Pirriei*, Pfr. *N.*

It is probable that some other species occur in all the ranges, or we should be obliged to conclude that as a rule, each has fewer species in common with the other, at a distance of not more than 30 or 40 miles, than with the Nilgiris at from 90 to 120 miles distance; as is shown by the following table:—



|                         | Nilg. | Kolam. | Patch. | Kalr. | Shev. |
|-------------------------|-------|--------|--------|-------|-------|
| Nilgiri Hills, .....    | —     | 6      | 3      | 5     | 6     |
| Kolamullay Hills, ..... | 6     | —      | 3      | —     | 3     |
| Patchamullay Hills, ... | 3     | 3      | —      | 4     | 1     |
| Kalryenmullay Hills, .. | 5     | 2      | 4      | —     | 1?    |
| Shevroy Hills,.....     | 6     | 3      | 1      | 1?    | —     |

The most interesting circumstance connected with these collections, is the evidence they afford of an uniform fauna, (though with some slight specific distinctions, as in the case of *Alycaeus*, *Diplommatina*, *Cyclotus*, *Streptaxis* &c.) upon the higher portions of the various detached groups of hills with more or less flat tops, which are scattered over the plains of Southern India. So much is this the case, that we have found *II. Nilagrica*, Pfr. and *II. Maderaspatana*,\* Gray near Chettycolum, N. of Trichinopoly, upon the upper portion of a detached peak, which cannot be above 1500 feet in height.

It is not at all probable these shells, all inhabitants of a comparatively moist and cool climate, should have been able to cross the hot dry plains which at present extend between the several groups of hills. But as all geological evidence clearly proves the comparatively recent elevation of the plains of the Indian peninsula, we can readily conceive, that in a recent geological epoch the whole of them were under water, and the occasional migration of living specimens on floating wood from island to island may easily have taken place in the manner suggested by Darwin: [On the origin of species, p. 397,] or we may suppose that, moisture being more influential in determining the range of the pulmoniferous mollusca than slight differences of temperature, and the elevation of the country having been extremely slow, those portions of the low country which were first elevated above the sea, enjoyed for a time a moister climate than obtains, now that a wide extent of country intervenes between the opposite coasts: and thus that migration took place across these tracts, the

\* *II. maderaspatana* is stated in Pfeiffer's Mon. Helic, vol. i. p. 63, to occur around Pondicherry, Maderaspatam (a locality perhaps somewhat more widely known as Madras,) and Mangalore. It may occur on the Western Ghats in the vicinity of the last named town, but we do not hesitate to express our disbelief in its occurrence within 60 miles of either Madras or Pondicherry. The shell is probably common to all the high table lands and hill groups of Southern India, and occurs on the Nilgiris, in Mysore, the Wynaad and probably along the Western Ghats.

migrated species being subsequently driven to their actual isolated stations by the progress of upheaval.

It would appear furthermore that a certain interexchange of species must have taken place, either immediately by transport across the sea area, or slowly and mediately across the plains, with areas far more distant than the Nilgiris. We have given 4 examples of hill shells known to be common to Ceylon or S. India and the Himalaya, the Khasia Hills, and even the Tenasserim Provinces and Singapore, ranges the more striking when we consider how few species are common to the Nilgiri Hills and those of Ceylon.

## PLATE I.

- Fig. 1. *Diplommatina Nilgirica*, enlarged.  
 " 2. " *Kingiana* "  
 " 3. *Alycæus Footei*, "  
 " 4. *Jerdonia Kolamulliensis*, "  
 " 5. Operculum of *Jerdonia trochilæa*, "  
 " 6. *Cyclophorus malleatus*, "  
 " 7. *Helix bilirata*, "  
 " 8. *Helix Todarum*, Nat. size.  
 " 9. *Helix mucosa*, " "  
 " 10. *Helix tricainata*, enlarged.  
 " 11. *Helix tertiana*, "  
 " 12. *Helix aspirans*, "  
 " 13. *Helix injussa*, "  
 " 14. *Bulimus orbus*, Nat. size.  
 " 15. *Spiraxis hebes*, " "  
 " 16. *Achatina paupercula*, enlarged.  
 " 17. " *Mullorum*, Nat. Size.

## PLATE II.

- Fig. 1. *Cyclotus Kalryenensis*, enlarged.  
 " 2. *Helix daghoba*, enlarged.  
 " 3. " *mucosa*. Nat. size.  
 " 4. " *febrilis*, enlarged.  
 " 5. " *Barrakporensis*, enlarged.  
 " 6. *Streptaxis Perotteti*, var *Footei*, enlarged 2 diam.  
 " 6a. " " " " mouth enlarged.  
 " 7. " *Watsoni*, mouth proportionately enlarged.  
 " 8. *Eunca Salemensis*, enlarged.  
 " 9. *Achatina* from the Kalryenmullies, enlarged 2 diam.



Sketch Map  
of the  
NORTHERN PORTIONS  
of  
ASSAM & BURMA  
WITH PART OF  
CHINA.

COMPILED IN THE SURVEYOR GENERAL'S OFFICE TO ACCOMPANY THE  
MEMORANDUM BY THE  
VERY REV<sup>d</sup> T. D'AZURE  
VICAR APOSTOLIC OF TIBET.

SCALE 16 MILES = 1 INCH

*W. H. Murray*  
Surveyor General of India





*Memorandum on the countries between Thibet, Yunán and Burmah.*

—By the VERY REVEREND THOMINE D'MAZURE, *Vicar Apostolic of Thibet*; communicated by *Lieut.-Colonel A. P. PHAYRE, Commissioner of Pegu*; (with notes and a comment by *Lt.-Col. H. YULE, Bengal Engineers*). With a *Map of the N. E. FRONTIER prepared in the office of the Survr.-Genl. of India, Calcutta, August, 1861.*

The following account of the countries situated between Thibet, the Chinese provinces of Setehuen and Yunán, and the Northern portion of Burmah, is contained in a letter written by the Very Reverend Thomine D'Mazure, Vicar Apostolic of Thibet, residing in the valley of Bonga in about 28° 15' of North Latitude and 96° 30'\* of East Longitude.

The country is under the government of Hlassa. The letter is addressed to the Right Reverend Bishop Bigandet, Bishop and Vicar Apostolic in Pegu and Ava.

The Vicar Apostolic of Thibet considers that the Tsanpo river of that country, or as he writes it, Gakbo-dzanbo,† is the upper course of the Irawadi river. Bishop Bigandet's communication, addressed to Lieutenant-Colonel A. P. Phayre, is as follows.

'Rangoon, 15th September, 1860. I have the pleasure to communicate to you the following remarks on the geographical situation of the countries between Thibet, the Chinese Province of Setehuen and a portion of Yunán and Burmah, as well as on the tribes inhabiting them, which have been supplied, at my request, by the Vicar Apostolic of Thibet. On my return from Bhamo in 1857, I felt very anxious to ascertain whether it would be possible to establish a communication between the Missionaries established in those localities and ourselves. The distance between Bhamo in Burma and the Valley of Bonga where our Missionaries have a small establishment, could not be more, in my estimation, than 4° or 4° 25' of North Latitude, and I wished to be informed as correctly as possible on the geographical position of Bonga, the names of the principal rivers, mountains, and

\* This is probably Paris longitude. Otherwise it is an impossible position. It does not appear whence it is derived. The letter does not mention the supposed longitude of Bonga.—Y.

† This should be "Yarkiou dzanbo." The Gakbo he describes as a tributary only of the other.—Y.

tribes of those parts. Agreeably to my demand, the following details have been forwarded to me and received here about three months ago. The letter is dated 9th August, 1859,\* and runs as follows :

“DEAR MONSEIGNEUR.

“I need hardly state that the items of information respecting the position of places are not based on geometrical mensuration, or astronomical observations. They have been collected on the spot from personal observation, and from the reports supplied by natives of various nations and tribes.

I. “Relying upon the Map of Andriveau Goujon, Paris, 1841, the main chain of the Himalaya is supposed to end in the Province called Khana Deba,† by the 27° and 28° of North Lat. and the 96°‡ of (Paris) Long.

II. “From probable, but not positive, calculations that I have made, as well as from the particulars I have been able to collect, the Chinese towns of Longtehang-fou,§ Teniné tchou.|| ought to be placed one degree and a half farther in an eastern direction, and the distance between the Irrawaddy and the Louts Kiang ought to be nearly double that which is indicated on the said Map.¶

III. “On the same map Tsatsorken (in Thibetan Tsarong),\* and the tributary of the Louts Kiang are marked too low in a southern direction. The great bending of the two rivers Louts Kiang and Lantsan Kiang seems to begin above the 28° of Latitude. Bonga, our small establishment, is in one of the valleys of the range of mountains that separate those two rivers, near to the left bank of the Louts Kiang, and not far from the beginning of the bending from N. W. to S. E. in about 28° 15' N. Lat.

\* Therefore about ten months on the way.—Y.

† Khana Deba is the name given by Wilcox's informants to a Tibetan chief near the sources of the Brahmaputra. It is derived from Wilcox by the French geographers.—Y.

‡ Add 2° 20' for Greenwich = 98° 20', which agrees pretty well with Wilcox's Map.

§ Should be Yong-chang-foo probably, but may be Loung-chouan-foo the Mowun of the Burmese.—Y.

|| Theng-ye-choo of the Maps, the Momien of the Burmese.—Y.

¶ The Vicar is doubtless forced to this conclusion by the wrong position given to the Irawadi on his maps. In compiling my map of Burma I was compelled to take an opposite view and to move these places and the Chinese-Burman frontier to the westward. See *Mission to Ava*, pp. 266.—Y.

† Tsatsorgang in Klaproth's map is in Lat. 30° 18', Long. Paris 95° 54' = Gr. 98° 14'. In D'Anville its latitude is 28° 20'. All the latitudes in D'Anville's maps hereabouts are greatly too low, as our knowledge of Assam demonstrates.—Y.

IV. "That country is the south-easternmost limit of the possessions directly subjected to the government of Hlassa. There begins the country called Lokatra by the Thibetans. Lokatra means the *southern tattooed people*. Lokapatra has nearly the same meaning: Kapa means lips.\* This last name which the Rev. Mr. Fage never heard mentioned by the Thibetans may be likewise correct, because some of the wild tribes, both men and women, tattoo the lips and chin so as to resemble a beard. This same country is called Loke Patchan by the Chinese.† South of Bonga the tribe of the Louts is met with, and they occupy all the western country as far as that part of the Himalaya where in the maps the Mishmis are located.

V. "In that extent of territory west of the Louts Kiang at a distance of about 30 miles, is to be met a range of high mountains. On the west of that range, is a river rather inconsiderable called Kouts Kiang or Schété Kiang (both names are used by the Chinese). When it enters the Province of Yunan, it is known under the name of Lountehang Kiang, flows east of Teniné, and joins the Irrawaddy below Bhamo.‡ Between the Kouts Kiang and another considerable river that flows in the Irrawaddy, there are several ranges of mountains, the general direction whereof is from south to north. That river is named in the maps Gakbo Dzanbo. Its course through Thibet appears to be very different from what has hitherto been supposed. Its junction with the Irrawaddy must be placed somewhat more in the south. That§ called by the Chinese Kanpoo-tsangbo, is named by the people of Bonga, Dzain, because it flows through the sub-pre-fecture of that name. In that district, according to the Thibetans, is

\* This no doubt refers to a passage in Father Giorgi's *Alphabetum Tibetanum*, p. 423, where describing the province of Tak-po which is that to the east of Jigatze (or Teshoo Loombo of our maps), he says it is bounded on the south by the *Lhokaha-patra* or the "Southern Cut-mouths" "quod populi hi meridionales labia gerunt incisa."—Y.

† Klaproth has got the Hlokba or Hlokabadja north of Burmah near the Irrawadi, but probably transferred from the Himalaya far to the west, to meet his theories.—Y.

‡ This must be the Shoay-lee of the Burmese, which empties its water in the Irrawaddy about 55 miles south of Bhamo. On leaving the Province of Yunán the Shoay lee flows through mountainous districts, inhabited by Shans, winds through a very extensive flat country in a south-western direction, and finally joins the great river of Burmah. At its mouth, there is an island upon which is a small village called Shoay-lee-wa-youa.—*Note by Bishop Bigandet.*

§ I have no doubt this should be "this river"—i. e. the Gakbo-dzanbo of the maps.—Y.



the village of Samé where our two priests MM. Kriek and Boury were murdered.

VI. "To me there is not the least doubt, that the great river that flows through the whole length of Thibet, marked on the maps Yarou dzanbo, called by the Chinese Ia-lou-tsang-pou, and by the Thibetans, Yar-Kiou-tsangbo, is the Irrawaddy. I believe that its bending must be brought more to the east. This would agree better with the observations made by the English on the tributaries of the Brahmaputra. The latter cannot possibly be the Yar-Kiou-tsangbo.

VII. "Here is the general aspect of this country ; three principal rivers, the Irrawaddy, with its tributary the Kan-pou-kiang, the Kouts-Kiang, and the Louts-Kiang. These rivers are divided or separated by four principal ranges of mountains. The 1st range is formed by the last and easterly range of the Himalaya, west of the Irrawaddy ; the 2nd lies between the Irrawaddy and the Kouts-Kiang ; the 3rd between the Kouts-Kiang and the Louts-Kiang and the 4th between the latter river and the Lantsang-Kiang. The two first ranges appear to lower their heads beyond the 28° of North latitude owing to the great elevation of the soil in Thibet. The only range well known to our priests is the one near their settlement. Two spurs of that range that are north and south of their habitation are called Dokerla and Dokela.\* The latter is visited by innumerable pilgrims from all parts of Thibet, who come to worship the Spirit Kaoua Kerbo, that is to say, the white snow. It takes 7 days of hard travelling, to go from the Louts-kiang, to Kan-pou-kiang, or river of Dzain. The distance in a straight line is very short, but in countries like these, where there is nothing but ascending and descending, the direct distance gone over during one day is very small. East of that extent of territory lies the district called Tsarong, ending at the summit of the chain of the Dokerla, separating the rivers Louts and Lantsang. West of that same district, near to the Irrawaddy, † and close to the Himalaya, is the district of Dzain, where is the village of Samé two days distant from Oua. ‡ the last Thibetan village in

\* There is a range of snowy mountains called Douk-la Gangri in Klaproth's map, but near the Gakbo, and considerably west of the supposed position of Bonga.—Y.

† For Irawadi read Tsanpo, which he assumes to be the same.—Y.

‡ There is a village called Wa-loung near Samé in Wilcox's map of the upper Brahmaputra.—Y.

the direction of the Mislunis. Between the two above mentioned districts are the pastures of Dromba where are the sources of the Kouts-Kiang.

“All that country, which forms a part of the prefecture of Sang-Nga-Kien-dzong,\* is purely Thibetan. All that lies south of it is peopled with savages formerly paying tribute to Thibet. The limits between the territories of each tribe are generally, according to the custom of the country, the summits of high ranges, impassable on account of the snow during the greatest part of the year. They ordinarily live on the banks of rivers which are to them the best and safest highways.

VIII. “For the names of those wild tribes, known under the general appellation of Lokatra, and the districts they inhabit, I am chiefly indebted to our boys, purchased at Bonga, most of whom belong to those tribes.

|              |   |                |
|--------------|---|----------------|
| The Louts    | } | Chinese names. |
| Lisou        |   |                |
| Terong.      |   |                |
| Renney pang. |   |                |
| Dedze.       |   |                |
| Anampae.     |   |                |
| Metious.     |   |                |
| Dabou dam.   |   |                |
| Pang dang.   |   |                |
| Lam bcm.     |   |                |
| Damra.       |   |                |
| Kabing.      |   |                |
| Mooua.       |   |                |
| Apo.         |   |                |
| Mandeing.    |   |                |
| Telou.       |   |                |

“It is difficult to determine the position of the localities occupied by thoses various tribes: what will be stated on his subject, requires more accurate information. It is the result of the reports made by individuals belonging to those various tribes. Persons

\* Sangak-tchoui-dzong is in Klaproth's map, near the sources of the Chodteng chiu, which may be the Kouts Kiang of the Vicar, and very possibly similar in pronunciation, for the relations between Thibetan spelling and pronunciation appear to be complicated.—Y.

acquainted with the loose and always incoherent and disconnected statements made by savages on every subject of inquiry will readily understand how cautious one must be in giving belief to their sayings.

“*Louts or Anong*.—It is certain that below Bonga the valley of the Louts Kiang is occupied by the Louts\* (Chinese name) who in their language are called Anong, and in that of Thibet Guia, on an extent of four or five days’ journey. They are of a weak temper. They pay tribute both to the Thibetans and Chinese.

“*Lisou*.—The Lisou† occupy the same valley, as far as Yunán. They are said to be of very wicked dispositions.

“*Terong*.—South of the Dromba pastures the first population to be met with on the banks of the Kouts-Kiang, are the Derong, called, in Chinese Kuts, in Thibetan, Kiang or Kiong, and sometimes Tsong, and oftener Bain. Hence in Thibetan the Kouts Kiang is often called Bain Kioung, and by the natives Terong Ouang. In Chinese Kiang means river, which is translated Kiong by the Thibetans, meaning *water*, and Ouang in the native language has the same meaning.

“The Terong are separated from the Louts by one range of mountains. It is one of the most numerous tribes. Up to this the indications are tolerably correct, but the farther we move from Tsarong the less are they to be relied upon.

“*Renney-pang*.—Proceeding in a south-western direction, close to the Terong, are the Renney-pang. In that locality the Kouts-Kiang can scarcely be forded, but is crossed on rafts. That tribe is inconsiderable.

“*Dedze*.—In the vicinity of the two above-mentioned tribes are living the Dedze, called Dijon by the Thibetans. They inhabit high table-lands. They are celebrated for stealing cattle and carrying away the women and children of other tribes. In their country there is a small river called Ain Ouang.

“*Anampae*.—They are probably on the banks of the Kouts-Kiang below the Renney-pang, though separated for a distance of two or three days’ journey by a territory wholly uninhabited. Throughout

\* The Louts are probably the Nous or Lous of Klaproth’s map, giving name to the Nou-kiang, Lou-kiang, or Louts-kiang, as our author calls it.—Y.

† The Lisou are also in Klaproth’s map, to the north of Theng-ye-choo.—Y.

their country, there is great abundance of iron mines; the steel is of a superior quality.\*

“*Melious, Daboudam.*—In the vicinity of the Anampae, live those two tribes; they speak the same language. They manufacture earthen vessels.

“*Pangdang.*—They are found close to the Dedze. The mountains in that locality have not much elevation, the country is somewhat flat and there is scarcely any snow.

“*Lambenn.*—They sell Chinese pans; it is probable they are on the banks of the Louts Kiang close to Yunán.

“*Damra.*—Three days west of the Anampae, dwell the Damra. They are separated from them by a range of mountains.

“*Kabing, Mooua.*—These two tribes dwell near the junction of the Kiang Ouan with another river, larger than the Kouts Kiang and all the others. This must infallibly be the Irrawaddy. The language of the Mooua is the same as that of the Pani who live near Yongpetin, in Yunán. They use European articles, weave cloth, and cultivate cotton. Some Thibetans maintain that the Mooua are the same as the Meneupguiebo, the Thibetan name of Burmah. There is no doubt but that tribe is close to Burmah.

“The Kabing appear to be the same as the tribe of the Kakhien to be met with east and north of Bhamo.†

“The Mooua are now probably some Shan tribe living in the same localities as the Kakhien. The latter dwell on the hills and the former in the valleys.‡

“*Apo.*—They are separated by a range of mountains from the Damra on the west. They are said to be very wicked.

\* The Kakoos are mentioned below by Bishop Bigandet as celebrated for their *dhas* or swords. See also *Mission to Ava*, p. 146. Y.

† They are very numerous. I have seen hundreds of them at Bhamo whither they come to buy salt and some other articles. They appear of mild dispositions, though the Burmese represent them as cruel and treacherous. If some of them be really so, the ill-treatment they receive from the Burmese is the prolific cause of the evil.—*Note by Bishop Bigandet.*

‡ By their industry and mercantile habits the Shans are far superior to all the other tribes. They are exceedingly numerous, but unfortunately divided into a great many fractions. They are to be met with from the borders of Assam to the gulf of Siam. The Siamese are but one of the many Shan tribes, that is more advanced in civilization than the others, owing to the geographical position of their country on the extremity of the gulf of Siam. The Thibetans may possibly make no difference between the Shans and the Burmese.—*Note by Bishop Bigandet.*

“ *Mendeing*.—They are supposed to inhabit south west of the Mooua.

“ *Telon*.—Where are they? It is said that they live not far from the Dronba, since the Thibetans of Tsarong go and exact tributes from them.

“ This is what we have been able to collect respecting those tribes and the territories they inhabit.

“ Very grateful I would be to you, if you could send me the most accurate particulars respecting the north of Burmah, the course of rivers, the mountains, tribes, &c. &c. With the Chinese and Thibetan notions we may obtain here, something might be done for throwing some light on this part of eastern Asia, which is to Europeans a *terra incognita*. If there be some map of these parts, of a more recent date than that I have mentioned, have the goodness to procure it and forward it to me.

“ I may infer from the above that we are not far from each other, and that there may be a possibility of meeting each other on some future day. We would have to pass in the midst of tribes that are in general of a meek temper and good disposition, except when they are at war among themselves.

“ I will close this long letter with stating a curious fact. The Thibetans, of the province of Tsarong at least, are in great fear of the Burmah King. They say that it is written in their books that he will on a future period make himself master of their country.

“ Your affectionate brother in Christ,

(Signed) J. THOMINE MAZURE,

*Vic. Ap. of Thibet.*”

‘ As an addition to the above remarks contained in my friend’s letter I will, my dear Col. Phayre, convey to you the following scanty information I received from some Burmans when I was at Bhamo in 1857.

‘ It appears, that at his accession to the throne the present Ruler of Burmah sent an embassy to the Viceroy of Yunân. I conversed with several men that had, from Bhamo, accompanied the embassy. They stated to me that it took them 10 days to proceed from Bhamo to Momien, the first Chinese frontier town. On their way through Yunân they crossed on iron bridges three rivers, the Shoay-lee, the Salween and the Mekon. These bridges were described to me in the



following manner. I saw also a rough sketch of one of them made by a Burmese on the spot. Strong chains are laid horizontally on the stream from bank to bank and planks are placed and well fixed upon them. On each side at a height of about three feet, two other chains are likewise stretched across, and planks are laid vertically to secure the safety of passengers. These chains are carefully greased to prevent their destruction by rust. The bridges were ten cubits broad, men and beasts of burden cross them, and a small tax is levied by the Chinese authorities. I believe that the Kouts Kiang, the Louts Kiang and the Lantsan Kiang are respectively the Shoay-lee, the Salween and the Mekon or Cambodia river.

‘Here are the names of the wild tribes north and east of Bhamo ; the Kakiens, Shans, Katou, Phoun, Anga Shan, Palaong, Kakou.

‘The Katou are divided in three tribes called Mokatou, Mein-pekatou, Sanyua Katou.

‘The Kakiens are likewise subdivided into Marou, Tsinpho, Adzi, Lishi-sonce ; if these names can be identified with those above described ? The Kakou are celebrated for the *dás* or large knives they manufacture in great quantities, the blades of which are of the best description. When at Bhamo I saw one of those knives cutting large iron nails without receiving the least blunt.

‘Those rough and imperfect notes may possibly enable you to make an attempt to elucidate some controverted points respecting the places, countries, rivers, mountains and tribes of Burmah. No one is better fitted for such an arduous task than you, who have paid so much attention to all that has reference to Upper Burmah.

Believe me, my dear Col. Phayre,

Yours sincerely,

(Signed) + PAUL BIGANDET.’

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*Remarks on M. DEMAZURE's letter.*

The reverend writer justly calls the land from which he writes a *terra incognita*. The circle of unknown territory in the interior of Africa is rapidly shrinking, whilst of eastern Thibet we have scarcely added to our knowledge in the present century. This will not, we

may hope, continue so much longer.\* Meanwhile it is startling to receive a contribution to the Society's proceedings from this unknown corner of the world ; but these brave Roman Catholic priests penetrate everywhere.

Grateful as we ought to be for this contribution, we must not accept all its geographical indications for facts. To appraise them properly it would be necessary to determine what the worthy Vicar Apostolic has derived from actual observation and information received in the country, and what are merely preconceptions derived from the maps in his possession.

The map which he names, that of Andriveau Goujon, Paris, 1841, we have not been able to find in Calcutta. But there can be little doubt, from the missionary's references, that it is substantially the same in its peculiarities with the map constructed by Klapproth for his Treatise on the Irawadi. Nearly the same is Berghaus's map of Further India 1843, which I also produce. These maps show the country of the Khana Deba, Tsatsorken, and other places named by the Vicar Apostolic.

Now this map of Klapproth's, which I take to be the basis of the missionary's general ideas of the geography of the country in which he lives, was compiled from Chinese sources for a specific purpose, viz. that of demonstrating that the great Tsanpo river of Thibet was identical with the Irawadi, and not with the Brahmaputra as we believe.

I do not know whether anybody on the continent still maintains this view. Thirty years ago it was the subject of earnest controversy, and seems to have become almost a national dispute, Englishmen for

\* We see that intelligence has been received of the English travellers now advancing towards Lassa, from Chung-king upon the great Yangtse Kiang on the 28th April, and that they were about to proceed towards Ching-tu the capital of the province of Seeluen. This town is on one of the branches of the great river in Lat.  $30^{\circ} 50'$  and Long.  $104^{\circ}$ . Hence we see that they will pass far to the north of the country of which the Vicar apostolic speaks in this letter, their route probably lying by the great military road through Bathang and Tsamdo (the latter at least as high as  $31^{\circ} 30'$ ) of which the route is given in great detail in Klapproth's description of Thibet. If, as we trust, they accomplish their great journey, they will be the first European travellers who ever have done so. About 1660 the journey through Lassa from Pekin to India was accomplished by the Jesuit Fathers Grueber and Dorville. But they followed to Lassa the same route that was taken by the missionaries Huc and Gabet in their wellknown journey, passing from the neighbourhood of the Wall of China to the great lake the Koko-noor, far to the northward. [I need scarcely add that since this was written Col. Sarel has been obliged to abandon his journey.]

the Brahmaputra, Frenchmen for the Irawadi. Twenty years ago we see that it was an assumed fact in the map of the German geographer Berghaus; though I observe that in later maps he has quitted the position. So possibly it may be warring with ghosts to say any more on the argument. It is certainly an interesting question, if it be a question, whether the river, on whose delta-branches stand our thriving ports of Rangoon and Bassein, does or does not come all the way from the mountains north of Rohilkund; whether its sources are in the mountains of Khamtee, or are fifteen degrees further west. It is a question which reminds us of that of the course of the Niger, which the *Quarterly Review*, if I recollect rightly, tried hard to argue into the Nile, till the Landors solved the problem by descending to the Gulf of Guinea. We are not likely yet a while to find a Landor for the Tsanpo. It is not navigable, and the savages that border Thibet are much more unmanageable than the negroes of the Niger. You will find the matter ably diseussed by Wileox in the 17th volume of this Society's quarto researehes, and a resumè of all the available subsequent information on the subject in an appendix to my account of the Mission to Ava in 1855.

The idea that the Irawadi was the debouchement of the Tsanpo was first started by D'Anville. It was maintained by Dalrymple, the author of the Oriental Repertory. And it was revived by Klapproth, who supported his view by citations from Chinese geographers and state papers, by arguments from physieal geography, and by maps based on Chinese sources. He insisted that the great river of Thibet passed through Yunán and entered the Burmese territories at Bhamo, there joining a river flowing from the north to form the Irawadi which passes by Ava.

Since Klapproth wrote, Bhamo has been several times visited by European travellers, (by Col. Hannay, Dr. Bayfield, Dr. Griffith, Kineaid the American missionary, and as we see here by Bishop Bigandet), and it is well ascertained that the river which enters at Bhamo from the Chinese frontier is an inconsiderable one. The upper Irawadi was also visited in 1827 by Wileox, not far from its sources in the snowy mountains of Khamti. It was indeed ascertained both by him and by Col. Hannay that there was an *eastern* branch joining with the western, according to the latter about Lat. 26°. And, as this has been seen by no European eye, it *might* of course prove to be

the continuation of a great Thibetan river, though such evidence as could be got was against the supposition. We shall see if M. De-Mazure throws any light on this presently.

The Tsanpo in Thibet has been reached by only one traveller in modern times, at least only one who has narrated his journey, viz. Turner, on his Embassy in the days of Warren Hastings. Turner was told by the Thibetans that the river entered Assam. So says Father Giorgi who wrote on the authority of the Catholic missionaries in Thibet in the last century.\* The measured discharge of the Dihong in the month of January is 56000 feet per second, probably more than twice the low water discharge of the Ganges at Benares, and considerably more than the low water discharge of the Indus at Attok, (a river which so singularly resembles it in its course, on the assumption that the Tsanpo and Dihong are the same)†. This alone is almost enough to decide the question. For if the Dihong is *not* itself the Tsanpo, the Tsanpo must limit the basin that feeds the Dihong in a manner quite irreconcilable with the enormous discharge of the latter.

With a philologist who has a theory to maintain, it is said that vowels go for nothing and consonants for very little. With a geographer who has a theory to maintain, we may say that latitude goes for very little and longitudes for nothing.

Klaproth, not aware indeed of the discharge attributed to the Dihong, at least when his theory was started, tried to provide for the difficulty we have just alluded to by carrying the southern turn of the Thibetan Tsanpo a degree and a half to the eastward of its position in D'Anville's maps and by carrying the Dihong's mouth forty miles to the westward of its *known* position, besides twisting its direction in a way for which there is no foundation in fact.

\* "Seseque tandem in Gangem exonerat." *Alphabetum Tibetanum*, p. 343, Major Dalton, long resident in upper Assam, stated at the Society that the general belief of the people near the Dihong was, that it came from Thibet. The Dihong and the (eastern) Brahmaputra are the only rivers of Assam which they admit to come from Thibet. Major Dalton believes both the Dihong and the Subanshiri, great as their volume is, to be derived entirely from the Himalya and not from Thibetan sources.

† Wilcox mentions the traditions of a great and destructive flood on the Dihong in the last century, analogous to the Indus "cataclysm" of 1841 and 1858. Major Dalton at the Society's meeting mentioned a more curious Assamese tradition, viz. that some centuries ago there was *no* Dihong, but that it appeared by sudden irruption into the valley.

Now, this is the kind of preconception with which our worthy Vicar Apostolic starts, and we must try to eliminate this preconception from all his statements which it affects.

It will be seen that he is describing a succession of parallel rivers, separated by parallel chains of mountains just as they have fixed themselves in his mind from his French map. His own position at Bonga he states to be in a valley of the mountains between the Lantsang Kiang (which is well known as the Chinese name of the Me-kong or great river of Cambodia), and the Louts Kiang, which is without doubt the Loo-kiang or Noo-kiang of our maps, the Salwen of Tenasserim. Bonga, he says, is near the great bending of these two rivers and in about  $28^{\circ} 15''$  latitude as well as he can judge.

Westward of the Louts Kiang, at a distance of 30 miles, is a range of high mountains, and west of those "a rather inconsiderable river" called the Kouts Kiang or Sehete-kiang, which he describes as known in Yunan under the name of Loungchang-kiang, as flowing east of Tenine (or Theng-ye-ehoo,) and joining the Irawadi below Bhamo.

This is so precise, that it is difficult not to accept it as derived from actual information. There can be no doubt that the description of this Kouts Kiang in the lower part of its course applies exactly to the Shweli, a tributary of the Irawadi, which it enters in Lat.  $24^{\circ}$  nearly. It is variously described by the British officers who passed up the Irawadi in 1837 at from 300 yards to 600 yards wide at its mouth, full of shoals and discharging little water. The width however indicates that at times it carries a large body of water. It is mentioned by the Chinese geographers quoted by Klaproth under the name of Loung-ehuan-kiang, probably from its passing near Loung-ehuen the Mo-wún of the Burmese. It is on a small tributary of the Shweli that the celebrated ruby mines of Ava are found, and near its banks in former days stood two important cities; that of Mweyen or Mauroya, the most ancient capital of the Burmese kings of sacred Indian descent, and supposed to be mentioned by Ptolemy as *Maureura metropolis*; and Maulong the capital, in later times, of a Shan kingdom.

Just a doubt remains whether this identity of the Kouts Kiang and the river Shweli is not suggested by his map rather than got from



local knowledge. Such a lengthened course of the Shweli is indeed given conjecturally in the map of Klaproth who brings it down from a combination of several of the rivers of Thibet. Just above the town of Theng-ye-choo, he gives it the Chinese name of Khiu-chy which perhaps corresponds to the Kouts of our missionary.

But supposing that this is not the case, that this is really the Shweli which flows down from the latitude of Bonga, the course of the river is a very singular one; it so far justifies the theories of Klaproth's map, and it forces us to carry the eastern source of the Irawadi much nearer to the western one than we have placed it hitherto, on the information given to Hannay that they were eight days' journey asunder.

Proceeding westward, the Bishop says that "Between the Kouts Kiang and another considerable river that flows into the Irawadi there are several ranges of mountains, the general direction whereof is from south to north. That river is named *on the maps* Gakbo-dsanbo. Its course through Thibet appears to be very different from what has hitherto been supposed. Its junction with the Irawadi must be placed somewhere more in the south.\* That called by the Chinese Kanpoo Tsangbo"—this I have no doubt is mistranslated, and should be "*this*," viz. the Gakbo-tsangbo of the maps—"called by the Chinese Kanpoo Tsangbo is named by the people of Bonga Dzain, because it flows through the sub-prefecture of that name. In that district, according, to the Thibetans is the village of Samé where our two priests Messrs. Kriek and Boury were murdered."

He then goes on to allude to the Yaro-tsanpo of our maps and to express his conviction that *there is not the least doubt* that this great river is the Irawadi. It is curious that this is just the same expression as is used by the Chinese geographers quoted by Klaproth. "There is no manner of doubt," say the Editors of the grand Imperial Geography,† that this great navigable river that flows through the kingdom of Mian or Ava is the Yaroo-dzangbo of Thibet. But this sort of assertion rather implies an absence of argument, and does not carry conviction to a reader. The Viear goes on to give reasons however, and a very good specimen of circular logic his reasoning is.

\* Qy. North?

† Klaproth, *Memoire sur les sources du Brahmaputra*, etc. p. 281.

“ I believe that its bending must be brought more to the east. This would agree better with the observations made by the English on the tributaries of the Brahmaputra. The latter cannot possibly be the Yarkiou-tsangbo.”

Now observe his reasoning.

‘ 1st. There is no doubt that the Yaro-dzangbo is the Irawadi.

‘ 2nd. Its bending must be brought more to the east’ (i. e. to enable it to be the Irawadi.)

‘ 3rd. The Brahmaputra cannot possibly be the Tsangpo’ (i. e. because the Yaro-Tsanpo’s bending goes so far to the east, where we have just obliged it to go).

But just let us get rid of this notion and all his information will fall into place, and leave little difficulty remaining.

The Lantsang-kiang, and the Luts Kiang or Loo-kiang we are already familiar with on the maps. The Kuts Kiang we will admit to be the Shweli running into the Irawadi. We have then, he says not one, but *several* mountain ranges running from south to north, and we come to the river which the Thibetans call Gakbo, and the Chinese call Kanpoo. The Gakbo you will find, as I have said, in Klaproth’s map forming an imaginary junction with the Kuts-kiang or Shweli. In a map of Berghaus’s published in Perthes’s Gotha Hand Atlas (1860) you will find it doing duty as a tributary of the Yaro-tsangpo. In the original authority for the Thibetan geography, or at least in the nearest form to the original which is accessible to us and not biassed to meet theories, that is to say in D’Anville’s Atlas, the river is found, under its Chinese name of Kenpoo, in a position which identifies it either with the Dibong or with the (eastern) Brahmaputra.

The mention of it by the Vicar Apostolic as the river on the banks of which the priests Krick and Boury were murdered identifies it with the latter, and this murder of two missionaries becomes thus in fact the basis of a geographical connection between British India and Thibet. For these gentlemen were murdered about the mouth of August, 1854 (as we know from the reports of the British officers in Upper Assam) at a village called Simé\* (the Samé of the Vicar Apostolic) near the banks of the eastern or real Brahmaputra, where

\* This village is entered from native information in Wilcox’s map, dated many years before the murder of the abbés.

they had halted for some time to acquire the Thibetan language before penetrating into Thibet by that route from Assam.\* This fact therefore should satisfy M. De Mazure that his theories about the Irawadi are all wrong. Not only so, but if he is right about the Kuts Kiang being the same as the Shweli, you will observe that between this Kuts Kiang and the Kenpoo, which we have identified with the Brahmaputra, he mentions *no river*, so that his evidence, so far as it goes, is against the derivation of any supply to the Irawadi from the mountains of Thibet, excepting what enters by this river Shweli. If again his identification of the Kuts Kiang with the Shweli is only a deduction from his maps, I would say that it is highly probable that this Kuts Kiang is *not* the Shweli, but is the unseen eastern branch of the Irawadi called in our maps the Shu-mai-kha.

Indeed every attempt to construct a map which shall combine with the data ascertained by Wilcox in his journeys, those furnished by M. de Mazure, including the most liberal estimate of the "seven days hard travelling" which he places between Samé and Bonga, ends in something like a conviction that his river Kuts-kiang is really the eastern branch of the Irawadi, the Shumai Kha of our maps. To make room for the Shweli in this position the Loo-kiang and its parallel rivers must be moved considerably further to the eastward than any maps represent them. But then Bonga will be carried very much beyond any possible seven days journey from Samé in such a region. We do not seem to be in a position to solve the difficulty, but could communication with M. de Mazure succeed in removing his erroneous views about the Irawadi, then he might supply most valuable information.

The Vicar says, "The spurs of the range that are north and south of their habitation are called Dokerla and Dokelá. The latter is visited by innumerable pilgrims from all parts of Thibet who come to worship the Spirit *Kaoua Kerbo*, that is to say the *White Snow*." We find this mountain under the name of *Kawa Garbou Gangri* in Klaproth's map, but in Lat. 28° 45' and to the *north* of the position which is assigned by the missionary to his establishment.

East of the country traversed in passing from Bonga to the Ken-

\* See "Official and interesting correspondence &c. regarding the melancholy and brutal massacre of the Rev. Messrs. Krick and Boury, Priests of the Society of Foreign Missions, Calcutta—R. C. Orphan Press, 1855."

poo he describes the district of Tsarong, or Tsatsorken, terminating on the Dokerla north of their establishment. And between the district of Tsarong and the Dzaing are the pastures of Dromba.\* "All that country" the paper says, but evidently in English we should say "all *this* country" viz. of Dromba, in which are the sources of the Kuts-kiang, is purely Thibetan," and all south of it is peopled with savages. These are probably the Mishmis and other tribes adjoining the upper Brahmaputra.

I can add nothing of any use regarding the wild tribes catalogued in the latter part of the letter. The indications are nearly all too vague, and Bishop Bigandet has anticipated the few remarks that could be made.

It should be noticed that when this paper was read, I was under the impression, derived from high authority in matters geographical, that the Abbés Krick and Boury had been murdered, not on the upper Brahmaputra, but near the banks of the Dihong. Accidentally Major Dalton, the officer who made the official investigation into the crime, and by whom the murderer was convicted, was present at the meeting and corrected this impression. It need scarcely be said that the assumed position on the Dihong would have been much more difficult to reconcile with the Vicar Apostolic's statements. Several passages in the present comment have been altered in accordance with this correction.



*Letter to the Secretary of the Asiatic Society of Bengal, on some Recent Statements touching certain of the Gupta Kings and others.*  
—By FITZ-EDWARD HALL, Esquire, D. C. L.

SIR,—With many other well-wishers of India, I hail it as an encouraging sign, that the natives of this country are beginning, here and there, to evince an intelligent interest in the history of their

\* This should perhaps be Dromla. There is a range of mountains called Douroungla in this position in Klaproth's map. *La* I believe in Thibetan signifies a mountain pass.

forefathers. It has been, therefore, with no little gratification, that I have read Bábú Rájendralál Mitra's paper on the Toramáṇas, in the last number of our journal which has reached me.\* Consulting the Bábú's welfare, I would, however, exhort him to the study of accuracy, and to an advised consideration in the choice of his premises. Several remarks of mine he has lately honoured with his notice; and there are those who, prompted by curiosity to read what he has written, would scarcely accord more than a glance, if even that, to my "Note on Budhagupta."† The design of the present short letter is, to point out a few instances in which the Bábú has mis-stated my conclusions, and in which he has taken for postulates positions which are still unestablished.

Speaking of Mr. James Prinsep's "translation of the Eran records," the Bábú, after calling it "sadly defective in many respects," goes on to say: "Even the proper names, in two instances, are misrepresented; and the paramount sovereign Tárápáyi appears only to be a mislection of Toramáṇa. Col. Cunningham was the first to point out the mistake with regard to the name of the King; but, by assuming the rest of Prinsep's translation to be correct, he was led to opinions which the advantages of subsequent researches shew to be other than well-founded. He supposed, that the record adverted to a regency of Dhanyavishṇu, during the minority of the young prince Toramáṇa, and, by a curious mislection of the document now under notice, made him the son of Mátṛidása, and the grandson of Mátṛikula. According to him, the principality of Toramáṇa extended from Eran to the banks of the Jumna, and his reign from A. C. 520 to 550. Mr. Fitz-Edward Hall, in his 'Note on Budhagupta,' accepts these deductions, with only a few reservations. He assumes Toramáṇa to have been 'an usurper, and a proximate, if not the immediate, successor of Budhagupta, the first sovereign of a tentative independent branch [of the Gupta dynasty?] which almost certainly ended with himself.'"

Manifestly enough, the drift of this passage is, in the main, to sum up the errors of Mr. Prinsep and Colonel Cunningham. The summary finished, I am taxed with accepting "these deductions, with only a few reservations." What deductions are intended? And how many of them have I accepted? Can the Bábú indicate

\* *Vide supra*, pp. 267-278.

† *Vide supra*, pp. 139-150.



a single assertion, or inference, made by the gentleman aforesaid, now known to be wrong, that I have signified my adhesion to? In passing, the "subsequent researches" which the Bábú alludes to are, I believe, entirely my own. But who would ever have surmised so from his language? Nor have I written about Toramána what is imputed to me above; nor have I, as the Bábú, a little further on, says I have, ventured on the "assumption," that Budhagupta was first sovereign, &c. I cite my own words: "Budhagupta, by possibility, may have been the first sovereign of a tentative independent branch, which almost certainly ended with himself; for Toramána, his proximate, if not immediate, successor, was not a Gupta, and very likely was a usurper." The expressions "by possibility" and "very likely" do not, to my apprehension, denote assumption.

Again, the Bábú, having pronounced Toramána to have been "an usurper in central India, and a rebel in his own country," adds: "Mr. Hall admits the first," &c. On this I have simply to remark, that the phrase "very likely" does not express admission any more than it does assumption.

My circumspection of phrase with regard to Budhagupta and Toramána thus appears to have had but indifferent success. The very first person who uses my observations about those kings ascribes to me opinions, respecting them, which I never entertained, and which I wholly repudiate.

As an argument to uphold my view, that Toramána was a sovereign, I wrote: "By the kings of all ages, the minting of money has been jealously reserved as a royalty; and Toramána is known to have coined copper." On this the Bábú observes: "We shall presently shew, that a Toramána did strike gold without assuming the imperial purple, and that his copper coins are still extant; not to advert to the privilege of coining held by the Cæsars or younger Rájáhs of Rome." And this Toramána, as my critic himself informs us, met with "an untimely death in a prison, to which he was consigned for his presumption in striking coins in his own name during the lifetime of his liege lord." That this makes directly in my behalf, it can require no great perspicacity to discover. As for Cæsars, or *Yuvarájas*, it is well known, that, to all interests and purposes, they were full kings. Certainly in India, they issued royal charters; and, not improbably, they issued money. I have never denied that they did so.

The solecistic "imperial purple" of Hindu rulers shall not detain me for a comment.\*

\* At p. 149, *supra*, I have written as follows: "My paper on the land-grants of Hastin, and that on the Eran inscriptions, as I did not see the proof-sheets, abound in errors of the press, to say nothing of other faults. The more important will here be rectified, and a few comments interspersed." As soon as I saw in print the second paper just mentioned, I amended, for my private eye, part of a sentence in the translations which it contains, in these words: "Māṭṛivishṇu, a most devout worshipper of Bhagavat; providentially preferred by Royal Prosperity, as it had been a maiden who elects her husband; of fame diffused as far as the four oceans; whose wealth of high-mindedness was never diminished; victorious, in battle, over many an enemy," &c. I could go on; but the Bábú will, from my own indications, already be fully satisfied,—if he gives himself to a close inspection of the above,—that he has entered the lists against fallibility. In that for which I have thus given a substitute, the Bábú has tracked out a dissyllable that I at first overlooked, and has detected one other error of similar magnitude. So nice an Aristarch, especially when he enjoyed the advantage, which a neglect on the part of the printers gave him over me, ought to have reaped a richer harvest. *Verbum sat*. He has seen, that, in two trifles, I was in the wrong; but it would be easy to show, that, in trying to set me right, he has himself opened a door for criticism.

One point more,—one not quite so minute. Mr. Prinsep, in his analysis of the Eran inscriptions, speaks of "Tárapáni"—rightly, Toramána,—as "of Surástra (?)," and afterwards speaks of "Budhagupta in Surástra." All this I quoted in my "Note on Budhagupta." The Bábú says of Toramána: "Prinsep threw out only a conjecture, when he called him a king of Saurástra" (*sic*); and he subjoins, in a note, "not, as has been supposed, by the misapprehension of a word in the inscription, which Mr. Hall (ante, p. 18.) has read *sansurabhu*." The Bábú must pardon me for declaring, that I never supposed any such thing. The word which I read *sansurabhu* occurs in an inscription where there is no mention of Toramána, but in one where there is mention of Budhagupta. As I have shown, Mr. Prinsep was uncertain as to the empire of the former, not as to that of the latter. His *sansuratam* he translates, erroneously, by "beautiful country." There is scarcely room for question, that in a moment of forgetfulness, he thought it was in the Budhagupta inscription, and that he considered it to be equivalent to *suráshtra*, beautiful kingdom, literally, and the name of a realm. A home—covered up in *sansuratam*—thus found for Budhagupta, it was natural, I allow, to conjecture, that Toramána also, who came shortly after him, and was commemorated colloquially with him, might have been of Surástra. On any other theory than this, Mr. Prinsep's "Surástra" is inexplicable.

But the Bábú's oversights about my *Sansurabhu* do not stop here. It was insufficient, it appears, for me to have written, that "what I read *Sansurabhu* is doubtful in its penultimate syllable, and very doubtful in its final." Touching this reading of mine, the Bábú says: "It would be a presumption, on our part, to question the reading of one who has the evidence of his own eyes to support it; and yet we feel disposed to think, that Mr. Hall's reading is the offspring of an illusion." For the courtesy of this, I thank the Bábú; but his inconsistency distresses me. Furthermore, it goes, with the Bábú, for but little, I find, as contributing to induce credit in the trustworthiness of my version of the Eran inscriptions, that "standing before the originals, I compared my facsimiles, letter by letter, with those that have been lithographed; and every the slightest dissimilarity of the copies was patiently tested by the perishing archetypes." The lithographed copies were those of Mr. Prinsep.

The venerable Páṇini is summoned to complete my annihilation. *Sansurabhu*, the Bábú avers, is a word that flies in the face of the aphorism *ते प्राग् धातोः*, which imports, according to my critic, that inseparable prepositions "should be used before verbal roots only." Common sense should of itself suffice to explain

On the Bábú's proposal to identify Toramána of Káshmir with the Toramána of the Eran inscription, I have to offer only one or two suggestions. Are we sure, that the former lived "about the end of the fifth century?" Far from it. And are we sure, that, as the Bábú takes for granted, the latter belonged to that age? Not at all. No attempt whatever has been made to set aside my implied assignment of him, on the basis of an ascertained date, to the first half of the second century;\* and the time of Budhagupta, on which his own depends, is hypothetically reckoned by the Bábú, in an era which perhaps began A. D. 278. The result is a difference of three hundred and thirty-five years.

Hiouen-Tsang's Buddhagupta must have flourished at least a

the aphorism; but I annex the amplification of it given in the *Siddhanta-Kaumudí*:  
 दे गत्युपसर्गसञ्ज्ञका धातोः प्रागेव प्रयोक्तव्याः. The incidence of the *eva*, "exclusively," is unmistakable. Páñini means, that it is only before verbs, and never after them, that such particles as *sam*, &c. can be used in composition. These prefixes are by no means restricted to direct connexion with verbs, or with any other class of vocables; and to all such they are non-essential. As the Bábú interprets Páñini, authority is wanting even for putting one inseparable preposition before another; and yet in compounds by the myriad, we come upon these prepositions lying from two to four deep. In the very inscription where I could make out of chaos nothing better than *Sansurabhu*, we have *anuvídháyin*, *ápyáyana*, and *abhyuchchhṛita*. The Bábú, to be consistent, must ostracize them. And what of *Sankata*, *Samadhika*, &c. &c.?

Mr. Prinsep's decipherment *Sansuratam* has the Bábú's approval; and he analyzes it into *sam*, "with," or "altogether," *su*, "well," and *rata*, "pleased." He has laid down, that "the particle *sam* is seldom, if ever, used before other than a verb or a participial noun;" and he thinks it "not at all likely," "that the writer of the inscription should have so sinned against grammar" as to write *Sansurabhu*. In so saying, he fails to perceive, that his condemnation of another applies just as much to himself; for *su*, "well," precisely like my *sura*, "god," is neither a verb nor a participial noun.

Finally, as for the epithet *Sansurabhu*, I have only said, and with all distinctness, that one must render it, "if right," by "in which is the good land of the gods." I have far from intimated any confidence in the correctness of my reading; and I have no partiality for it whatever. The fact is, simply, that the original symbols looked to me, in the dilapidated condition in which I found them, rather like the constituents of *Sansurabhu* than like anything else. That *Sansuratam* is not on the Eran column, I am quite positive, the Bábú's suspicion of "illusion" to the contrary notwithstanding. Both words are artificial and unnatural; but *Sansuratam* is the more so. In the account of grammatical propriety, they are pretty much on a par.

It will have been perceived, that I have not here had to retract anything. *Sansurabhu* must have passed uncensured, had the Bábú chosen to give proper heed to my account of it which he had before his eyes. This I have now made plain. If, in doing so, I have reciprocated somewhat of the animadversive attention which has been bestowed upon me, the reciprocation has not been altogether voluntary.

\* *Vide supra*, p. 15, second foot-note.

hundred years before our era. But the Bábú, like Professor Lassen, after silently converting him into Budhagupta and from a Buddhist into a Hindu, takes him to have been one with the Budhagupta of Eran. This identification is utterly untenable; and the Bábú had before his eyes the clearest evidence of its being so.\*

The Bábú likewise writes, as if he were dealing with demonstrated historical verities, of "Kumáragupta, several generations before Budhagupta assumed the royal sceptre," and of "Skandagupta, the immediate predecessor of Budhagupta." Not to my knowledge, is there one particle of proof, that Kumáragupta preceeded Budhagupta, or that Skandagupta did, whether immediately, or after an interval. That with Skandagupta, "to all appearance, the glory of the Guptas set for ever,"† is a conclusion of mine which, till we possess ourselves of fresh data, is likely to hold its ground.

In parting, I would remind the Bábú, that fidelity of citation and reference is a negative virtue not to be contemned by any of us; and that, if one is minded to build, it is well to select weather-proof materials.

I have the honor to be,

Sir,

Your most obedient Servant,

FITZ-EDWARD HALL.

*Camp Jubbulpore, January 1st, 1862.*

\* *Vide supra*, pp. 143-147.

† *Vide supra*, p. 148.



*Literary and Miscellaneous Intelligence.*

Mirza Abdul Wujood who brought Mr. Adolphe Selhagintweit's note-book and skull to Lord Wm. Hay, gave precisely the same account of the circumstances of the traveller's death as that given by Muhammad Amin and Kashmiri Abdoollah. The head after execution was hung on a bridge in the vicinity of Kashgar. Shortly after it was suspended on a tree, from which it was taken down and buried in the ground by a grower of melons who pointed out the spot to the Mirza. The note-book contained 135 pp. of MS. and has been sent to Europe. There seems reason to doubt the genuineness of the skull.

Capt. H. G. Raverty is bringing out Selections from the Poetry of the Afghans from the 16th to the 19th century, being literal translations from the Pushtoo texts lately published by him in the *Gulshan-i-Roh*. The author will add notices of the different poets and some remarks on Sufi literature.

An April letter from Professor Wright, lately appointed Assistant Librarian in the British Museum, with special charge of the Syriac MSS. has the following.

"That part of *Ahmad al-Yákúbi's* geography that relates to *al-Maghrib* has been edited and translated by *de Goeje* of Leyden in very good style. He is also busy on *Ibn Haukal*; and *Wustenfeld* upon *al-Bakri's* معجم ما استعجم. *Barbier de Maynard* of Paris is going, I believe, to publish all the articles from the great معجم البلدان of *Yákút*, that relate to *Persia*. I only wish that a few scholars would combine to publish this huge dictionary, and we could then dispense with nearly every other work of the sort.

The British Museum has just purchased the late Col. *Taylor's* (successor to Rich at Bagdad) collection of MSS., Arabic, Persian and Turkish, for £2000. It is well worth the sum. The poetry is poor; but the history, geography, law and philosophy are very fine."

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The following inscription from a ruined Mosque (so described by the Executive officer) on the old Badshahee road which is still traceable through the Beerbhoom District, is worth preserving.



هو الله

قَالَ اللهُ تَعَالَى • مَنْ جَاءَ بِالْحَسَنَةِ فَلَهُ عَشْرُ أَمْثَالِهَا \* بَنَى  
هَذِهِ السَّقَايَةَ السُّلْطَانُ الْعَالِمُ الْعَادِلُ الْمَعْتَمَدُ الْمَكْرَمُ عَلَاوَالدُّنْيَا وَالدِّينِ  
أَبُو الْمَظْفَرِ حُسَيْنِ شَاهِ السُّلْطَانِ ابْنِ سَيِّدِ أَشْرَفِ الْكُسَيْنِيِّ خَلْدِ اللهِ  
مَلِكُهُ وَسُلْطَانُهُ فِي سِنَةِ إِثْنَيْ وَعِشْرِينَ وَتَسْعَمَايَةَ

*Translation.*

*He is God.*

The Most High God hath said,—“Whoso doeth a good action—his reward shall be tenfold.”

This drinking-place (a fountain or well) was built by the Wise, the Just, the Illustrious, the Noble, the Pride of the World and [Glory] of the Faith, Soltan Aboo 'l Mozaffar Hosain Shah, son of Saiyid Ashraf al-Hosaini, may God perpetuate his empire and government; in the year of the flight 922.

The remains of what is believed to be a Buddhist Vihar have been discovered on the railway works half way between Bhaugulpore and Monghyr. They were some ten feet below the surface, and among them is a brass figure eight feet high with other smaller pillars of stone and clay bearing partially obliterated inscriptions.

Dr. Jerdon of the Madras Army who had come up from Burmah in the hope of joining Capt. Smyth's expedition to Chinese Tartary has been placed by Lord Canning on special duty to enable him to carry out the publication of his Natural History of the Vertebrate Animals of India. His work will include the animals of the Indian Continent from the Burranpooter to the Indus, but will exclude those of Thibet and Assam, and the countries to the Eastward.

The Birds are to be the first portion published and will consist of two volumes, the first of which (containing the Raptores and the greater part of the Insessores,) is now in the press, and will it is hoped be ready in the course of the cold weather. It will contain

descriptions of all the species known to inhabit India, but will not give all the synonyms in detail as is done in Horsfield's Catalogue, as too much space would be occupied. Reference however is in all cases made to Horsfield, Blyth, and other writers on Indian Ornithology, the habits when known, and geographical distribution are fully noticed.

Mr. Blyth, who left Calcutta for Moulmein in October on account of his health, writes as follows from Pahpoo, on the Yunzalin River, tributary to the Salween, November 20th, 1861, (lat.  $18^{\circ} 7' 43''$ , long.  $97^{\circ} 26' 0''$ .)

"I reached this station on the 15th, after fifty-two miles' trudge through the jungles, in four marches; not much fatigued, but a little foot-sore,—through jungle all the way, and therefore mostly in shade. Four days poling up the Salween, then a day's halt, then one day up the Yunzalin, and finally the land journey. But there is not much to be done here in the Natural History way, at least at this season; the underwood being so dense as to be impassable, except where paths have been cut, and these generally are in great need of their annual repair. Besides this, there has been rain as yet daily, which has brought out the land-leeches in abundance. In fact, we are here hemmed in by dense jungle, far too dense for any successful shooting; with just a few paths in different directions, one or more of which are now being re-cleared. One leads to a patch of teak-forest, after passing a quantity of elephant-grass, the path through which has at length been opened out, much to my convenience. There are fine hills close by; and in them Gibbons abound (*H. lar*), and I often hear them. The only mammal yet obtained is *Seiurus Phayrei*—common; but I have seen what I take to be *Sc. Berdmorei*,\* also numerous mole-hill like casts of *Rhizomys*, and footsteps of Tigers and Deer,—Muntjac too I have seen, a small house-rat, and bats,—also the earth turned up by Pigs,—but nought else of mammalia. There is a troop of wild Dogs about, which the Karens say have driven off the Tigers from this immediate vicinity. Of birds, the commonest are *Pal. javanicus* and *P. cyanocephalus*, then *Garr. Belangeri*, and I have obtained the *G. chinensis* of my Catal. (not uncommon): I doubt if it inhabits China. Jungle Fowl and *Gallophasis lineatus* are common. By the way, the generic name *Nycthemerus*, Swainson, should stand for

\* Since obtained.

this division. Very few other birds—*Megalaima lineata*, Sháma, *Turtur tigrinus* (as distinguished from *T. suratensis*), *Treron Phayrei*, *Melias tristis*, *Mot. luzoniensis*, *Pycn. nigropileus*, *Caprimulgus monticolus*,\* and on the river sand-banks *Esacus* and *Hopl. ventralis* abound. *Nycticorax* common, and the usual small *Totani*. I have not even heard a Woodpecker, at least here, but on the march I noticed *Chr. sultaneus*, *G. viridanus*, and *Meigl. jugularis*.† Of Hornbills, only *B. albirostris*, which my host insists is *capital eating*. These Karens are an impracticable set: they are now busy with their rice-harvest, but I hope soon to get fish, &c. from them. Not any as yet; nor orchids, though plenty about. Of plants, the *Plumbago rosea* grows wild here, of the large full-coloured variety; looking very splendid. Also the fine *Eranthemum erectum*. *Thunbergia laurifolia* (vel *Burmesiana*) abounds in the jungle, and I have once met with *Th. odorata* in deep jungle. Ferns are numerous. Of insects remarkably few. On the Yunzalin river I twice saw the fine *Papilio polymnestor*, which I had hitherto only seen from Lower Bengal; but very many of the common Bengal butterflies are about here, still not numerously. At this season it is decidedly an unfavorable place for making collections, as there is scarcely any getting about, and the tree-jungle is very high, and most difficult to distinguish birds in, straining one's neck till it aches in the perpetual effort. The Karens are civil and quiet, but quite indifferent to any money payment. They won't sell their ducks and fowls and pigs, and won't settle down to regular cultivation. And what is strange, for thorough jungle-wallahs, they have no notion of entrapping any thing, and do not fish at this season. A Burman has just brought me in a small *Monitor dracæna* and a small common *Calotes versicolor*, and these are almost the only reptiles I have seen,—not one snake as yet, save a *Tropidonotus* (?) in the Salween. My people tell me, however, that they have seen one or two snakes—likely enough. I have walked miles without seeing a single thing to shoot at, and often without hearing a chirp. On the march we came on the remains of a Peahen (*P. muticus*), killed by some jungle-cat. I also twice came upon huge specimens of *Scorpio aser*, right in the middle of the foot-path, and scorned to move off. From all this you will perceive that I have not

\* Also the fine *Lyncornis cerviniceps* of Gould,—very plentiful.

† Many species since obtained.

been very successful yet, and am here at the wrong time of the year for collecting. When the underwood is (annually) burned, it might be different."

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Annexed is an extract from a letter dated 17th December, from Capt. E. Smyth to the President. There is clearly no difficulty to be apprehended from Chinese officials in traversing this part of Thibet. The "watching" of the traveller here alluded to, is not observed with a view to impediment, and would probably be abandoned even as a precaution, could the traveller show the "red chop." It is to be hoped notwithstanding the late unfavourable reply to our Viceroy's application to Peking, that the required passports will yet be obtained in the course of the ensuing year.

Capt. S. is sending to our Museum some fine skins of Yak, Barral, Musk Deer and Thar in their winter coats. A subsequent letter gives the following dimensions for the Yak.

"The Yak is a good specimen though not so large as two I shot in 1859, both of which were within an inch of eighteen hands. This skin was never pegged out and has of course shrunk very much. The dimensions of the animal which I took as well as I could when he was lying dead are as follows. I had only two men with me and we could not turn him over to measure him *very* correctly, but you may look upon the following as tolerably correct. I had a measuring tape with me:—

|                             |                        |                   |                          |
|-----------------------------|------------------------|-------------------|--------------------------|
| Nose to between horns,      | 27 inches,             | girth round belly | 8 feet.                  |
| Circumference of do.        | 15 do.                 | do.               | chest $7\frac{1}{2}$ do. |
| Length of do.               | 30 do.                 |                   |                          |
| From horns to root of tail, | 87 do.                 |                   |                          |
| Length of tail,             | 40 do.                 |                   |                          |
| Between eyes,               | 15 do.                 |                   |                          |
| Height                      | $16\frac{1}{2}$ hands. |                   |                          |

"I spent twenty days in Thibet in October, I crossed the pass on 30th September, and returned by another pass on 21st October. For the first fifteen days, I met no one and could have gone half way to Lassa. I then sent to Daba for some things, and about twelve or fourteen men came out, as usual, to watch me. I heard that a proclamation had been issued at Lassa during the previous winter opening the country to all foreigners, but that it had been cancelled

by another proclamation issued in April. I also heard of Blakiston's party which I was told had been turned back from the Thibet frontier.

It was awfully cold in Thibet in October, and I did not go very far, as I had a very bad set of Bhootiah servants with me. I spent the twenty days principally in shooting, though I frequently could not go out on account of the cold-cutting wind. It was always freezing day and night, and I was snowed up in my tent for two days, and on the 20th October, the morning before I crossed the pass on my return, the thermometer outside my tent was 3° below zero: next morning 4° above zero: I had some first-rate sport, killing altogether fifty-three head of large game in two months eleven days; two wild yak bulls, four Oves Ammon, twenty bural, twenty-one thar, three musk deer, &c., &c. I had great difficulty in getting Bhootiahs to go with me on account of the cold, and they were all busy and preparing to go down to the plains with their borax, &c. and I had no one with me who could prepare heads and skins well. One of my baggage animals fell off a bridge into the Doulee, and neither it nor the load it carried was ever seen again. On one side was a wild yak skin, and on the other all my bedding and clothes; everything was lost except what I had on at the time. I managed to buy some second-hand blankets, &c. and a native comb."



PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR AUGUST, 1861.

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The Monthly General Meeting of the Asiatic Society of Bengal was held on the 7th instant, A. Grote, Esq., President, in the chair. His Excellency the Governor General was present.

The proceedings of the last meeting were read and confirmed.

Presentations were received :—

1. From Major G. G. Pearse, the following Historical Persian MSS :—

History of the Gukkur race of Hazara, the Punjab and Kashmir, and the supposed descendants of the Satrap of Cyrus the Great. History of Kashmir. History of the district of Hazara.

2. From Mrs. Brandis, of Rangoon, a copy of Voigt's Hortus Suburbanus Caleuttensis.

3. From Bábu Sivaprasád, a copy of his little work on the adaptation of the Roman alphabet to Hindi and Urdu.

4. From Col. Phayre, a wooden looking-glass frame of Burmese manufacture.

5. From T. P. Larkins, Esq., Magistrate of Bograh, a gold coin of rare execution and debased metal of the Gupta series.

6. From Capt. Bates, of the Punjab Infantry, through Lieut.-Col. Thuillier, a Chinese cross bow.

7. From Mr. J. Obbard, a box containing a few Chinese copper coins and some specimens of poisonous beans.

The following note accompanied the presentation :—

“TO W. S. ATKINSON, ESQ.,

*Secy. Asiatic Society.*

“DEAR SIR,—I beg to forward herewith a small box containing twelve specimens of what is said to be a poisonous bean picked up at

Pekin, and the same as that with which an attempt was made to poison the water-tanks and wells in the vicinity of the allied troops. I do not, of course, vouch for this, but one of the beans has been found to kill a dog.

“There are also in the box twelve coins picked up at the same place. These are probably very common, though unknown to me, but on the chance of their being acceptable to the Society, I beg to forward them to you and remain

“Your’s truly,

“*(Sd.)* J. OBBARD.”

*August 3rd, 1861.*

8. From Dr. T. Anderson, copies of his works on the Ceylon Acanthaceæ and on the flowering plants of Aden.

9. From Mr. T. F. Peppé, three fragments of the meteorite which fell on the 12th May at Peprassee and Bullooh on the borders of the Sarun district.

Mr. Peppé writes as follows:—

*Patna, 12th July.*

“A. GROTE, ESQ.

“DEAR SIR,—I have the pleasure to send you some further notes regarding the aërolite which fell on the 12th May last, together with three pieces of it. The larger specimen was obtained from the village of Peprassee, while the two smaller were obtained from a village called Bullooh, about three miles distant from the former, and I would particularly call your attention to the interesting fact that the smaller pieces exactly fit on to one side of the larger piece. This might, I imagine, give some clue to the height above the earth where the explosion took place, and it also shows from the fact of the fractured edges not being oxidised, that the greatest heat (which I take to be the oxidising agent) had been obtained prior to the explosion.

“There is also a singular vein observable in this specimen, which I think note-worthy; it looks as if a fracture had taken place and had been re-cemented again.

“I have ascertained that it does not decrepitate when heated before the blow-pipe, but it is readily oxidised, forming a glistening black surface exactly resembling the black crust at present covering the outside surface of the specimens.

“The polished surface does not show the Weidmanstättian figures, probably from the surface being at the wrong angle, but the particles of native iron are arranged in a reticulated or cellular manner.

“The depositions of the men who first saw the specimens forwarded are as follows :—

“Regarding the larger specimen, Bunnoo Bin Athert says :—

“‘On Sunday, the 12th May, as I was sitting in a field in company of a number of villagers, we were startled by three loud reports which were succeeded by a rumbling sound which gradually died away. We were on the East side of the village, and our attention was immediately attracted by a cloud of dust which rose from the ground at a distance of 15 biggahs from us. There was nothing seen to fall, but there was a whistling sound something like that which accompanies a bullet, but much louder. We rushed to the spot and found the stone exactly in its present state as far as I can judge. The ground had been thrown out all round it for about two feet. For two days nobody touched it, as it was said to be Mahadeo. A faqeer then brought it to the place near the village from whence your servant, 15 days after, took it away. There was no cloud at the time, and it was very hot and calm. Every one was very much frightened and the cattle all ran away.’

“With regard to the other two pieces from Bullooah, Ruder Moodsuhar says,

“‘On the 12th May as I was taking the cattle to water I was startled by three very loud reports, and saw a light high up in the air which fell to the ground within three biggahs of where I was, I went up to the place from whence the sand had been raised up from the ground, and found five pieces of stone. They were very hot, and the sand all round was the same and thrown up all round there to the depth of a foot.

“‘There was a very small cloud where the report came from; it was otherwise clear, calm, and extremely hot. I was very much frightened, and sat down, being afraid to move.’

“On being further questioned, he said :—

“‘First there was the loud report and about the same time I saw the light, like a flame; then the stone fell; whilst falling it made a great noise, and after falling the sand was taken up high into the sky.’

"I have heard nothing further of the pieces which went to Goruckpore, but hope that you may have heard something of them yourself.

"Your's truly,

"(Sd.) T. F. PEPPE."

The following letter received from the Magistrate of Goruckpore, announces the despatch of other fragments of the same fall for the Society's Museum.

"TO THE SECY. ASIATIC SOCIETY,

Calcutta.

"SIR,—In reply to your letter No. 221, dated 11th June, 1861, I have the honour to inform you that I have this day forwarded the stone alluded to in a separate pareel by steamer.

"On the 12th May, 1861, at 5 P. M., the above stone and another piece, fell near Thanna Nimbooh situated at a distance of 42 miles North and East of this station.

"The fall of the stones\* was attended with a great noise similar to that of cannon fire. The distance apart at which they fell was two miles, and on their fall they penetrated into the ground one cubit and half a cubit respectively, and an appearance of smoke was seen by the people to issue from the spot. After an interval of two hours a storm ensued, and it rained a little. At the time of the fall of the stones it is reported that the sky was clear.

"I have, &c.

"(Signed) F. M. BIRD,

"Magistrate."

Goruckpore, 5th July, 1861.

Read the subjoined letter from Col. Sir G. Everest, on his election as an Honorary Member :—

To the Secy. Asiatic Society.

June, 25th, 1861, Hyde Park, W.

"DEAR SIR,—I have been prevented by indisposition and divers other causes, from earlier acknowledging the receipt of your letter of the 19th November, 1860, which duly reached me.

"I beg the favor of you to present to the Asiatic Society of Calcutta my respectful compliments and thanks for the honour they

\* Both stones are sent by steamer.

have been pleased to confer on me, and for the very flattering terms in which they notice my humble labours in the prosecution of the Great Trigonometrical Survey of India.

“It must never be forgotten that by their publication in the proceedings of the Asiatic Society of Calcutta, the labours of my honoured predecessor, Colonel Lambton, first attracted the notice of the scientific world. Indeed, but for the patronage of that learned and eminent body, those celebrated operations might for ever have remained in obscurity; wherefore the gratitude and respect of myself and all connected with the Department of which I was for many years the chief, are especially due; and I request you will express for me to the Society how deeply I am and always have been impressed with this sentiment.

“I have, &c.

“(Signed) GEORGE EVEREST.”

Nawab Mohammed Khazim Ali Khan Bahadur, of Rampore, was balloted for and elected an ordinary member.

The following gentlemen were named for ballot at the next meeting:

Captain A. R. Fuller, Director of Public Instruction, Punjab; proposed by Lieutenant-Colonel Maelagan, seconded by Mr. H. S. Reid.

Dr. Clement Williams, H. M.'s 68th Regiment, Thyet Myo, proposed by the President, seconded by Mr. Oldham.

Babu Shumbhoo Chunder Roy, Zemindar of Rungpore; proposed by Babu Rajendra Lal Mitra, seconded by Mr. Atkinson.

Major P. Stewart, Bengal Engineers; proposed by the President, seconded by Col. Yule.

J. F. Coekburn, Esq., C. E.; proposed by Mr. Wilson, seconded by Mr. Oldham.

A. Tween, Esq., Geological Survey; proposed by Mr. Oldham, seconded by Mr. Medlieott.

Nawab Saiyid As'ghurally Khan Bahadur, of the Chitpore family; proposed by Moulvi Abdul Lutf Khan Bahadur, seconded by Mr. Atkinson.

Captain E. Davidson, Engineers; proposed by the Ven'ble Archdeacon Pratt, seconded by Lieut-Colonel Scott.



L. Griffin, Esquire, C. S. ; proposed by Mr. Cowell, seconded by Mr. Atkinson.

Lieut R. C. Beavan, late 62nd B. N. I. ; proposed by Mr. Atkinson, seconded by the President.

Communications were received :—

1. From the Under Secretary to the Government of India, copies of two letters from the Bombay Government, with reports on the eruption of a volcano on the African shore of the Red sea.

2. From Babu Radha Nath Sikdar, abstracts of Meteorological Observations taken at the Surveyor General's Office in January last.

3. From Mr. W. T. Blanford, contributions to Indian Malacology, No. II. by Messrs. W. T. and H. F. Blanford.

4. From Mr. E. Blyth, a paper containing Zoölogical notices and extracts.

5. From Colonel A. P. Phayre, a memo. on the countries between Thibet, Yunan and Burmah, by the Very Rev. Thomine de Mazure, Vicar Apostolic of Thibet.

Lieutenant-Colonel Yule read the paper communicated by Col. Phayre, Commissioner of Pegu, being a letter from T. de Mazure, Vicar Apostolic in Thibet, residing at the mission establishment of Bonga in a valley of the mountains separating the Loo-kiang from the Lantsang-kiang, in the extreme S. E. corner of Thibet, to the Right Rev. Bishop Bigandet, Vicar Apostolic in Pegu and Ava.

The Rev. Vicar Apostolic's letter was dated 9th August, 1859, and took about 10 months to reach Rangoon. The route by which it came was not stated.

He described the position of Bonga as above given, in about lat.  $28^{\circ} 15''$ , and gave various particulars regarding the rivers flowing to the South. Commencing with the Loo-kiang called by him Loutskiang and going westward he mentioned the Kouts-kiang which appears from his description to be the Shweli, a tributary joining the Irrawadee below Bharno, the Kanpo-dzanbo and the great Yarou-dzanbo, which he had no hesitation in identifying with the Irrawadee. He also mentioned Same, the village where the French fathers Krick and Boury were murdered in 1855, as only seven hard days' travelling west of Bonga. The letter concluded with a short description of a number of wild tribes in that region.

Col. Yule commented at some length on the paper. He pointed

out that it was necessary to distinguish, if possible, between what the Rev. Vicar Apostolic knew by personal observation or inquiry, and what was merely preconception derived from the maps in his possession. He showed that he was completely imbued with the notions regarding the rivers of Thibet which are set forth in the maps of Klaproth, and in Berghaus's map of Further India (1843), and was misled by these. The reasons for entirely rejecting the identity of the great Dzanbo and the Irrawadee were given shortly. The very fact that he attributed the locality of the murder of Krick and Boury to the banks of a river running into the Irrawadee was shown to disprove his notions, as the locality of that murder was known to be near the great Dihong in the Mishmi country. It was singular that the only common basis of geographical knowledge between British India and the Thibetan missionary should be the tragical murder of those two reverend fathers.

Major Dalton, formerly principal Assistant Commissioner at Lukhimpoor in Upper Assam, who was present at the meeting, then made some very interesting remarks from his intimate knowledge of that country and the tribes surrounding it. He corrected Colonel Yule's belief that the Missionaries had been murdered near the Dihong. They were actually on their way into Thibet by the route of the real or eastern Brahmaputra (above the Brahmakoond) and had reached a Thibetan village where they stopped some time, when they were murdered by Kesa a Mishmi chief.

Colonel Yule pointed out that this was a most valuable correction, and much more easily reconciled with the distance from Bonga on the Loo-kiang stated by M. de Mazure. It seemed to prove also that the Gakbo-dzangbo of the maps, the Kanpo of M. de Mazure, and the Kenpou of d'Anville was actually the eastern Brahmaputra.

Major Dalton mentioned that the hill people about the Dihong were uniform in their statement that the river came from Thibet. That river and the eastern Brahmaputra were the only rivers of Assam, they generally maintained, that did come from Thibet. He also mentioned a curious tradition among the people that some centuries ago the Dihong did not exist, but appeared suddenly in vast irruption through the mountains.

He spoke with authority on the subject of the murdered missionaries as the arrangements that led to the capture of the murderer

were made by him. He had been well acquainted with the two murdered men.

The Officiating Librarian submitted the usual monthly report.

LIBRARY.

The Library received the following additions since the last meeting.

*Presented.*

The Acanthaceæ of Ceylon.—BY DR. T. ANDERSON.

The Flowering plants of Aden.—BY THE SAME.

The Vividhārtha Sangraha, No. 74.—BY BABU KALIPROSANNO SINGH.

The Calcutta Christian Observer for July and August.—BY THE EDITOR.

History of Kashmir in Persian.—BY MAJOR G. G. PEARSE.

History (in Persian) of the Gulkur race of Hazara, the Panjab and Kashmir and the supposed descendants of the Satrap of Cyrus the Great.—BY THE SAME.

History of the district of Hazara, also in Persian.—BY THE SAME.

Journal Asiatique, Tome XVII. No. 66.—BY THE PARIS SOCIETY.

Natuurkundig Tijdschrift voor Nederlandsch, Deel XXII.—BY THE BATAVIAN SOCIETY.

Oriental Baptist for July.—BY THE EDITOR.

Oriental Christian Spectator for May.—BY THE EDITOR.

Proceedings of the Royal Geographical Society of London, Vol. 5, No. 2.—BY THE SOCIETY.

Proceedings of the Academy of Natural Sciences of Philadelphia.—BY THE ACADEMY.

Quarterly Journal of the Geological Society of London, Vol. 18, No. 66.—BY THE SOCIETY.

Report of the Bengal Chamber of Commerce from Nov., 1860 to April, 1861.—BY THE CHAMBER.

Second Report of the Municipal Commissioners of Calcutta.—BY THE COMMISSIONERS.

Selections from the Records of the Government of India (Foreign Dept.) Nos. 30, 31.—BY THE GOVERNMENT OF INDIA.

Selections from the Records of the Madras Government, No. 70.—BY THE MADRAS GOVERNMENT.

Theoretical Consideration and Tables in reference to Indian Hypsometry, being Part I of Vol. II. of the work on India and High Asia.—BY MESSRS. DE SCHLAGINTWEIT.

Roman Characters, being a pamphlet on the adaptation of the Roman Alphabet to Hindi and Urdu.—BY BABU SIVAPRASA'D.

Voigt's Hortus Suburbanus Calcuttensis.—BY MRS. BRANDIS.

Indische Studien, Vol. 5, Part I.—BY DR. WEBER.

*Exchanged.*

The Athenæum for May, 1861.

The Philosophical Magazine for June, with Supplement.

*Purchased.*

The Annals and Magazine of Natural History for June, Vol. 7, No. 42.

The American Journal of Science and Arts, for May, 1861, Vol. 19, No. 93

Comptes Rendus, Tome LI. Nos. 17 to 20 with Index of Tome LI.

Motanabbii Carmina cum Commentario Wahidii, Part V.

The Literary Gazette, Nos. 151 to 154.

Revue des Deux Mondes for 15th May and 1st June, 1861.

Revue et Magasin de Zoologie, No. 4 of 1861.

Turner's Embassy to Thibet.

Indische Studien, Vol. 5, Part 1.—By Dr. A. Weber.

On the Study of Sanskrit in relation to Missionary work in India, *pamphlet*.  
—By Monier Williams.

LALGOPAL DUTT.

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FOR SEPTEMBER, 1861.

The Monthly General Meeting of the Asiatic Society of Bengal was held on the 4th instant.

A Grote, Esq., President, in the chair.

The proceedings of the last meeting were read and confirmed.

Presentations were received—

1. From Prince Mohammad Jalaluddeen, two specimens of silver coins of his grandfather Tipu Sultan; they bear date 1216 Scil æræ novæ, 1787-S. A. D.

2. From the Director of Public Instruction, Bombay, copies of Bombay Government Selections No. 63 and "statement exhibiting the external trade of Sind for 1859-60."

3. From Babu Hitalál Misra, a copy of his edition of the Ráma Gíta in the Adhyátma Rámáyana of Brahmánda Purána.

4. From Mr. J. Obbard, a specimen of Iron Pyrites found in the Coast Battery excavations in Shakespear's Cliff at Dover.

5. From the Principal Grant Medical College, a copy of the Report of the College for 1860-61.

6. From Lieut W. P. Fisher, Dera Ismael Khan, the jaws and tongue preserved in spirit, and skin of a lizard supposed to be the *Biskopra*.

Read the following note from Mr. Obbard about the recent Comet:—

*To the Secy. Asiatic Society.*

DEAR SIR,—Herewith I have the pleasure to enclose a sketch of the track of the Comet of July last.

On the 7th of July, I received through the kindness of the President a telegram which he had received from Benares. Up to that time, I had not seen the Comet, and consequently had lost the opportunity of observing it during the most useful and brilliant period of its passage.

It was moreover very vexatious that from the nature of my duties at the time, I was unable to obtain any shore observations.

The following data therefore from which the track has been drawn, are mere sextant measurements,—which have all been reduced in the sketch to the hour of 9. p. m. for the sake of uniformity. The limit of error, may be calculated at from 15'' to 4' of arc according to the state of the weather. But as nothing more elaborate seems to have been forwarded to the Society, I am emboldened to submit these, as they may prove interesting, though not sufficiently accurate for scientific purposes.

*Abstract of the measured positions of the Comet of July, 1861, referred to the stars in the constellation of Ursa Major.*

| Date. | Hour. | Star.      | Mean Angle. | Hour. | Star.  | Mean Angle. | Direction of Tail from                                    |
|-------|-------|------------|-------------|-------|--------|-------------|-----------------------------------------------------------|
|       | h. m. |            | ° ' "       | h. m. |        | ° ' "       |                                                           |
| 8     | 8 27  | $\gamma$   | 13 33 40    | 8 34  | $\eta$ | 13 15 47    | $\alpha$ .                                                |
| 9     | 9 30  | $\gamma$   | 15 06 50    | 9 15  | $\eta$ | 11 14 40    | Midway between $\alpha$ and $\beta$ .                     |
| 10    | 9 00  | $\gamma$   | 16 40 00    | 9 22  | $\eta$ | 9 43 45     | Between $\alpha$ and $\beta$ , one-fourth from $\alpha$ . |
| 11    | 9 00  | $\gamma$   | 17 59 00    | 8 58  | $\eta$ | 8 46 30     | As yesterday, parallel to $\delta \epsilon \zeta$ .       |
| 12    | 9 05  | $\gamma$   | 19 12 10    | 9 14  | $\eta$ | 8 06 34     | As yesterday.                                             |
| 13    | 8 33  | $\beta$    | 26 23 27    | 8 25  | $\eta$ | 7 50 10     | As yesterday.                                             |
| 14    | 8 40  | $\alpha$   | 26 04 50    | 8 31  | $\eta$ | 7 44 10     | Midway between $\alpha$ and $\beta$ .                     |
| 15    | 8 24  | $\epsilon$ | 13 20 40    | 8 18  | $\eta$ | 7 48 30     | $\beta$ .                                                 |
| 16    | 8 33  | $\alpha$   | 28 02 50    | 8 26  | $\eta$ | 7 59 40     | $\beta$ .                                                 |



## REMARKS.

- (a.) Length of visible tail to the naked eye  $12^{\circ} 12'$ .  
 (b.) Visible tail  $27^{\circ} 50'$ ; clear night.  
 (c.) Visible tail  $12^{\circ}$ .  
 (d.) Nucleus less bright but looming as large.  
 (e.) Visible tail  $8^{\circ}$ .  
 (f.) Visible tail  $6^{\circ}$ ; cloudy night, the worst observations of the series.  
 (g.) Visible tail  $6^{\circ}$ ; comet generally much more indistinct.  
 (h.) Visible tail  $3^{\circ}$ ; very faint and difficult to observe.  
 (i.) Little or no tail, clear night.

Latitude 21-51—45 N. } N. B.—Mean Time was used through-  
 Longitude 88-08—15 E. } out. The centre of the Nucleus was  
 always measured.

In another letter Mr. Obbard describes the appearance of another Comet observed in the Southern Hemisphere. He states—

“I beg to draw the attention of the Society to the following report of a Comet having been observed in the Southern Hemisphere, which has not, to the best of my knowledge, been noticed before. The extract for which I am indebted to Captain Hill, first Assistant to the Master Attendant, is copied *verbatim* on the other side, with this exception, that the correction for variation of the compass has been applied to convert the magnetic into true bearings. The speed with which the Comet must have travelled through the heavens appears most extraordinary, but from the entire absence of observations, the following report will only serve as a mere record of its appearance.

American Ship *Rival*, F. Hatch, Master, from Liverpool, bound to Calcutta, 1861.

*May 30th*, 5 A. M.—Saw a beautiful Comet bearing South South East. True-judged altitude  $10^{\circ}$ , latitude  $25^{\circ} 32'$  S., longitude  $22^{\circ} 53'$  W.

*June 14th*.—Saw it again at 4 A. M., bearing East, Latitude  $38^{\circ} 08'$  S., Longitude  $19^{\circ} 26'$  E., measured altitude  $19^{\circ} 25'$ .

*June 16th*.—At 4 A. M. saw it again bearing N. E. by E., judged altitude  $30^{\circ}$ , the tail  $15^{\circ}$  long and a little curved.

*June 28th*.—At about 3-30 A. M. saw it again. Latitude  $33^{\circ} 01'$  S., Longitude  $62^{\circ} 13'$  E., the tail much bushed (?). It was very cloudy all the time and stormy with a heavy sea.”

The following gentlemen duly proposed at the last meeting were balloted for and elected ordinary members :—

Captain A. R. Fuller ; Dr. C. Williams ; Baboo Shumbhoo Chunder Roy ; Major P. Stewart ; J. F. Coekburn, Esq., C. E. ; A. Tween, Esq., Nawab Saiyid As'ghur Ali Khan ; Captain E. Davidson ; L. Griffin, Esq., C. S. and Lieut. R. C. Beavan.

The following gentlemen were named for ballot at the next meeting :—

Sahebzadah Mohammad Walagohur of the Mysore family, proposed by Moulvi Abdul Lutf Khan Bahadur, seconded by Mr. Cowell.

Moonshi Suderooddeen of Pandooah, proposed by Huzrut Shah Kabiruddeen, seconded by the President.

Communications were received—

1. From the Under-Secy. to the Govt. of India in the Foreign Dept., a copy of a letter from the Bombay Government containing a report in continuation on the eruption of a Voleano on the African shore of the Red Sea.

2. From Babu Radha Nath Sikdar, Abstracts of Meteorological Observations taken at the Surveyor General's office, in February and March last.

Sir B. Frere read the following extracts from letters from Major Sarel, announcing his return from the expedition which started up the Yang-tse-Kiang in February last with the object of reaching India through Thibet :—

Extract from an official letter from Lieut.-Col. Sarel, 17th Lancers, dated Shanghai, China, 18th July 1861, to Colonel Haythorne, Adjutant-General H. M.'s Forces, Calcutta.

“ I have the honor to report my return to Shanghai with the N. C. officer and men of the 11th Punjab Infantry.

“ Sir Hope Grant granted me leave to take these men and to endeavour to proceed to India viâ Thibet, in February last, at the same time telling me that he would write to India to inform H. E. the Commander-in-Chief that I had obtained leave of absence.

“ I regret to have to state, that the expedition has proved unsuccessful so far as the route through Thibet is concerned, our party penetrated 1800 miles into the interior and then found the country so overrun with rebels, that no men could be induced to accompany us, and no carriage of any sort was procurable ; the towns-people in

one place fired upon us, and though they could not have prevented our proceeding, it became evident, that no one would be allowed to accompany us, and we were compelled to return.

“We have mapped the Yang-tse-Kiang for a thousand miles higher than any Europeans had ascended, and collected all the information possible relative to the commerce and rebels of Western China.

“The native soldiers before alluded to have been of the greatest service and their conduct has been most excellent; I beg to be allowed to bring them to His Excellency’s notice.

“(Sd.) H. A. SAREL,

“*Capt. and Bt. Lieut.-Colonel, 17th Lancers.*”

Extract from a private letter from Lieut.-Col. Sarel, dated 18th July, Shanghai, China, to Col. Haythorne, A. G. :—

“I am sorry to have to report my return from the west of China; I fully expected that our party would have been the first to penetrate across from China to India, and if it had not been for the rebels in the west, I think we should have had no difficulty.

“The mandarins evidently suspected us of being in league with the rebels, though we had passports and a mandarin with us. I do not think the mandarins who accompanied us, were of much service to us, as they were unwilling to peril their heads among the rebels, but even if the authorities had been anxious to help us, I think no orders of their’s would have induced the coolies to go with us; the western rebels are not connected with your Canton friends, the Taipings, but are large bands of robbers collected under four or five different leaders; the idea of the Yang-tse-Kiang being navigable to the west, must, I think be given up, though coal is to be had in any quantities.

“(Signed) H. A. SAREL.”

Mr. Cowell read a short account of a paper by M. Klaproth on the paper currency of China, as an Appendix to a paper on the subject of Asiatic paper currency, read by him before the Society last year.

The officiating Librarian submitted the usual monthly report.

#### LIBRARY.

The following additions were made to the Library since the meeting in August.

#### *Presented.*

Report of the Grant Medical College for 1860-61.—BY THE COLLEGE.  
Rāma Gīta.—BY BABU HITALAL MISRA.

The Indian Annals of Medical Science, No. XIV.—BY THE EDITORS.

Journal of the Statistical Society of London for June, Vol. XXIV. Part 2.  
—BY THE SOCIETY.

Journal of the Royal Asiatic Society of London, Vol. XVIII. Part 2.  
and Vol. XV. Part 1.—BY THE SOCIETY.

Statements exhibiting the External Trade of Sindh for 1859-60.—BY THE  
DIRECTOR OF P. INSTRUCTION, BOMBAY.

Madras Journal of Literature and Science, New Series, Vol. VI. No. 11.  
—BY THE MADRAS ROYAL ASIATIC SOCIETY.

Oriental Baptist for August.—BY THE EDITOR.

Oriental Christian Spectator for June.—BY THE EDITOR.

Selections from the Records of the Bombay Government, No. 62.—BY  
THE BOMBAY GOVERNMENT.

Selections from the Records of the Government of India (Foreign Dept.)  
No. 32.—BY THE GOVT. OF INDIA.

Zeitschrift der Deutschen Morgenlandischen Gesellschaft, Vol. 15, Part 2.  
—BY THE SOCIETY.

*Exchanged.*

The Athenæum for June, 1861.

The Philosophical Magazine for July, No. 144.

*Purchased.*

The Annals and Magazine of Natural History for July, Vol. 8, No. 43.

Annales des Sciences Naturelles—Botany, Nos. 5 and 6; Zoology, Nos.  
2 to 6.

Kritische Grammatik der Sanskrita Sprache.—By F. Bopp.

The French Translation of the Bhagabadgita.—By E'mile Burnouf.

Comptes Rendus, Tome LII. Nos. 21 to 24.

Dozy's Histoire des Musulmans D'Espagne, Vols. 1 and 2.

The Edinburgh Review for July, No. 231.

Journal des Savants for May, 1861.

Vikramorvaçi of Kálidása, translated into French by P. E. Foucaux.

The Literary Gazette, Nos. 155 to 159.

Letellier's Les Lois de la Parole.

Martin's Civilisations Primitives en Orient.

Natural History Review for July, No. 3 of 1861.

Neumann's Ostasiatische Geschichte.

Revue des Deux Mondes for 15th June and 1st July, 1861.

Revue et Magasin de Zoologie, No. 5 of 1861.

Reeve's Conchologia Iconica, Parts 208 and 209.

The Westminster Review for July, 1861.

Wahrmund's Handbuch der neu-Arabischen Sprache.

Zamakhsario's Al-Mufussal, edited by J. P. Broch.

المفصل في العجوة العلامة الزمخشوري

LALGOPAL DUTT.

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FOR OCTOBER 1861.

The monthly general meeting of the Asiatic Society of Bengal was held on the 2nd instant.

Babu Rájendralál Mitra, Vice-President, in the chair.

Presentations were received—

1. From the Secretary to the Government of India, Public Works Department, a copy of Colonel Sir P. T. Cautley's report on the Ganges Canal.

2. From Mr. J. Obbard, some genealogical tables (in Persian) of the principal Mahomedan saints, and of the Arsacidan and Sassanian dynasties.

3. From His Excellency the Governor-General, two sandstone sculptures (one of them a little mutilated) representing Buddha, found among the remains of Kurun Bil near Jubbulpore.

4. From F. M. Bird, Esq., Magistrate of Goruckpore, two fragments of the meteorite which fell on the 12th May last, at a distance of 42 miles N. and E. of his station; the larger weighing above 45½ lbs. avoirdupois.

Read the following letter from Mr. J. Obbard, containing some further particulars of the comet described in his former communication:—

E. B. COWELL, Esq.,

*Secy. Asiatic Society.*

“SIR,—On the last meeting of the Asiatic Society, I had the pleasure of forwarding you an extract from the log of the American ship *Rival*, recording the appearance of a strange comet in the Southern hemisphere.

“From another paper which I have received this day, there can be no doubt that this comet is one and the same with that which has been observed in the Northern hemisphere, but that it was observed



previously to its crossing the plane of the earth's orbit. It is to be hoped that accurate observations may yet reach us from the Cape or Mauritius.

I remain, &c.,

“(Sd.) J. OBBARD.”

The enclosed extract is from the log of the British ship *Saladin*, Captain James Baillie, and I am indebted for it also to Captain Hill, First Assistant Master Attendant.

8th June, 1861.—Ship lat.  $40^{\circ}$  S., long.  $10^{\circ}$  E. at 5 A. M. a fine Comet visible to the eastward, alt. about  $40^{\circ}$ . Nucleus equal to star of second magnitude; consider its R. A. 4h. and Dec.  $33^{\circ}$  S., it bearing about  $34^{\circ}$  N. N. E. from Canopus and  $37^{\circ}$  N. W. by W. from Eridani Depernon.

22nd June.—Comet moved to N. W. Eastward and increased in size to double that of Jupiter, Its tail  $50^{\circ}$  to  $60^{\circ}$  long but partly absorbed in moon's light. R. A. about 4h. 30m.; Dec. about  $15^{\circ}$  S.; from Canopus about  $44^{\circ}$ , and Eridani  $53^{\circ}$ . Ship's lat.  $38^{\circ}$  S., long.  $62^{\circ}$  E.

27th June.—Comet now passing through constellation Orion and two-thirds as large, apparently, as the full moon. R. A. about 5h. Dec.  $7^{\circ}$  N., bearing  $4^{\circ}$  or  $5^{\circ}$  from Bellatrix and about  $13^{\circ}$  from Aldeberan, evidently travelling fast to the N. N. East. Ship's lat.  $30^{\circ}$  S., long.  $77^{\circ}$  E.

Memo.—Did not see it again as it merged into the rising Sun's rays.

But on the evening of 5th July in lat.  $5^{\circ}$  S., long.  $83^{\circ}$  E., saw what I imagine to be the same brilliant comet, about  $6^{\circ}$  N. N. E. of the Northernmost pointer, “Dubhe;” truly, a grand object, and seen at the same time as Venus, (near the setting sun) Jupiter, and Saturn, but much larger than either.

6th July.—Comet moved into such a position as would be taken by the hat of the celestial “Waggoner of Charles' Wain.”

The following is an extract from the *Cape Argus* newspaper of the 4th June :—

Comet observed at 5 A. M. of the 3rd June on the Eastern horizon, Right Ascension, 3h. 58m. 30s. South Declination,  $30^{\circ}$  10.'

It now equals a star of  $2\frac{1}{2}$  magnitude, and has a tail of  $3^{\circ}$  in length inclined to the South pole.

The following gentlemen duly proposed at the last meeting were balloted for and elected ordinary members :

Sahebzadah Mohammad Walagohur of the Mysore family, and Moonshi Sudder-oo-ddeen.

The following gentlemen were named for ballot at the next meeting :—

Captain M. Lloyd, Deputy Commissioner of Tounghoo, proposed by Lieutenant-Colonel A. P. Phayre, seconded by Mr. Atkinson.

R. H. Davies, Esq., Secretary to Punjab Government, proposed by Lieutenant-Colonel Maelagan, seconded by Mr. D. F. Macleod.

The Council recommended that Mr. F. E. Hall's proposal be accepted to edit in the *Bib. Indica* the *Sánkhya Sára* by Vijnána Bhikshu, and the *Nátya S'ástra* of Bharata ; each work will occupy one fasciculus. The former is an important treatise on the Sánkhya philosophy. The latter is part of Bharata's very rare work, which, though often quoted by the old Hindú writers, Professor Wilson believed to be no longer extant—(Hindú Drama.—Introduction). Mr. Hall has never seen or heard of any besides his own single copy. The recommendation was adopted.

Communications were received :—

1. From Rev. Mr. Loewenthal, the following account of some of the sculptures in the Peshawur Museum.

The Peshawur Museum is gradually filling up with sculpture and haut-reliefs of Buddhist times, which are now and then found by the country people almost on the surface of the ground. The Buddhas, apparently, in every variety of size are almost innumerable. Then there are kings of various sizes, the ornaments of pearls and precious stones, on the head, neck, breast, and arms being usually the most elaborate parts of the figures. There is a lady sitting on a lion, playing the lute ; and other things. The haut-reliefs present every kind of scene—domestic, religious, warlike. There are interiors, apparently, of the harem ; there are scenes of worship and sacrifice ; there are elaborate figures of warriors in all kinds of dresses, sometimes purely Greek, sometimes purely oriental, sometimes a mixture of the two. There is one remarkable slab, lately brought from Nagram in Yusafzai, by Lieut. Short which might almost be a petrified Cartoon of the Punch of the period. That the artist meant it for a grotesque, the first glance is sufficient to convince one. The foreground of the

fragment—for it is only a fragment—is occupied by three figures ; the one on the right, of a European cast of countenance, and clad like a Macedonian soldier ; the helmet, however, being of a very peculiar shape. He is armed with a javelin and a short broad sword, and has a shield on his shoulder. The figure on the left is armed in a similar manner, a bow slung over his body being added, but has a turban instead of a helmet, and a heavy-folded *dhoti* under the regulated armour which covers the abdomen. These two have pendant whiskers and moustaches, but the chin closely shaved. The middle figure has only a sword and a shield, and no armour ; the dress consists of a *dhoti*, and a twisted cloth tied in the manner of a scarf across the nude thorax ; the head is bare. The figure is smaller than the other two, and the features of the face are heavy and coarse. The rest of the slab is occupied by a number of men—as they seem to be, to judge by their limbs and by what is visible of their bodies, but with monkey faces of the greatest diversity of expression, and executed with much skill ; no two are alike. Some loll out their tongue, some have tusks, one puts his fingers into the corners of his mouth to make a grimace, one has two faces on one neck, one has some animal's head as his own head-covering, one has a face on his chest, etc. They are armed with clubs and formidable looking knives. No mere description can give a correct idea of this or of any of the other sculptures. I shall try to obtain drawings or photographs of some of the best, and send them to you, if it is thought worth while. The execution of most of them is quite different from anything purely Hindu or Asiatic. Most of these things have been found accidentally in various parts of the Peshawur and Yusafzai valleys ; some even within the cantonments of this place. Some pieces of pottery have also been found in the cantonment, stamped with figures of pure Greek designs. No systematic attempt at opening any of the mounds abounding in this region has yet been made, except by Lieutenant Johnston, Assistant Commissioner, who has been exploring one situated some two miles from the station ; but little has as yet come to light, besides a copper urn, in the shape of a common water-jar, containing nothing but fragments of bones and some lamina of mica. He has, however, laid bare pavements and steps of burnt brick, and obtained a sufficient number of sculptured cornices, friezes, pediments, statues, ornaments, &c., etc., all in

fragments, to show that the mound covers the ruins of a splendid building, which was destroyed with the utmost violence and by fire; also sufficient evidence to show that the place was built by Buddhists and destroyed by Mahomedans, for faces of persons are often much mutilated; a few coins have also been found, one of them of the reign of Lysias. The Yusafzai district, however, would most likely repay the trouble of exploration; the expense need not be very great; and yet it is not likely that anything can be done unless Government or the Society make an appropriation of funds, as few officers with sufficient leisure stay long enough here to undertake explorations on their own account.

• Inscriptions seem to be very scarce. There are two small stone urns in the Museum, one of which has an inscription.\*

Mr. G. D. Westropp of Rawal Pindce, also sent me, sometime ago, an account of a discovery made eighteen miles to the North West of that station, near Shah Ke Dehri of the following articles:—

1. A circular stone trough about one foot in diameter and three inches in depth, beautifully turned and polished; the outer shape is that of a truncated cone. "The trough has three grooved circles diverging from the base of a small cone which rises about  $1\frac{1}{2}$  inches from its centre." The vessel is about half an inch thick. The stone is of a dark green colour, interspersed with white spots, free from flaws or defects.

2. The trough contained a crystal figure inverted on the small centre cone, representing a duck with a turtle's head. It is delicately carved and in a state of good preservation. Within the figure there was a piece of gold leaf three inches by one, with an inscription, in relief and perfectly clear and distinct.

2. From Reverend Dr. W. S. Mackay "Notes on the Comet of 1861."

3. From Babu Rajendralal Mitra, a few notes with a translation of the Wardak inscription, and an account of Toramana.

4. From F. E. Hall, Esq., a paper on an inscription from Chedi.

5. From Lieutenant-Colonel Sarel, Notes on the river Yangtse-Kiang from Hankow to Pingshan.

6. From Babu Radhanath Sikdar, abstracts of Meteorological Observations taken at the Surveyor General's Office in April last.

\* This inscription is with Babu Rajendralal Mitra.

Lieutenant-Colonel Yule read a paper about some Indian remains in Java. His remarks were illustrated by drawings of several of the most interesting ruins, and he compared the style of their architecture with that of the Burmese temples and some of the temples in India.

Sir Bartle Frere made some remarks on some of the ruins in Sindh, which bore an analogy to these Javanese remains.

The thanks of the meeting were voted to Lieutenant-Colonel Yule for his very interesting communication, which will be inserted at length in the Society's Journal.

The Officiating Librarian submitted the usual monthly report.

#### LIBRARY.

The following books and periodicals were added to the Society's Library since the last meeting.

#### *Presented.*

- The Annals of Indian Administration.—BY THE BENGAL GOVT.  
 Annual Report of the Geological Survey of India for 1860-61.—BY THE CALCUTTA GEOLOGICAL MUSEUM.  
 Archiv für Kunde Oesterreichischer Geschichts-Quellen, Vols. 24 and 25.—BY THE SOCIETY.  
 Almanach der Kais : Academie der Wissenschaften.—BY THE ACADEMY.  
 Abhandlungen der philosophisch-philologischen Classe, Academie der Wissenschaften, IX. Bd. I. Abth.—BY THE SAME.  
 Ditto ditto der Philosophie Classe, Vol. 36.—BY THE SAME.  
 Annual Report on the Administration of the Straits Settlement for 1860-61.—BY THE BENGAL GOVT.  
 Annual Report on the Administration of the Provinces of Oude for 1860-61.—BY THE SAME.  
 The Vividhartha Sangraha, No. 75.—BY THE EDITOR.  
 Bulletin de l'Académie Impériale des Sciences de St. Petersburg, Tome I. Nos. 3 to 9, Tome II. Nos. 1, 2 and 3.—BY THE ST. PETERSBURGH ACADEMY.  
 Calcutta Christian Observer for September, 1861.—BY THE EDITORS.  
 Report on the Ganges Canal.—By Col. T. P. Cautley, Vols. 1, 2 and 3 with a book of plates, &c.—BY THE GOVT. OF INDIA.  
 Denkschriften der Kais : Academie der Wissenschaften, Vol. X.—Philosophie-Histoire Classe.—BY THE ACADEMY.  
 Fraser's Account of the Quinquina plantations in the Island of Java.—BY THE MADRAS GOVT.  
 Fontes Rerum Austriacarum, Vol. XX. Part 2.—BY THE VIENNA ACADEMY.



General Report on Public Instruction of the Lower Provinces of the Bengal Presidency for 1859-60.—BY THE DIRECTOR OF PUBLIC INSTRUCTION.

Gelehrte Anzeigen, Vols. 49, 50.—BY THE MUNICH ACADEMY.

Journal Asiatique, Tome XVII. Nos. 67, 68.—BY THE PARIS ASIATIC SOCIETY.

Journal of the Academy of Natural Sciences of Philadelphia, Vol. IV Part 4.—BY THE ACADEMY.

Jahrbuch der Geologischen Reichsanstalt Vol. XI. No. 1.—BY THE VIENNA GEOLOGICAL MUSEUM.

Descriptio Al-Magribi By M. Do Goeje.—BY THE LUGDUNE-BATAVIAN ACADEMY.

Kitab ul Boldan Al-Jaqubii.—BY THE SAME.

Memoires de l'Academie Imperiale des Sciences de St. Petersburg, Tome II. Nos. 1 to 7, Tome III. No. 1.—BY THE ACADEMY.

Memorie della Reale Accademia delle Scienze di Torino, Vol. XVIII.—BY THE ACADEMY.

Memoires of the Geological Survey of India, Vol. III. Part 1, with a map.—BY THE GEOLOGICAL MUSEUM.

Notice of the Origin, Progress and Present Condition of the Academy of Natural Sciences of Philadelphia, 1860.—BY THE ACADEMY.

Oriental Baptist for September.—BY THE EDITOR.

Oriental Christian Spectator for July and August.—BY THE EDITOR.

Proceedings of the Royal Geographical Society of London, Vol. V. No. 3.—BY THE SOCIETY.

Proceedings of the Royal Society of London, Vol. XI. No. 44.—BY THE SOCIETY.

Proceedings of the Royal Society of Edinburgh, Vol. IV. No. 50.—BY THE SOCIETY.

Proceedings of the Zoological Society of London from January to March, 1861.—Part I.—BY THE ZOOLOGICAL SOCIETY.

Report on the Survey Operations of the Lower Provinces for 1860.—BY THE BENGAL GOVT.

Report on the Administration of the Madras Presidency for 1860-61.—BY THE SAME.

Report on the Administration of the Tenasserim and Martaban Provinces for 1860-61.—BY THE SAME.

Ditto ditto of the Provinces of Pegu for 1860-61.—BY THE SAME.

Ditto ditto of Hyderabad, Assigned Districts for 1860-61.—BY THE SAME.

Remarks on Native Education in India in a Psychological point of view.—BY DR. S. G. CHUCKERBUTTY.

Sitzungsberichte der Konigl.-Bayerl.-Akademie der Wissenschaften zu Munchen, Hefts 1 to 3 for 1860.—BY THE ACADEMY.

A Month in the Cotton Districts—being a visit in the Districts about Bursee. By W. C. Sillar.—BY THE AUTHOR.

Schriften der Koniglichen Physikalisch—Okonomischen Gesellschaft zu Konigsberg Academie &c. Vol. 1, Parts I and 2.—BY THE ACADEMY.

Sitzungsberichte der Kais.-Academie der Wissenschaften Philoso-Historio Classe, Vol. 32, Nos. 9 and 10, Vol. 33, Nos. 1 and 2, Vol. 34, Nos. 3 to 5, Vol. 35, Nos. 6 to 9.—BY THE ACADEMY.

Ditto ditto Mathematische Classe, Vol. 39, Nos. 1 to 6, Vol. 40, Nos. 7 to 12, Vol. 41, Nos. 13 to 20, Vol. 42, Nos. 21 to 26.—BY THE ACADEMY.

Transactions of the Royal Society of Edinburgh, Vol. XXII. Part 2, with an Appendix containing Markstoun observations, being a Supplement to Vol. XXII.—BY THE SOCIETY.

Transactions of the Zoological Society of London, Vol. IV. Part 2.—BY THE ZOOLOGICAL SOCIETY.

Transactions of the Government of India in the Military Department for 1860-61.—BY THE BENGAL GOVT.

Kongliga Svenska Fregatten Eugenie's Resa, No. 7., Zoologi, No. 4.—BY THE AUTHOR.

Martins' Denkrede auf Alexander von Humboldt.—BY THE MUNICH ACADEMY.

Rede auf Sir Thomas Babington Macaulay. By Dr. G. Thomas von Rudhart.—BY THE SAME.

Verzeichniss der Mitglieder der K. B. Academie der Wissenschaften, 1860.—BY THE SAME.

Grenzen und Grenzgebiete der Physiologischen Forschung.—BY THE SAME.

Prof. Muller's Einleitende Worte zur des Feier Majestats des Konigs Maximilian, II.—BY THE SAME.

*Exchanged.*

The Athenæum for July, 1861.

The Philosophical Magazine for August, 1861.

*Purchased.*

The Annals and Magazine of Natural History, Vol. 8, No. 44.

The American Journal of Sciences and Arts, Vol. XIX. No. 94.

Annuaire des Deux Mondes for 1860.

Annales des Sciences Naturelles, Vol. XIV. No. 1.

Burnouf's Methode la langue Sanserite.

Comptes Rendus, Tome LII. No. 25 and Tome LIII. Nos. 1 to 4.

Freytag's Einleitung in das Studium der Arabischen Sprache.

Journal des Savants for June and July, 1861.

The Literary Gazette, Nos. 160, 162 and 163.

The Quarterly Review for July, 1861.

Revue des Deux Mondes for 15th July and 1st August, 1861.

Revue et Magasin de Zoologie, Nos. 6 and 7 of 1861.

Sacy's *Mélanges de Littérature Orientale*, Par Le Due de Broglie.

Zenker's *Bib. Orientalis*, Vol. II.

LALGOPAL DUTT.

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FOR NOVEMBER, 1861.

The monthly General Meeting of the Asiatic Society of Bengal was held on the 6th instant.

Lieut.-Col. H. L. Thuillier, Vice-President, in the chair.

Presentations were received—

1. From Babu Rajendra Mulliek, dead specimens of a Fallow Deer and a Cape Baboon.
2. From Mr. Cowell, a copy of Part I. of *Bhámíni Bilása*, edited by Pundit Jadu Náth Mookerjee.
3. From the Surveyor General's Office, a new map of India, (small scale).
4. From Mr. J. J. T. H. Asphar, a small collection of shells, collected chiefly in Ceylon and Malta.

Read a letter from Major T. James, intimating his desire to withdraw from the Society.

The following gentlemen duly proposed at the last meeting were balloted for, and elected ordinary members:—

Capt. M. Lloyd, and R. H. Davies, Esq.

The following gentlemen were named for ballot at the next meeting:—

Major H. R. James, C. B., Commissioner of Peshawur, and M. Kempson, Esq., Principal of Bareilly College, proposed by Lieutenant-Colonel Maelagan, seconded by Mr. H. S. Reid.

C. B. Saunders, Esq., C. S., Judicial Commissioner at Bangalore, proposed by the President, seconded by Lieutenant-Colonel Thuillier.

Captain W. A. Ross, Bengal Artillery, proposed by Mr. H. F. Blanford, seconded by Lieutenant-Colonel Thuillier.

Communications were received—

1. From N. R. Pogson, Esq., F. R. A. S., Government Astronomer, Madras, a paper on the discovery of the New Planet "*Asia*."

2. From the Under-Secretary to the Government of India, Foreign Department, papers containing the translation of a report (sent through the Government of Bombay) of a visit to the volcano of Jebbel Dubbeh by a Somali named Hussein Arraleh.

3. From Babu Radha Nath Sikdar, abstracts of Meteorological Observations taken at the Surveyor General's Office in May last.

The Secretary read the two first papers.

Mr. Blanford read an abstract of his paper on the Spiti fossils. Commencing by stating that the collection of fossils described in the paper had been collected in the year 1828, by Dr. Gerard, since which time they had lain undescribed in the Society's Museum, Mr. Blanford proceeded to describe the portion of the fossiliferous rocks of the north flank of the Himálaya so far as it was known at present from the writings of M. Jaquemont and Col. Strachey. He noticed the discovery at the Niti Pass of fossils of the age of the Oxford clay by the latter, which fossils had been examined and pronounced upon by Professor Edward Forbes. M. Jaquemont had collected fossils also in the Spiti valley, but his collection still remained undescribed in the Museum of the Jardin des Plantes at Paris.

Dr. Gerard's collection from Spiti consisted chiefly of Cephalopoda. There were also a few Gasteropoda and Conchifera and one Echinoderm. The indications of age presented by the collection were, that while the majority were closely allied to or identical with fossils of the upper Lias and inferior Oolite of Europe, a minority were equally characteristic of Triassic, middle and upper Oolitic faunas, and one specimen, an Echinoderm, appeared to belong to a genus characteristic of the chalk. The inference to be drawn from those was, that while beds of Liassic or inferior Oolitic age certainly existed at Spiti, it remained open to future observers who visited Spiti to decide whether the other fossils were really from distinct formations, or indicated the co-existence in Asiatic Seas of animals which in Europe lived at distant periods of time. A member of the Geological Survey, Mr. W. Theobald, junior, had lately visited Spiti, and it was to be hoped that his investigations might decide the above point.

The thanks of the meeting were unanimously accorded to Mr. Blanford for his valuable paper.

The Officiating Librarian submitted the usual monthly report.

## LIBRARY.

The following are the accessions to the Library since the meeting held in October last.

*Presented.*

The Annual Report of the Geological Survey of India for 1859-60.—BY THE BENGAL GOVT.

The Calcutta Christian Observer for October.—BY THE EDITOR.

The Calcutta Review for June.—BY THE EDITOR.

Prison Returns of the N. W. Provinces for 1860.—BY THE GOVT. N. W. PROVINCES.

Botanical Descriptions of the Species of *Cinchona* now growing in India and China.—BY THE MADRAS GOVT.

Journal of the Statistical Society of London for September.—BY THE SOCIETY.

Journal of the Agricultural and Horticultural Society of India, Vol. XII. Part I.—BY THE SOCIETY.

Memoirs of the Geological Survey of India, Vol. II. Part II. and Vol. III. Part I.—BY THE BENGAL GOVT.

Map of India (small scale) showing Railway and Telegraph Stations.—BY THE SURVEYOR GENERAL OF INDIA.

Meteorological Observations for Hobart Town from 1841 to 1860.—BY THE ROYAL SOCIETY OF TASMANIA.

Oriental Christian Spectator for September.—BY THE EDITOR.

Proceedings of the Royal Geological Society of London, Vol. V. No. 4.—BY THE SOCIETY.

Proceedings of the Royal Society of London, Vol. XI. No. 45.—BY THE SOCIETY.

Papers regarding culturable waste lands at the disposal of Government.—BY THE BENGAL GOVT.

Quarterly Journal of the Geological Society of London, Vol. 18, No. 67. BY THE SOCIETY.

Cultivation of Quina Tree in Java in 1859.—BY THE MADRAS GOVT.

Selections from the Records of the Bombay Government, No. 63, new series.—BY THE BOMBAY GOVT.

Selections from the Records of the Government of India, Foreign Department, No. 34.—BY THE GOVT. OF INDIA.

Selections from the Records of the Madras Government, Nos. 68 and 69.—BY THE SAME.

Bhámíni Bilása, Part I.—BY MR. E. B. COWELL.



*Exchanged.*

The Athenæum for August.

The Philosophical Magazine for September.

*Purchased.*

The Annals and Magazine of Natural History, Vol. VIII. No. 45, for September.

Analectes sur L'Histoire et La Littérature des Arabes D'Espagne by Al-Makkari, Vols. 1 and 2.

Annales des Sciences Naturelles, Vol. XIV. No. 3.

Abdul Razzák's Rokáyeat Jámi. *رقعات جامي مولفه عبدالرزاق*

Brockhaus' Die Lieder des Hafis, Vol. 3, Part 3.

Benfey's Orient und Occident, Vol. I. Part 3.

Bohtlingk and Roth's Sanscrit Wörterbüch, 1851-60.

Franck's Études Orientales.

Juynboll's Abu'l Mahasin, Vol. 2, Part 2.

Reeve's Conchologia Iconica, Parts 210 and 211.

Revue des Deux Mondes for 15th August and 1st September.

Comptes Rendus, Vol. LIII. Nos. 5 to 8.

The Literary Gazette, Nos. 164 to 168.

LALGOPAL DUTT.

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FOR DECEMBER, 1861.

The monthly General Meeting of the Asiatic Society of Bengal was held on the 4th instant.

A. Grote, Esq., President, in the chair.

The proceedings of the last meeting were read and confirmed.

Presentations were received—

1. From Mr. W. Theobald, Junior, a box containing specimens of a Lagomys, a Lemming and some lizards.

2. From Captain W. A. Ross, a specimen of the Albatross.

3. From the same, a copy of Colonel Sleeman's Report on Budhuk *alias* Bagree Dacoits.

4. From Dr. H. Cleghorn, a copy of his paper on the subject of an expedition undertaken by him to the higher ranges of the Anamalia Hills, Coimbatore, in 1858, being an extract from the transactions of the Royal Society of Edinburgh, Vol. XXII. Part II.

5. From Major R. C. Tytler, a pamphlet entitled,—*Description D'Oiseaux Nouveaux de la Nouvelle Calédonie, par M. M. J. Verreaux et O' Des Murs*, being an extract from the *Revue et Magasin De Zoologie*, for September, 1860.

6. From the Bengal Government, a copy of the selections from the records of the Bengal Government, No. 38.

7. From the Ven'ble J. H. Pratt, a copy of each of his treatises on the Figure of the earth and "Scripture and Science not at variance."

8. From Lieut.-Col. A. Fyfehe, Commissioner of Martaban and Tenasserim Provinces, a skeleton of an adult male of one of the aborigines of the Andaman Islands.

With reference to this presentation, the following letter has been received :—

*Maulmain, 1st November, 1861.*

SIR,—I have the pleasure to present to the Asiatic Society a skeleton of an adult male of one of the aborigines of the Andaman Group of Islands, one of the three who were lately captured in the vicinity of Port Blair, and who died at Maulmain a short time ago.

In my note on these people, forwarded to the Society in the latter end of May last, I stated my belief that their reputed similarity to the true African Negro had been much exaggerated, giving my reasons for such at length, and what I considered to be their origin. The Society will no doubt be able to determine distinctly from the bones now sent, whether these people are true aborigines or belonging to the African Negro race as formerly represented.

I remain, dear Sir,

Yours sincerely,

(Sd.) A. FYTCHE, LIEUT.-COL.

Letters from Messrs. W. S. Halsey and A. Payne expressing their desire to withdraw from the Society were recorded.

The following gentlemen, duly proposed at the last meeting, were balloted for and elected ordinary members :—

Major H. R. James, C. B.

M. Kempson, Esq.

C. B. Saunders, Esq., C. S.

Captain W. A. Ross, Bengal Artillery.

The following gentlemen were named for ballot at the next meeting :—

Major D. Briggs (for re-election) proposed by the President, seconded by Colonel Yule.

G. E. Ward, Esq., C. S, proposed by Mr. Cowell, seconded by the President.

W. King, Esq., Junior, Geological Survey of India, proposed by Mr. T. Oldham, seconded by Mr. J. G. Medlicott.

Communications were received—

1. From Babu Radha Nath Sikdar, Abstracts of Meteorological Observations taken at the Surveyor General's Office, in June last.

2. From Mr. F. E. Hall, a paper on the vestiges of three Royal lines of Kanouj.

The President informed the meeting of the appointment by Government of Colonel A. Cunningham on an Archæological Mission which might be expected to occupy him for the next two years and in the course of which the Colonel intended to explore the interesting district of Behar. He invited Mr. Bayley to read extracts from a letter in which Colonel Cunningham sketched his plans for the ensuing cold weather.

Mr. Bayley stated that from a private letter he understood it to be Colonel Cunningham's intentions to devote the present cold season to the examination of Behar and especially to the exploration of the sites of the ancient cities of Vaisali and Kusinagara and of some unopened *topes* in their vicinity. Mr. Bayley added that Colonel Cunningham's letter also announced his acquisition of an extremely curious silver coin of the Indo-Parthian group. Mr. Bayley concluded by expressing his views regarding this class of coins and the relation of the kings by whom they were struck to the Bactrian and Indo-Scythian Kings of Upper India.

The Officiating Librarian submitted the usual monthly report.

#### LIBRARY.

The following books and periodicals were added since the November meeting.

#### *Presented.*

The Vividhartha Sangraha, No. 76.—BY THE EDITOR.

The Calcutta Christian Observer for November.—BY THE EDITOR.

Prison Return of the N. W. Proviuees for 1860.—BY THE GOVT. N. W. PROVINCES.

Expedition to the Higher Ranges of the Anamalia Hills, Coimbatore, in 1858. By Dr. H. Cleghorn.—BY THE AUTHOR.

Description D'Oiseaux Nouveaux de la Nouvelle Caledonie, par M. M. J. Verreaux et O'Des Murs.—BY MAJOR R. C. TYTLER.

Journal Asiatique, Tome XVIII. No. 69.—BY THE ASIATIC SOCIETY OF PARIS.

Journal of the Royal Asiatic Society of London, Vol. XIX. Part I.—BY THE SOCIETY.

Journal of Sacred Literature and Biblical Record, Vol. XIV. No. 27.—BY THE EDITORS.

Purána Sangraha, Parts 3 to 6.—BY BABU K. P. SINGH.

Memoirs of the Geological Survey of India, Paleontologia Indica, Vol. I., Part I. containing descriptions of the Cretaceous Cephalopoda of S. India, By Mr. H. F. Blanford.—BY THE GOVT. OF INDIA.

The Oriental Baptist for November.—BY THE EDITOR.

The Figure of the Earth. By Archdeacon Pratt.—BY THE AUTHOR.

Scripture and Science not at variance.—BY THE SAME.

Report on the Cholera in the Delhi Division, No. 8.—BY THE PUNJAB GOVERNMENT.

Report (fifth) of the Council of the International Association.—BY THE ASSOCIATION.

Report of the Oriental Translation Committee for 1861.—BY THE TRANSLATION COMMITTEE.

Selections from the Records of the Government N. W. Proviuees, No: 34.—BY THE GOVT. N. W. P.

Selections from the Records of the Bengal Government, No. 38.—BY THE BENGAL GOVT.

Sleeman's Report on Budhuk *alias* Bagree Decoits.—BY CAPT. W. A. ROSS.  
*Exchanged.*

The Athenæum for September.

The Philosophical Magazine for October.

*Purchased.*

The Annals and Magazine of Natural History for October, Vol. VIII. No. 46.

The American Journal of Sciences and Arts, Vol. XIX. No. 95, for September.

The Natural History Review for October.

Revue et Magasin de Zoologie, No. 8 of 1861.

Revue des Deux Mondes for 15th September and 1st October.

The Westminster Review for October.

Dr. Weber's Indische Studien, Vol. VI.

Comptes Rendus, Vol. LIII. Nos. 9 to 12.

The Literary Gazette, Nos. 169, 171 and 172.

Journal des Savants for August.

Über Chinesische und Tibetische Lautverhältnisse, von Richard Lepsius, *Berlin*, 1861.

Über die Arabischen Sprachlaute und Deren Umschrift, von Richard Lepsius, *Berlin*, 1861.

LALGOPAL DUTT.

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*Meteorological Observations.*

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1860.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of the Barometer at 32° Fahrt. | Range of the Barometer during the day. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature during the day. |      |       |
|-------|--------------------------------------------|----------------------------------------|---------|---------|----------------------------|------------------------------------------|------|-------|
|       |                                            | Max.                                   | Min.    | Diff.   |                            | Max.                                     | Min. | Diff. |
|       | Inches.                                    | Inches.                                | Inches. | Inches. | o                          | o                                        | o    | o     |
| 1     | 29.670                                     | 29.736                                 | 29.586  | 0.150   | 89.1                       | 98.6                                     | 82.3 | 16.3  |
| 2     | .619                                       | .702                                   | .506    | .196    | 88.7                       | 97.6                                     | 82.8 | 14.8  |
| 3     | .655                                       | .694                                   | .596    | .098    | 84.0                       | 95.6                                     | 72.9 | 22.7  |
| 4     | .694                                       | .807                                   | .633    | .174    | 82.4                       | 93.0                                     | 72.8 | 20.2  |
| 5     | .752                                       | .845                                   | .676    | .169    | 83.5                       | 90.1                                     | 78.4 | 11.7  |
| 6     | <i>Sunday.</i>                             |                                        |         |         |                            |                                          |      |       |
| 7     | .753                                       | .812                                   | .661    | .151    | 84.7                       | 95.0                                     | 74.8 | 20.3  |
| 8     | .719                                       | .786                                   | .612    | .174    | 84.2                       | 93.1                                     | 75.0 | 18.1  |
| 9     | .626                                       | .697                                   | .544    | .153    | 85.6                       | 95.3                                     | 76.4 | 18.9  |
| 10    | .624                                       | .683                                   | .540    | .143    | 87.9                       | 94.8                                     | 83.6 | 11.2. |
| 11    | .652                                       | .705                                   | .576    | .129    | 86.8                       | 97.0                                     | 77.4 | 19.6  |
| 12    | .665                                       | .738                                   | .580    | .158    | 86.6                       | 96.8                                     | 77.2 | 19.6  |
| 13    | <i>Sunday.</i>                             |                                        |         |         |                            |                                          |      |       |
| 14    | .600                                       | .654                                   | .532    | .122    | 91.1                       | 102.8                                    | 82.4 | 20.4  |
| 15    | .625                                       | .715                                   | .560    | .155    | 93.0                       | 103.5                                    | 84.2 | 19.3  |
| 16    | .628                                       | .697                                   | .566    | .131    | 92.0                       | 104.0                                    | 84.0 | 20.0  |
| 17    | .636                                       | .691                                   | .574    | .117    | 90.3                       | 100.6                                    | 83.8 | 16.8  |
| 18    | .650                                       | .722                                   | .585    | .137    | 90.3                       | 100.1                                    | 84.2 | 15.9  |
| 19    | .672                                       | .755                                   | .621    | .134    | 90.3                       | 100.4                                    | 83.2 | 17.2  |
| 20    | <i>Sunday.</i>                             |                                        |         |         |                            |                                          |      |       |
| 21    | .613                                       | .691                                   | .523    | .168    | 93.2                       | 105.8                                    | 84.2 | 21.6  |
| 22    | .561                                       | .627                                   | .477    | .150    | 93.2                       | 105.2                                    | 84.8 | 20.4  |
| 23    | .524                                       | .594                                   | .447    | .147    | 91.6                       | 102.8                                    | 85.0 | 17.8  |
| 24    | .529                                       | .579                                   | .452    | .127    | 90.3                       | 100.2                                    | 83.8 | 16.4  |
| 25    | .528                                       | .580                                   | .447    | .133    | 89.6                       | 98.6                                     | 84.0 | 14.6  |
| 26    | .507                                       | .557                                   | .434    | .123    | 89.8                       | 100.2                                    | 83.6 | 16.6  |
| 27    | <i>Sunday.</i>                             |                                        |         |         |                            |                                          |      |       |
| 28    | .535                                       | .602                                   | .477    | .125    | 88.2                       | 100.8                                    | 80.0 | 20.8  |
| 29    | .517                                       | .583                                   | .443    | .140    | 88.6                       | 97.6                                     | 80.8 | 16.8  |
| 30    | .490                                       | .563                                   | .428    | .135    | 90.1                       | 97.4                                     | 84.8 | 12.6  |
| 31    | .507                                       | .590                                   | .417    | .173    | 89.8                       | 99.0                                     | 81.2 | 17.8  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly observations made during the day.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1860.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of Air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity,<br>complete saturation be-<br>ing unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                   |
| 1     | 81.8                            | 7.3                 | 78.1                | 11.0                         | .943                             | 10.00                                            | 4.12                                                                    | 0.71                                                              |
| 2     | 81.3                            | 7.4                 | 77.6                | 11.1                         | .928                             | 9.85                                             | .11                                                                     | .71                                                               |
| 3     | 76.5                            | 7.5                 | 72.7                | 11.3                         | .792                             | 8.49                                             | 3.68                                                                    | .70                                                               |
| 4     | 76.8                            | 5.6                 | 74.0                | 8.4                          | .827                             | .90                                              | 2.71                                                                    | .77                                                               |
| 5     | 78.2                            | 5.3                 | 75.5                | 8.0                          | .868                             | 9.31                                             | .69                                                                     | .78                                                               |
| 6     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 7     | 79.2                            | 5.5                 | 76.4                | 8.3                          | .893                             | .56                                              | .86                                                                     | .77                                                               |
| 8     | 79.2                            | 5.0                 | 76.7                | 7.5                          | .902                             | .64                                              | .60                                                                     | .79                                                               |
| 9     | 79.6                            | 6.0                 | 76.6                | 9.0                          | .899                             | .59                                              | 3.17                                                                    | .75                                                               |
| 10    | 81.7                            | 6.2                 | 78.6                | 9.3                          | .958                             | 10.19                                            | .45                                                                     | .75                                                               |
| 11    | 80.5                            | 6.3                 | 77.3                | 9.5                          | .919                             | 9.78                                             | .43                                                                     | .74                                                               |
| 12    | 80.7                            | 5.9                 | 77.7                | 8.9                          | .931                             | .92                                              | .22                                                                     | .76                                                               |
| 13    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 14    | 83.4                            | 7.7                 | 79.5                | 11.6                         | .986                             | 10.40                                            | 4.57                                                                    | .70                                                               |
| 15    | 81.1                            | 11.9                | 75.1                | 17.9                         | .857                             | 9.00                                             | 6.81                                                                    | .57                                                               |
| 16    | 83.8                            | 8.2                 | 79.7                | 12.3                         | .992                             | 10.46                                            | 4.90                                                                    | .68                                                               |
| 17    | 83.2                            | 7.1                 | 79.6                | 10.7                         | .989                             | .45                                              | .18                                                                     | .71                                                               |
| 18    | 83.5                            | 6.8                 | 80.1                | 10.2                         | 1.005                            | .62                                              | .01                                                                     | .73                                                               |
| 19    | 83.5                            | 6.8                 | 80.1                | 10.2                         | .005                             | .62                                              | .01                                                                     | .73                                                               |
| 20    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 21    | 82.9                            | 10.3                | 77.7                | 15.5                         | 0.931                            | 9.78                                             | 6.12                                                                    | .62                                                               |
| 22    | 83.2                            | 10.0                | 78.2                | 15.0                         | .946                             | .94                                              | 5.96                                                                    | .63                                                               |
| 23    | 83.5                            | 8.1                 | 79.4                | 12.2                         | .983                             | 10.37                                            | 4.82                                                                    | .68                                                               |
| 24    | 83.0                            | 7.3                 | 79.3                | 11.0                         | .979                             | .36                                              | .27                                                                     | .71                                                               |
| 25    | 82.1                            | 7.5                 | 78.3                | 11.3                         | .949                             | .05                                              | .28                                                                     | .70                                                               |
| 26    | 81.3                            | 8.5                 | 77.0                | 12.8                         | .910                             | 9.63                                             | .79                                                                     | .67                                                               |
| 27    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 28    | 80.1                            | 8.1                 | 76.0                | 12.2                         | .882                             | 37                                               | .39                                                                     | .68                                                               |
| 29    | 81.6                            | 7.0                 | 78.1                | 10.5                         | .943                             | 10.00                                            | 3.92                                                                    | .72                                                               |
| 30    | 83.3                            | 6.8                 | 79.9                | 10.2                         | .998                             | .56                                              | .98                                                                     | .73                                                               |
| 31    | 83.0                            | 6.8                 | 79.6                | 10.2                         | .989                             | .48                                              | .94                                                                     | .73                                                               |

All the Hygrometrical elements are computed by the Greenwich Constants.

*Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of May, 1860.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

| Hour.      | Mean Height of the Barometer at 32° F. abt. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|---------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                             | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                     | Inches.                                                | Inches. | Inches. | o                          | o                                                        | o    | o     |
| Mid-night. | 29.617                                      | 29.776                                                 | 29.461  | 0.315   | 83.5                       | 87.6                                                     | 72.9 | 14.7  |
| 1          | .607                                        | .756                                                   | .461    | .295    | 83.0                       | 87.0                                                     | 72.8 | 14.2  |
| 2          | .590                                        | .736                                                   | .453    | .283    | 83.0                       | 86.8                                                     | 73.2 | 13.6  |
| 3          | .592                                        | .729                                                   | .449    | .280    | 82.6                       | 86.2                                                     | 73.2 | 13.0  |
| 4          | .602                                        | .738                                                   | .451    | .287    | 82.4                       | 86.0                                                     | 73.5 | 12.5  |
| 5          | .615                                        | .753                                                   | .473    | .280    | 82.3                       | 85.6                                                     | 74.2 | 11.4  |
| 6          | .630                                        | .763                                                   | .490    | .273    | 82.4                       | 86.0                                                     | 75.0 | 11.0  |
| 7          | .650                                        | .791                                                   | .533    | .258    | 83.6                       | 87.0                                                     | 76.8 | 10.2  |
| 8          | .668                                        | .831                                                   | .535    | .296    | 86.8                       | 90.6                                                     | 81.8 | 8.8   |
| 9          | .676                                        | .845                                                   | .546    | .299    | 89.5                       | 93.0                                                     | 85.0 | 8.0   |
| 10         | .674                                        | .835                                                   | .546    | .289    | 92.4                       | 95.8                                                     | 85.5 | 10.3  |
| 11         | .659                                        | .800                                                   | .531    | .269    | 94.6                       | 100.4                                                    | 81.6 | 18.8  |
| Noon.      | .616                                        | .792                                                   | .523    | .269    | 96.3                       | 102.6                                                    | 84.1 | 18.5  |
| 1          | .623                                        | .768                                                   | .495    | .273    | 97.8                       | 104.6                                                    | 85.7 | 18.9  |
| 2          | .596                                        | .745                                                   | .479    | .266    | 98.2                       | 105.1                                                    | 87.7 | 17.4  |
| 3          | .569                                        | .721                                                   | .460    | .261    | 98.3                       | 105.8                                                    | 90.0 | 15.8  |
| 4          | .547                                        | .703                                                   | .428    | .275    | 97.0                       | 104.8                                                    | 90.1 | 14.7  |
| 5          | .541                                        | .697                                                   | .417    | .280    | 95.0                       | 103.6                                                    | 89.8 | 13.8  |
| 6          | .555                                        | .756                                                   | .430    | .326    | 91.6                       | 100.6                                                    | 80.0 | 20.6  |
| 7          | .581                                        | .755                                                   | .464    | .291    | 87.9                       | 95.0                                                     | 75.0 | 20.0  |
| 8          | .599                                        | .758                                                   | .477    | .281    | 86.1                       | 92.2                                                     | 74.4 | 17.8  |
| 9          | .621                                        | .807                                                   | .498    | .309    | 84.5                       | 89.4                                                     | 74.3 | 15.1  |
| 10         | .625                                        | .778                                                   | .492    | .286    | 84.4                       | 88.6                                                     | 73.6 | 15.0  |
| 11         | .621                                        | .764                                                   | .452    | .312    | 83.9                       | 88.4                                                     | 72.9 | 15.5  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1860.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force<br>of Vapour. | Mean Weight of Va-<br>pour in a Cubic<br>foot of Air. | Additional Weight of<br>Vapour required<br>for complete satu-<br>ration. | Mean degree of Hu-<br>midity, complete<br>saturation being<br>unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | Troy grs                                              | Troy grs                                                                 |                                                                      |
| Mid-<br>night. | 79.5                            | 4.0                 | 77.5                | 6.0                          | 0.925                            | 9.92                                                  | 2.08                                                                     | 0.83                                                                 |
| 1              | 79.2                            | 3.8                 | 77.3                | 5.7                          | .919                             | .86                                                   | 1.96                                                                     | .83                                                                  |
| 2              | 79.4                            | 3.6                 | 77.6                | 5.4                          | .928                             | .97                                                   | .85                                                                      | .84                                                                  |
| 3              | 79.3                            | 3.3                 | 77.6                | 5.0                          | .928                             | .97                                                   | .71                                                                      | .85                                                                  |
| 4              | 79.2                            | 3.2                 | 77.6                | 4.8                          | .928                             | .97                                                   | .64                                                                      | .86                                                                  |
| 5              | 79.4                            | 2.9                 | 77.9                | 4.4                          | .937                             | 10.08                                                 | .50                                                                      | .87                                                                  |
| 6              | 79.5                            | 2.9                 | 78.0                | 4.4                          | .940                             | .11                                                   | .50                                                                      | .87                                                                  |
| 7              | 80.4                            | 3.2                 | 78.8                | 4.8                          | .964                             | .34                                                   | .69                                                                      | .86                                                                  |
| 8              | 81.9                            | 4.9                 | 79.4                | 7.4                          | .983                             | .47                                                   | 2.74                                                                     | .79                                                                  |
| 9              | 82.8                            | 6.7                 | 79.4                | 10.1                         | .983                             | .41                                                   | 3.88                                                                     | .73                                                                  |
| 10             | 83.4                            | 9.0                 | 78.9                | 13.5                         | .967                             | .18                                                   | 5.36                                                                     | .66                                                                  |
| 11             | 83.7                            | 10.9                | 78.2                | 16.4                         | .946                             | 9.92                                                  | 6.63                                                                     | .60                                                                  |
| Noon.          | 83.9                            | 12.4                | 77.7                | 18.6                         | .931                             | .72                                                   | 7.66                                                                     | .56                                                                  |
| 1              | 84.5                            | 13.3                | 77.8                | 20.0                         | .934                             | .72                                                   | 8.41                                                                     | .54                                                                  |
| 2              | 84.7                            | 13.5                | 77.9                | 20.3                         | .937                             | .75                                                   | .58                                                                      | .53                                                                  |
| 3              | 84.8                            | 13.5                | 78.0                | 20.3                         | .940                             | .78                                                   | .61                                                                      | .53                                                                  |
| 4              | 84.6                            | 12.4                | 78.4                | 18.6                         | .952                             | .92                                                   | 7.80                                                                     | .56                                                                  |
| 5              | 83.3                            | 11.7                | 77.4                | 17.6                         | .922                             | .65                                                   | .09                                                                      | .58                                                                  |
| 6              | 82.2                            | 9.4                 | 77.5                | 14.1                         | .925                             | .76                                                   | 5.43                                                                     | .64                                                                  |
| 7              | 80.7                            | 7.2                 | 77.1                | 10.8                         | .913                             | .70                                                   | 3.94                                                                     | .71                                                                  |
| 8              | 80.1                            | 6.0                 | 77.1                | 9.0                          | .913                             | .71                                                   | .21                                                                      | .75                                                                  |
| 9              | 79.3                            | 5.2                 | 76.7                | 7.8                          | .902                             | .64                                                   | 2.71                                                                     | .78                                                                  |
| 10             | 78.9                            | 5.5                 | 76.1                | 8.3                          | .885                             | .48                                                   | .83                                                                      | .77                                                                  |
| 11             | 78.9                            | 5.0                 | 76.4                | 7.5                          | .893                             | .56                                                   | .57                                                                      | .79                                                                  |

All the Hygrometrical elements are computed by the Greenwich Constants.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1860.  
Solar Radiation, Weather, &c.*

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                                                         |
|-------|-----------------------|---------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | 138.0                 | ..                              | S. & S. W.                        | Scatd. clouds till 8 A. M. cloudless afterwards.                                                                                                   |
| 2     | 137.0                 | ..                              | S.                                | Scatd. clouds till 1 P. M. cloudless till 7 P. M. cloudy afterwards.                                                                               |
| 3     | 135.0                 | 0.86                            | S. & S. W.                        | Cloudless till 9 A. M. Scatd. $\sim$ i & $\sim$ i till 4 P. M. cloudy afterwards; also raining between 6 & 8 P. M.                                 |
| 4     | 132.0                 | ..                              | S. & S. E.                        | Cloudless till 4 A. M. Scatd. clouds till 7 P. M. cloudy afterwards; also thunder and lightning, accompanied with little rain between 9 & 11 P. M. |
| 5     | 124.5                 | ..                              | S.                                | Scatd. clouds till 5 P. M. cloudless till 9 P. M. cloudy afterwards.                                                                               |
| 6     | <i>Sunday.</i>        |                                 |                                   |                                                                                                                                                    |
| 7     | 128.2                 | 0.94                            | S & S. E.                         | Scatd. clouds till 4 P. M. cloudy afterwards; also raining between 6 & 8 P. M.                                                                     |
| 8     | 128.0                 | 0.09                            | S. & S. E.                        | Scatd. clouds till 6 P. M. cloudy afterwards; also thunder & lightning & a little rain between 7 & 9 P. M.                                         |
| 9     | 133.0                 | ..                              | S. & S. E.                        | Cloudless till 4 A. M. Scatd. $\sim$ i till 1 P. M. cloudless afterwards.                                                                          |
| 10    | 129.8                 | ..                              | S. E. & S.                        | Cloudy till 10 A. M. cloudless till 5 P. M. Scatd. clouds afterwards.                                                                              |
| 11    | 135.0                 | 0.32                            | S. & S. E.                        | Cloudy; also rain accompanied with thunder & lightning between 7 & 8 P. M.                                                                         |
| 12    | 137.0                 | ..                              | S. & S. E.                        | Cloudless till 3 A. M. Scatd. clouds till 7 P. M. cloudless afterwards.                                                                            |
| 13    | <i>Sunday.</i>        |                                 |                                   |                                                                                                                                                    |
| 14    | 140.0                 | ..                              | S. & S. W.                        | Cloudless.                                                                                                                                         |
| 15    | 143.9                 | ..                              | S. & S. W.                        | Cloudless.                                                                                                                                         |
| 16    | 144.0                 | ..                              | S. & N. E.                        | Cloudless.                                                                                                                                         |
| 17    | 139.0                 | ..                              | S.                                | Cloudless till 3 P. M. cloudy till 7 P. M. cloudless afterwards.                                                                                   |
| 18    | 141.0                 | ..                              | S.                                | Cloudless till 11 A. M. Scatd. $\sim$ i till 6 P. M. cloudless afterwards.                                                                         |
| 19    | 142.6                 | ..                              | S.                                | Cloudless.                                                                                                                                         |
| 20    | <i>Sunday.</i>        |                                 |                                   |                                                                                                                                                    |
| 21    | 144.8                 | ..                              | S.                                | Cloudless.                                                                                                                                         |
| 22    | 146.8                 | ..                              | S. & S. E.                        | Cloudless.                                                                                                                                         |
| 23    | 136.0                 | ..                              | S. & S. E.                        | Cloudless till 4 A. M. Scatd. $\sim$ i till 5 P. M. cloudy till 9 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 May, 1860.  
Solar Radiation, Weather, &c.*

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                   |
|-------|-----------------------|---------------------------------|-----------------------------------|--------------------------------------------------------------------------------------------------------------|
| 24    | 135.0                 | Inches.<br>..                   | S. & S. E. & E.                   | Cloudless till 4 A. M. Scatd. clouds till 8 P. M. cloudless afterwards; also thunder & lightning at 5 P. M.  |
| 25    | 133.0                 | ..                              | S. & S. E.                        | Cloudless till 7 A. M. Scatd. ci afterwards; also lightning at 8 P. M.                                       |
| 26    | 134.5                 | ..                              | S. & S. E.                        | Cloudless till 7 A. M. Scatd. clouds afterwards; also slightly drizzling at 6 P. M.                          |
| 27    | <i>Sunday.</i>        |                                 |                                   |                                                                                                              |
| 28    | 136.4                 | ..                              | S. & N. E.                        | Cloudless till 4 A. M. Scatd. vi till 3 P. M. cloudy afterwards; also slightly drizzling between 8 & 9 P. M. |
| 29    | 132.0                 | ..                              | S. & S. E.                        | Scatd. clouds; also lightning at 7 P. M.                                                                     |
| 30    | 133.4                 | ..                              | S.                                | Cloudless till 4 A. M. Scatd. clouds afterwards.                                                             |
| 31    | 135.0                 | ..                              | S. E. & S.                        | Scatd. vi & ci; also slightly drizzling at 1 P. M.                                                           |

vi Cirri, vi Cirro-strati, ci Cumuli, cl Cumulo strati, vi Nimbi,—i Strati,  
vi Cirro cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1860.*

MONTHLY RESULTS.

|                                                                |    |    | Inches |
|----------------------------------------------------------------|----|----|--------|
| Mean height of the Barometer for the month,                    | .. | .. | 29.613 |
| Max. height of the Barometer, occurred at 9 A. M. on the 5th,  | .. | .. | 29.845 |
| Min. height of the Barometer, occurred at 5 P. M. on the 31st, | .. | .. | 29.417 |
| <i>Extreme Range</i> of the Barometer during the month,        | .. | .. | 0.428  |
| Mean of the Daily Max. Pressures,                              | .. | .. | 29.682 |
| Ditto ditto Min. ditto,                                        | .. | .. | 29.537 |
| <i>Mean daily range</i> of the Barometer during the month,     | .. | .. | 0.145  |

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|                                                              |    |    | o     |
|--------------------------------------------------------------|----|----|-------|
| Mean Dry Bulb Thermometer for the month,                     | .. | .. | 88.7  |
| Max. Temperature occurred at 3 P. M. on the 21st,            | .. | .. | 105.8 |
| Min. Temperature occurred at 1 A. M. on the 4th,             | .. | .. | 72.8  |
| <i>Extreme range</i> of the Temperature during the month,    | .. | .. | 33.0  |
| Mean of the daily Max. Temperature,                          | .. | .. | 98.7  |
| Ditto ditto Min. ditto,                                      | .. | .. | 81.0  |
| <i>Mean daily range</i> of the Temperature during the month, | .. | .. | 17.7  |

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|                                                            |    |    | o      |
|------------------------------------------------------------|----|----|--------|
| Mean Wet Bulb Thermometer for the month,                   | .. | .. | 81.4   |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, | .. | .. | 7.3    |
| Computed Mean Dew Point for the month,                     | .. | .. | 77.7   |
| Mean Dry Bulb Thermometer above computed Mean Dew Point,   | .. | .. | 11.0   |
|                                                            |    |    | Inches |
| Mean Elastic force of vapour for the month,                | .. | .. | 0.931  |

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|                                                                         |    |    | Troy grains |
|-------------------------------------------------------------------------|----|----|-------------|
| Mean weight of Vapour for the month,                                    | .. | .. | 9.88        |
| Additional weight of Vapour required for complete saturation,           | .. | .. | 4.08        |
| Mean degree of humidity for the month, complete saturation being unity, | .. | .. | 0.71        |

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|                                                   |    |    | Inches     |
|---------------------------------------------------|----|----|------------|
| Rained 8 days, Max. fall of rain during 24 hours, | .. | .. | 0.94       |
| Total amount of rain during the month,            | .. | .. | 2.21       |
| Prevailing direction of the Wind,                 | .. | .. | S. & S. E. |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1860.*

## MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind  
blew, together with the number of days on which at the same hour,  
when any particular wind was blowing, it rained.

| Hour.     | N.           | Rain on. | N. E. | Rain on. | E. | Rain on. | S. E. | Rain on. | S. | Rain on. | S. W. | Rain on. | W. | Rain on. | N. W. | Rain on. | Calm. | Rain on. | Missed. |
|-----------|--------------|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|-------|----------|---------|
|           | No. of days. |          |       |          |    |          |       |          |    |          |       |          |    |          |       |          |       |          |         |
| Midnight. |              |          |       |          |    |          | 7     |          | 19 |          |       |          |    |          |       |          |       |          | 1       |
| 1         |              |          |       |          |    |          | 7     |          | 19 |          |       |          |    |          |       |          |       |          | 1       |
| 2         |              |          |       |          |    |          | 7     |          | 18 |          |       |          |    |          |       |          |       |          | 2       |
| 3         |              |          |       |          |    |          | 8     |          | 18 |          | 1     |          |    |          |       |          |       |          | 2       |
| 4         |              |          |       |          |    |          | 9     |          | 14 |          | 1     |          |    |          |       |          |       |          | 3       |
| 5         |              |          |       |          | 1  |          | 8     |          | 17 |          | 1     |          |    |          |       |          |       |          |         |
| 6         |              |          |       |          | 4  |          | 8     |          | 14 |          | 1     |          |    |          |       |          |       |          |         |
| 7         |              |          | 1     |          | 4  |          | 6     |          | 15 |          | 1     |          |    |          |       |          |       |          |         |
| 8         |              |          |       |          | 1  |          | 5     |          | 21 |          |       |          |    |          |       |          |       |          |         |
| 9         |              |          |       |          | 1  |          | 1     |          | 25 |          |       |          |    |          |       |          |       |          |         |
| 10        |              |          |       |          |    |          | 1     |          | 23 |          | 3     |          |    |          |       |          |       |          |         |
| 11        | 1            |          |       |          |    |          | 3     |          | 18 |          | 3     |          | 1  |          | 1     |          |       |          |         |
| Noon.     |              |          |       |          |    |          |       | 1        | 19 |          | 4     |          | 2  |          |       |          |       |          |         |
| 1         | 1            |          | 2     |          |    |          | 4     |          | 13 |          | 5     |          | 1  |          |       |          |       | 1        |         |
| 2         |              |          | 1     |          |    |          | 6     |          | 10 |          | 6     |          | 1  |          | 3     |          |       |          |         |
| 3         |              | 2        | 2     |          |    |          | 8     |          | 11 |          | 2     |          | 2  |          |       |          |       |          |         |
| 4         |              | 2        | 3     |          |    |          | 4     |          | 15 |          | 3     |          |    |          |       |          |       |          |         |
| 5         |              | 3        | 1     |          | 1  |          | 4     |          | 15 |          | 2     |          |    |          |       |          |       |          | 1       |
| 6         |              | 2        | 1     |          | 3  |          | 5     | 1        | 13 |          | 2     | 1        |    |          | 1     |          |       |          |         |
| 7         |              |          |       |          | 2  |          | 4     |          | 18 | 1        | 1     |          | 1  | 1        | 1     | 1        | 1     |          |         |
| 8         |              |          | 1     |          | 2  |          | 5     | 2        | 17 | 2        | 1     |          |    |          | 1     |          | 1     |          |         |
| 9         |              |          | 1     |          | 2  |          | 8     | 1        | 12 | 1        | 2     |          | 1  |          |       |          | 1     |          | 1       |
| 10        |              |          | 1     |          | 4  |          | 7     |          | 13 |          | 1     |          |    |          |       |          | 1     |          | 1       |
| 11        |              |          | 1     |          | 3  |          | 7     |          | 14 |          | 1     |          |    |          |       |          | 1     |          | 1       |

*Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June, 1860.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

feet.

Height of the Cistern of the Standard Barometer above the Sea level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

| Date. | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer during the day. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature during the day. |      |       |
|-------|-------------------------------------------|----------------------------------------|---------|---------|----------------------------|------------------------------------------|------|-------|
|       |                                           | Max.                                   | Min.    | Diff.   |                            | Max.                                     | Min. | Diff. |
|       | Inches.                                   | Inches.                                | Inches. | Inches. | o                          | o                                        | o    | o     |
| 1     | 29.575                                    | 29.621                                 | 29.499  | 0.122   | 88.0                       | 99.2                                     | 79.2 | 20.0  |
| 2     | .615                                      | .681                                   | .550    | .131    | 88.8                       | 98.9                                     | 78.8 | 20.1  |
| 3     | <i>Sunday.</i>                            |                                        |         |         |                            |                                          |      |       |
| 4     | .610                                      | .677                                   | .523    | .154    | 88.2                       | 98.6                                     | 79.0 | 19.6  |
| 5     | .602                                      | .665                                   | .545    | .120    | 86.5                       | 95.6                                     | 82.0 | 13.6  |
| 6     | .637                                      | .691                                   | .586    | .105    | 84.3                       | 91.3                                     | 81.0 | 10.3  |
| 7     | .670                                      | .742                                   | .620    | .122    | 82.3                       | 87.4                                     | 79.2 | 8.2   |
| 8     | .627                                      | .673                                   | .575    | .098    | 82.2                       | 86.4                                     | 79.8 | 6.6   |
| 9     | .608                                      | .657                                   | .555    | .102    | 84.6                       | 92.3                                     | 78.5 | 13.8  |
| 10    | <i>Sunday.</i>                            |                                        |         |         |                            |                                          |      |       |
| 11    | .597                                      | .643                                   | .521    | .122    | 86.1                       | 93.4                                     | 81.2 | 12.2  |
| 12    | .572                                      | .631                                   | .510    | .121    | 83.9                       | 91.0                                     | 80.4 | 10.6  |
| 13    | .507                                      | .554                                   | .446    | .108    | 81.4                       | 84.8                                     | 79.4 | 5.4   |
| 14    | .442                                      | .484                                   | .368    | .116    | 81.8                       | 85.5                                     | 79.2 | 6.3   |
| 15    | .386                                      | .448                                   | .319    | .129    | 83.4                       | 88.8                                     | 79.3 | 9.5   |
| 16    | .337                                      | .385                                   | .293    | .092    | 84.4                       | 91.5                                     | 80.2 | 11.3  |
| 17    | <i>Sunday.</i>                            |                                        |         |         |                            |                                          |      |       |
| 18    | .454                                      | .513                                   | .402    | .111    | 89.4                       | 96.4                                     | 83.4 | 13.0  |
| 19    | .539                                      | .608                                   | .479    | .129    | 83.8                       | 94.5                                     | 77.0 | 17.5  |
| 20    | .615                                      | .663                                   | .560    | .103    | 82.7                       | 90.5                                     | 77.6 | 12.9  |
| 21    | .629                                      | .676                                   | .558    | .118    | 85.3                       | 91.0                                     | 80.6 | 10.4  |
| 22    | .624                                      | .674                                   | .574    | .100    | 84.4                       | 89.0                                     | 81.2 | 7.8   |
| 23    | .594                                      | .645                                   | .534    | .111    | 86.1                       | 92.6                                     | 81.3 | 11.3  |
| 24    | <i>Sunday.</i>                            |                                        |         |         |                            |                                          |      |       |
| 25    | .480                                      | .574                                   | .413    | .161    | 84.2                       | 87.4                                     | 78.2 | 9.2   |
| 26    | .423                                      | .458                                   | .380    | .078    | 85.1                       | 92.6                                     | 77.6 | 15.0  |
| 27    | .506                                      | .559                                   | .416    | .143    | 84.8                       | 90.6                                     | 80.6 | 10.0  |
| 28    | .529                                      | .597                                   | .469    | .128    | 86.1                       | 93.8                                     | 80.8 | 13.0  |
| 29    | .497                                      | .556                                   | .413    | .143    | 85.5                       | 92.0                                     | 80.8 | 11.2  |
| 30    | .478                                      | .549                                   | .436    | .113    | 84.1                       | 89.2                                     | 81.0 | 8.2   |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly observations made during the day.

*Meteorological Observations.*

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1860.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Thermometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew Point. | Mean Elastic force of Vapour. | Mean Weight of Vapour in a cubic foot of Air. | Additional Weight of Vapour required for complete saturation. | Mean degree of Humidity, complete saturation being unity. |
|-------|----------------------------|---------------------|---------------------|---------------------------|-------------------------------|-----------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------|
|       | o                          | o                   | o                   | o                         | Inches.                       | T. gr.                                        | T. gr.                                                        |                                                           |
| 1     | 81.1                       | 6.9                 | 77.6                | 10.4                      | 0.928                         | 9.87                                          | 3.81                                                          | 0.72                                                      |
| 2     | 81.0                       | 7.8                 | 77.1                | 11.7                      | .913                          | .68                                           | 4.32                                                          | .69                                                       |
| 3     | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 4     | 80.0                       | 8.2                 | 75.9                | 12.3                      | .879                          | .34                                           | .42                                                           | .68                                                       |
| 5     | 80.3                       | 6.2                 | 77.2                | 9.3                       | .916                          | .77                                           | 3.33                                                          | .75                                                       |
| 6     | 80.1                       | 4.2                 | 78.0                | 6.3                       | .940                          | 10.07                                         | 2.21                                                          | .82                                                       |
| 7     | 79.4                       | 2.9                 | 77.9                | 4.4                       | .937                          | .08                                           | 1.50                                                          | .87                                                       |
| 8     | 79.6                       | 2.6                 | 78.3                | 3.9                       | .949                          | .20                                           | .34                                                           | .88                                                       |
| 9     | 80.1                       | 4.5                 | 77.8                | 6.8                       | .934                          | 9.99                                          | 2.40                                                          | .81                                                       |
| 10    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 11    | 80.5                       | 5.6                 | 77.7                | 8.4                       | .931                          | .94                                           | 3.01                                                          | .77                                                       |
| 12    | 80.0                       | 3.9                 | 78.0                | 5.9                       | .940                          | 10.07                                         | 2.06                                                          | .83                                                       |
| 13    | 79.2                       | 2.2                 | 78.1                | 3.3                       | .943                          | .16                                           | 1.11                                                          | .90                                                       |
| 14    | 79.3                       | 2.5                 | 78.0                | 3.8                       | .940                          | .11                                           | .29                                                           | .89                                                       |
| 15    | 80.2                       | 3.2                 | 78.6                | 4.8                       | .958                          | .28                                           | .68                                                           | .86                                                       |
| 16    | 80.6                       | 3.8                 | 78.7                | 5.7                       | .961                          | .29                                           | 2.02                                                          | .84                                                       |
| 17    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 18    | 82.7                       | 6.7                 | 79.3                | 10.1                      | .979                          | .38                                           | 3.87                                                          | .73                                                       |
| 19    | 80.5                       | 3.3                 | 78.8                | 5.0                       | .964                          | .34                                           | 1.76                                                          | .86                                                       |
| 20    | 79.6                       | 3.1                 | 78.0                | 4.7                       | .940                          | .09                                           | .63                                                           | .86                                                       |
| 21    | 80.6                       | 4.7                 | 78.2                | 7.1                       | .946                          | .11                                           | 2.53                                                          | .80                                                       |
| 22    | 80.6                       | 3.8                 | 78.7                | 5.7                       | .961                          | .29                                           | .02                                                           | .84                                                       |
| 23    | 81.6                       | 4.5                 | 79.3                | 6.8                       | .979                          | .44                                           | .51                                                           | .81                                                       |
| 24    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 25    | 81.4                       | 2.8                 | 80.0                | 4.2                       | 1.001                         | .72                                           | 1.52                                                          | .88                                                       |
| 26    | 81.0                       | 4.1                 | 78.9                | 6.2                       | 0.967                         | .31                                           | 2.23                                                          | .82                                                       |
| 27    | 81.3                       | 3.5                 | 79.5                | 5.3                       | .986                          | .55                                           | 1.91                                                          | .85                                                       |
| 28    | 81.5                       | 4.6                 | 79.2                | 6.9                       | .976                          | .41                                           | 2.54                                                          | .80                                                       |
| 29    | 81.2                       | 4.3                 | 79.0                | 6.5                       | .970                          | .35                                           | .37                                                           | .81                                                       |
| 30    | 80.8                       | 3.3                 | 79.1                | 5.0                       | .973                          | .42                                           | 1.79                                                          | .85                                                       |

All the Hygrometrical elements are computed by the Greenwich constants.



*Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June, 1860.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

| Hour.      | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | o                          | o                                                        | o    | o     |
| Mid-night. | 29.555                                    | 29.742                                                 | 29.369  | 0.373   | 81.8                       | 85.6                                                     | 77.7 | 7.9   |
| 1          | .541                                      | .712                                                   | .349    | .363    | 81.5                       | 85.4                                                     | 77.7 | 7.7   |
| 2          | .531                                      | .682                                                   | .310    | .372    | 81.2                       | 85.3                                                     | 77.6 | 7.7   |
| 3          | .530                                      | .628                                                   | .390    | .238    | 81.2                       | 85.2                                                     | 77.6 | 7.6   |
| 4          | .532                                      | .650                                                   | .301    | .349    | 80.8                       | 85.0                                                     | 78.0 | 7.0   |
| 5          | .537                                      | .647                                                   | .302    | .345    | 80.9                       | 84.2                                                     | 77.8 | 6.4   |
| 6          | .554                                      | .665                                                   | .317    | .348    | 81.1                       | 84.6                                                     | 78.0 | 6.6   |
| 7          | .569                                      | .679                                                   | .314    | .335    | 82.0                       | 85.6                                                     | 79.4 | 6.2   |
| 8          | .582                                      | .688                                                   | .356    | .332    | 84.5                       | 89.0                                                     | 79.6 | 9.4   |
| 9          | .587                                      | .692                                                   | .360    | .332    | 86.2                       | 90.8                                                     | 79.8 | 11.0  |
| 10         | .586                                      | .691                                                   | .363    | .328    | 88.2                       | 93.2                                                     | 81.4 | 11.8  |
| 11         | .579                                      | .684                                                   | .364    | .320    | 89.5                       | 96.4                                                     | 81.8 | 14.6  |
| Noon.      | .564                                      | .690                                                   | .346    | .344    | 90.2                       | 99.0                                                     | 81.9 | 17.1  |
| 1          | .547                                      | .677                                                   | .325    | .352    | 89.8                       | 99.2                                                     | 81.4 | 17.8  |
| 2          | .526                                      | .647                                                   | .315    | .332    | 89.7                       | 99.0                                                     | 81.2 | 17.8  |
| 3          | .509                                      | .640                                                   | .297    | .343    | 89.4                       | 98.9                                                     | 77.0 | 21.9  |
| 4          | .490                                      | .631                                                   | .293    | .341    | 88.7                       | 97.8                                                     | 77.6 | 20.2  |
| 5          | .494                                      | .620                                                   | .300    | .320    | 87.8                       | 97.2                                                     | 77.7 | 19.5  |
| 6          | .501                                      | .629                                                   | .324    | .305    | 85.8                       | 94.0                                                     | 77.6 | 16.4  |
| 7          | .522                                      | .650                                                   | .332    | .318    | 84.4                       | 91.0                                                     | 78.0 | 13.0  |
| 8          | .538                                      | .658                                                   | .347    | .311    | 83.7                       | 90.0                                                     | 77.8 | 12.2  |
| 9          | .556                                      | .678                                                   | .367    | .311    | 83.3                       | 88.6                                                     | 77.8 | 10.8  |
| 10         | .569                                      | .687                                                   | .367    | .320    | 82.9                       | 87.8                                                     | 77.8 | 10.0  |
| 11         | .561                                      | .691                                                   | .374    | .317    | 82.3                       | 86.6                                                     | 78.4 | 8.2   |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1860.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force<br>of Vapour. | Mean Weight of Va-<br>pour in a Cubic<br>foot of Air. | Additional Weight of<br>Vapour required<br>for complete satu-<br>ration. | Mean degree of Hu-<br>midity, complete<br>saturation being<br>unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                                | T. gr.                                                                   |                                                                      |
| Mid-<br>night. | 79.0                            | 2.8                 | 77.6                | 4.2                          | 0.928                            | 9.99                                                  | 1.41                                                                     | 0.88                                                                 |
| 1              | 78.8                            | 2.7                 | 77.4                | 4.1                          | .922                             | .93                                                   | .38                                                                      | .88                                                                  |
| 2              | 78.8                            | 2.4                 | 77.6                | 3.6                          | .928                             | .99                                                   | .22                                                                      | .89                                                                  |
| 3              | 79.0                            | 2.2                 | 77.9                | 3.3                          | .937                             | 10.10                                                 | .11                                                                      | .90                                                                  |
| 4              | 78.6                            | 2.2                 | 77.5                | 3.3                          | .925                             | 9.98                                                  | .09                                                                      | .90                                                                  |
| 5              | 78.8                            | 2.1                 | 77.7                | 3.2                          | .931                             | 10.04                                                 | .06                                                                      | .91                                                                  |
| 6              | 79.0                            | 2.1                 | 77.9                | 3.2                          | .937                             | .10                                                   | .07                                                                      | .90                                                                  |
| 7              | 79.7                            | 2.3                 | 78.5                | 3.5                          | .955                             | .27                                                   | .20                                                                      | .90                                                                  |
| 8              | 80.9                            | 3.6                 | 79.1                | 5.4                          | .973                             | .42                                                   | .93                                                                      | .84                                                                  |
| 9              | 81.4                            | 4.8                 | 79.0                | 7.2                          | .970                             | .35                                                   | 2.64                                                                     | .80                                                                  |
| 10             | 82.1                            | 6.1                 | 79.0                | 9.2                          | .970                             | .31                                                   | 3.45                                                                     | .75                                                                  |
| 11             | 82.4                            | 7.1                 | 78.8                | 10.7                         | .964                             | .21                                                   | 4.08                                                                     | .71                                                                  |
| Noon.          | 82.6                            | 7.6                 | 78.8                | 11.4                         | .964                             | .21                                                   | .38                                                                      | .70                                                                  |
| 1              | 82.3                            | 7.5                 | 78.5                | 11.3                         | .955                             | .12                                                   | .30                                                                      | .70                                                                  |
| 2              | 82.4                            | 7.3                 | 78.7                | 11.0                         | .961                             | .18                                                   | .19                                                                      | .71                                                                  |
| 3              | 82.2                            | 7.2                 | 78.6                | 10.8                         | .958                             | .15                                                   | .10                                                                      | .71                                                                  |
| 4              | 82.0                            | 6.7                 | 78.6                | 10.1                         | .958                             | .17                                                   | 3.79                                                                     | .73                                                                  |
| 5              | 81.9                            | 5.9                 | 78.9                | 8.9                          | .967                             | .28                                                   | .32                                                                      | .76                                                                  |
| 6              | 81.2                            | 4.6                 | 78.9                | 6.9                          | .967                             | .32                                                   | 2.51                                                                     | .80                                                                  |
| 7              | 80.2                            | 4.2                 | 78.1                | 6.3                          | .943                             | .10                                                   | .21                                                                      | .82                                                                  |
| 8              | 80.1                            | 3.6                 | 78.3                | 5.4                          | .949                             | .18                                                   | 1.89                                                                     | .84                                                                  |
| 9              | 80.0                            | 3.3                 | 78.3                | 5.0                          | .949                             | .18                                                   | .75                                                                      | .85                                                                  |
| 10             | 79.9                            | 3.0                 | 78.4                | 4.5                          | .952                             | .21                                                   | .58                                                                      | .87                                                                  |
| 11             | 79.6                            | 2.7                 | 78.2                | 4.1                          | .946                             | .17                                                   | .41                                                                      | .88                                                                  |

All the Hygrometrical elements are computed by the Greenwich constants.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1860.  
Solar Radiation, Weather, &c.*

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                 |
|-------|-----------------------|---------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------|
| 1     | 134.0                 | ..                              | S. & E. & S. E.                   | Scatd. clouds; also very slightly drizzling at 7 P. M.                                                     |
| 2     | 137.9                 | ..                              | S. & S. W.                        | Cloudless till 3 A. M. cloudy till 11 A. M. Scatd. $\sim$ i till 5 P. M. cloudless afterwards.             |
| 3     | <i>Sunday.</i>        |                                 |                                   |                                                                                                            |
| 4     | 133.6                 | ..                              | N. E.                             | Scatd. clouds till 4 A. M. cloudless till 10 A. M. Scatd. $\sim$ i afterwards.                             |
| 5     | 127.0                 | ..                              | S.                                | Scatd. $\sim$ i & $\sim$ i till 1 P. M. cloudy afterwards; also very slightly drizzling at 5 P. M.         |
| 6     | ..                    | ..                              | E. & S. E.                        | Scatd. $\sim$ i till 6 A. M. cloudy afterwards; also drizzling after intervals between 1 P. M. & midnight. |
| 7     | ..                    | 0.15                            | E.                                | Cloudy; also constantly drizzling between Noon & 6 P. M.                                                   |
| 8     | ..                    | ..                              | E. & S.                           | Cloudy; also constantly drizzling.                                                                         |
| 9     | 124.0                 | 0.34                            | S. & E.                           | Scatd. $\sim$ i & $\sim$ i till 6 P. M. cloudless afterwards; also raining between 5 & 6 P. M.             |
| 10    | <i>Sunday.</i>        |                                 |                                   |                                                                                                            |
| 11    | ..                    | 0.32                            | N. E. & S. E. & E.                | Scatd. $\sim$ i till 6 A. M. cloudy afterwards; also raining between 6 & 7 P. M.                           |
| 12    | ..                    | ..                              | E. & S.                           | Cloudy; also drizzling at 1 & 5 & 6 P. M.                                                                  |
| 13    | ..                    | 1.16                            | S. & S. W.                        | Cloudy; also constantly raining or drizzling.                                                              |
| 14    | ..                    | 0.28                            | S. W. & W.                        | Cloudy; also occasionally drizzling.                                                                       |
| 15    | ..                    | 0.34                            | S. W. & calm.                     | Cloudy; also raining between Noon & 1 P. M. & drizzling between 8 & 11 P. M.                               |
| 16    | ..                    | 0.39                            | S. W. & S.                        | Cloudy; also drizzling at 11 A. M. & between 5 & 9 P. M.                                                   |
| 17    | <i>Sunday.</i>        |                                 |                                   |                                                                                                            |
| 18    | 137.0                 | ..                              | S. W. & S.                        | Cloudy till 8 A. M. cloudless till 3 P. M. cloudy till 8 P. M. cloudless afterwards.                       |
| 19    | 120.5                 | 1.18                            | S. & E. & S. E.                   | Cloudless till 3 A. M. cloudy afterwards; also raining between 2 & 6 P. M.                                 |
| 20    | 112.0                 | 0.14                            | S. & S. E. & E.                   | Cloudless till 8 A. M. Scatd. $\sim$ i till 1 P. M. cloudy afterwards; also raining at 2 P. M.             |
| 21    | 135.0                 | ..                              | S. E. & E. & S.                   | Cloudless till 10 A. M. Scatd. $\sim$ i & $\sim$ i till 7 P. M. cloudless afterwards.                      |

$\sim$ i Cirri,  $\sim$ i Cirro strati,  $\sim$ i Cumuli,  $\sim$ i Cumulo strati,  $\sim$ i Nimbi,  $\sim$ i Strati,  $\sim$ i Cirro cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1860.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                              |
|-------|-----------------------|---------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------|
| 22    | 0<br>..               | Inches.<br>..                   | S.                                | Cloudless till 7 A. M. cloudy till 2 P. M. Scatd. ☉ & ☽ afterwards; also drizzling between 9 & 10 A. M. |
| 23    | 132.0                 | ..                              | S.                                | Cloudless till 4 A. M. Scatd. ☽ & ☉ till 11 A. M. cloudy till 7 P. M. cloudless afterwards.             |
| 24    | <i>Sunday.</i>        | 1.32                            |                                   |                                                                                                         |
| 25    | ..                    | 0.21                            | S. & S. W.                        | Cloudy; also drizzling between midnight & 2 A. M.; also slightly raining at noon & at 11 P. M.          |
| 26    | 126.0                 | 0.46                            | S. & S. W.                        | Cloudy till 9 A. M. Scatd. ☽ afterwards; also raining between midnight & 2 A. M.                        |
| 27    | ..                    | ..                              | S. & E.                           | Cloudy; also drizzling between 3 & 7 A. M.                                                              |
| 28    | 127.0                 | ..                              | S. & N. E.                        | Scatd. clouds till 3 P. M. Scatd. ☽ afterwards.                                                         |
| 29    | 132.4                 | 0.10                            | N. E. & E.                        | Cloudy; also drizzling at noon & between 4 & 6 P. M.                                                    |
| 30    | 126.0                 | 0.07                            | S. & N.                           | Cloudy; also drizzling at 1 & 5 & 6 A. M. & also at Noon.                                               |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1860.*

MONTHLY RESULTS.

|                                                                         |    |    |             |
|-------------------------------------------------------------------------|----|----|-------------|
|                                                                         |    |    | Inches      |
| Mean height of the Barometer for the month,                             | .. | .. | 29.544      |
| Max. height of the Barometer occurred at Midnight on the 7th,           | .. | .. | 29.742      |
| Min. height of the Barometer occurred at 4 P. M. on the 16th,           | .. | .. | 29.293      |
| <i>Extreme range</i> of the Barometer during the month,                 | .. | .. | 0.449       |
| Mean of the daily Max. Pressures,                                       | .. | .. | 29.601      |
| Ditto ditto Min. ditto,                                                 | .. | .. | 29.482      |
| <i>Mean daily range</i> of the Barometer during the month,              | .. | .. | 0.119       |
| —————                                                                   |    |    |             |
|                                                                         |    |    | o           |
| Mean Dry Bulb Thermometer for the month,                                | .. | .. | 84.9        |
| Max. Temperature occurred at 1 P. M. on the 1st,                        | .. | .. | 99.2        |
| Min. Temperature occurred at 3 P. M. on the 19th,                       | .. | .. | 77.0        |
| <i>Extreme range</i> of the Temperature during the month,               | .. | .. | 22.2        |
| Mean of the daily Max. Temperature,                                     | .. | .. | 91.7        |
| Ditto ditto Min. ditto,                                                 | .. | .. | 79.9        |
| <i>Mean daily range</i> of the Temperature during the month,            | .. | .. | 11.8        |
| —————                                                                   |    |    |             |
|                                                                         |    |    | o           |
| Mean Wet Bulb Thermometer for the month,                                | .. | .. | 80.6        |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer,              | .. | .. | 4.3         |
| Computed Mean Dew-point for the month,                                  | .. | .. | 78.4        |
| Mean Dry Bulb Thermometer above computed Mean Dew-point,                | .. | .. | 6.5         |
|                                                                         |    |    | Inches      |
| Mean Elastic force of Vapour for the month,                             | .. | .. | 0.952       |
| —————                                                                   |    |    |             |
|                                                                         |    |    | Troy grains |
| Mean Weight of Vapour for the month,                                    | .. | .. | 10.17       |
| Additional Weight of Vapour required for complete saturation,           | .. | .. | 2.32        |
| Mean degree of humidity for the month, complete saturation being unity, | .. | .. | 0.81        |
| —————                                                                   |    |    |             |
|                                                                         |    |    | Inches      |
| Rained 21 days, Max. fall of rain during 24 hours,                      | .. | .. | 1.32        |
| Total amount of rain during the month,                                  | .. | .. | 6.46        |
| Prevailing direction of the Wind,                                       | .. | .. | S. & E.     |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1860.*

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind  
blew, together with the number of days on which at the same hour, when  
any particular wind was blowing, it rained.

| Hour.     | N.           |          | N. E.    |          | E.       |          | S. E.    |          | S.       |          | S. W.    |          | W.       |          | N. W.    |          | Calm.    |          | Missed.  |  |
|-----------|--------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|
|           | Rain on.     | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. |  |
|           | No. of days. |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |  |
| Midnight. | 1            | 1        | 1        | 6        | 1        | 3        | 10       | 2        | 3        | 10       | 2        | 3        | 1        | 1        |          |          |          | 1        | 1        |  |
| 1         | 1            | 1        | 1        | 6        |          | 3        | 10       | 2        | 2        | 10       | 2        | 2        | 1        |          |          |          |          | 3        |          |  |
| 2         | 1            | 1        | 1        | 6        |          | 3        | 10       | 2        | 2        | 10       | 2        | 2        | 1        |          |          |          |          | 3        |          |  |
| 3         | 2            | 2        | 2        | 6        |          | 1        | 9        | 2        | 1        | 9        | 2        | 1        |          | 1        | 1        |          |          |          | 4        |  |
| 4         | 2            | 2        | 2        | 8        | 1        | 1        | 10       | 2        | 1        | 10       | 2        | 1        |          | 1        | 2        |          |          |          | 1        |  |
| 5         | 3            | 1        | 1        | 6        | 1        | 2        | 9        | 1        | 2        | 9        | 1        | 2        |          | 1        | 1        |          |          |          |          |  |
| 6         | 1            | 3        | 3        | 7        | 1        | 2        | 8        | 1        | 4        | 8        | 1        | 4        | 1        | 1        | 2        |          |          |          |          |  |
| 7         |              | 5        | 5        | 5        | 2        | 3        | 6        | 1        | 6        | 6        | 1        | 6        |          | 1        |          |          |          |          |          |  |
| 8         |              | 3        | 3        | 8        |          | 2        | 9        | 2        | 4        | 9        | 2        | 4        |          | 1        |          |          |          |          |          |  |
| 9         |              | 1        | 1        | 10       |          | 2        | 7        | 1        | 6        | 7        | 1        | 6        | 2        |          |          |          |          |          |          |  |
| 10        |              | 1        | 1        | 9        |          | 3        | 6        | 1        | 6        | 6        | 1        | 6        |          | 1        |          |          |          |          |          |  |
| 11        |              | 5        | 5        | 5        |          | 2        | 5        |          | 5        | 5        |          | 9        | 1        |          |          |          |          |          |          |  |
| Noon.     | 1            | 2        | 4        | 1        | 4        | 6        | 1        | 6        | 1        | 6        | 1        | 6        | 1        | 3        | 1        |          |          |          |          |  |
| 1         |              | 3        | 3        | 2        | 4        | 2        | 7        |          | 8        | 7        |          | 8        | 2        | 1        | 1        |          |          |          |          |  |
| 2         | 1            | 2        | 5        | 2        | 3        |          | 7        | 2        | 7        | 7        | 2        | 7        | 1        | 1        | 1        |          |          |          |          |  |
| 3         | 1            | 2        | 4        | 1        | 4        |          | 7        | 1        | 6        | 7        | 1        | 6        | 1        | 2        | 1        |          |          |          |          |  |
| 4         |              | 2        | 3        | 1        | 5        | 1        | 12       | 1        | 2        | 12       | 1        | 2        |          | 1        |          |          |          |          | 1        |  |
| 5         |              | 2        | 4        | 1        | 2        |          | 15       | 5        | 2        | 15       | 5        | 2        |          |          |          |          | 1        |          |          |  |
| 6         |              | 1        | 5        | 3        | 3        |          | 12       | 2        | 4        | 12       | 2        | 4        | 1        |          |          |          | 1        |          |          |  |
| 7         |              | 1        | 3        | 1        | 2        | 1        | 14       | 1        | 3        | 14       | 1        | 3        | 1        | 1        | 1        |          | 2        |          |          |  |
| 8         |              | 2        | 3        | 2        | 2        |          | 13       |          | 3        | 13       |          | 3        | 1        | 1        | 1        |          | 2        |          |          |  |
| 9         |              | 2        | 3        | 1        | 2        |          | 13       |          | 3        | 13       |          | 3        | 1        | 1        |          |          | 2        |          | 1        |  |
| 10        |              | 2        | 3        |          | 3        |          | 13       |          | 3        | 13       |          | 3        | 1        |          |          |          | 2        |          | 1        |  |
| 11        |              | 2        | 1        | 3        |          | 11       | 1        | 3        |          | 11       | 1        | 3        |          |          |          |          | 3        |          | 2        |  |



*Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of July, 1860.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

| Date. | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer during the day. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature during the day. |      |       |
|-------|-------------------------------------------|----------------------------------------|---------|---------|----------------------------|------------------------------------------|------|-------|
|       |                                           | Max.                                   | Min.    | Diff.   |                            | Max.                                     | Min. | Diff. |
|       | Inches.                                   | Inches.                                | Inches. | Inches. | o                          | o                                        | o    | o     |
| 1     | <i>Sunday.</i>                            |                                        |         |         |                            |                                          |      |       |
| 2     | 29.530                                    | 29.584                                 | 29.462  | 0.122   | 85.3                       | 91.4                                     | 81.0 | 10.4  |
| 3     | .521                                      | .558                                   | .457    | .101    | 85.5                       | 91.3                                     | 78.6 | 12.7  |
| 4     | .524                                      | .561                                   | .458    | .103    | 85.0                       | 89.6                                     | 82.2 | 7.4   |
| 5     | .530                                      | .586                                   | .488    | .098    | 85.3                       | 90.6                                     | 81.4 | 9.2   |
| 6     | .532                                      | .569                                   | .478    | .091    | 85.5                       | 90.6                                     | 82.5 | 8.1   |
| 7     | .500                                      | .537                                   | .434    | .103    | 85.3                       | 90.4                                     | 82.0 | 8.4   |
| 8     | <i>Sunday.</i>                            |                                        |         |         |                            |                                          |      |       |
| 9     | .523                                      | .561                                   | .482    | .079    | 85.7                       | 90.8                                     | 81.6 | 9.2   |
| 10    | .505                                      | .566                                   | .468    | .098    | 87.3                       | 93.8                                     | 82.8 | 11.0  |
| 11    | .446                                      | .494                                   | .373    | .121    | 88.8                       | 96.8                                     | 82.0 | 14.8  |
| 12    | .456                                      | .519                                   | .401    | .118    | 87.0                       | 96.4                                     | 83.4 | 13.0  |
| 13    | .511                                      | .575                                   | .458    | .117    | 87.0                       | 94.0                                     | 81.4 | 12.6  |
| 14    | .534                                      | .574                                   | .486    | .088    | 85.4                       | 89.8                                     | 82.0 | 7.8   |
| 15    | <i>Sunday.</i>                            |                                        |         |         |                            |                                          |      |       |
| 16    | .561                                      | .622                                   | .515    | .107    | 82.6                       | 87.4                                     | 79.8 | 7.6   |
| 17    | .584                                      | .624                                   | .527    | .097    | 83.2                       | 88.8                                     | 80.0 | 8.8   |
| 18    | .599                                      | .644                                   | .537    | .107    | 83.7                       | 88.6                                     | 80.0 | 8.6   |
| 19    | .567                                      | .605                                   | .514    | .091    | 83.7                       | 87.2                                     | 80.7 | 6.5   |
| 20    | .578                                      | .619                                   | .502    | .117    | 83.0                       | 84.8                                     | 80.6 | 4.2   |
| 21    | .552                                      | .592                                   | .491    | .101    | 83.3                       | 87.8                                     | 80.6 | 7.2   |
| 22    | <i>Sunday.</i>                            |                                        |         |         |                            |                                          |      |       |
| 23    | .579                                      | .637                                   | .536    | .101    | 79.4                       | 81.6                                     | 77.0 | 4.6   |
| 24    | .592                                      | .635                                   | .532    | .103    | 80.7                       | 87.2                                     | 77.8 | 9.4   |
| 25    | .532                                      | .573                                   | .476    | .097    | 80.7                       | 83.4                                     | 78.0 | 5.4   |
| 26    | .496                                      | .546                                   | .434    | .112    | 79.6                       | 80.6                                     | 77.9 | 2.7   |
| 27    | .508                                      | .561                                   | .460    | .101    | 81.6                       | 84.1                                     | 78.4 | 5.7   |
| 28    | .511                                      | .545                                   | .464    | .081    | 81.8                       | 87.2                                     | 77.6 | 9.6   |
| 29    | <i>Sunday.</i>                            |                                        |         |         |                            |                                          |      |       |
| 30    | .512                                      | .574                                   | .451    | .123    | 82.3                       | 85.7                                     | 79.0 | 6.7   |
| 31    | .537                                      | .586                                   | .471    | .115    | 82.9                       | 89.0                                     | 79.2 | 9.8   |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly observations made during the day.

Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1860.

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| 1     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 2     | 81.4                            | 3.9                 | 79.4                | 5.9                          | 0.983                            | 10.49                                            | 2.15                                                                    | 0.83                                                                |
| 3     | 81.4                            | 4.1                 | 79.3                | 6.2                          | .979                             | .46                                              | .26                                                                     | .82                                                                 |
| 4     | 81.8                            | 3.2                 | 80.2                | 4.8                          | 1.008                            | .77                                              | 1.76                                                                    | .86                                                                 |
| 5     | 82.1                            | 3.2                 | 80.5                | 4.8                          | .017                             | .87                                              | .77                                                                     | .86                                                                 |
| 6     | 81.8                            | 3.7                 | 79.9                | 5.6                          | 0.998                            | .65                                              | 2.07                                                                    | .84                                                                 |
| 7     | 81.7                            | 3.6                 | 79.9                | 5.4                          | .998                             | .67                                              | 1.97                                                                    | .84                                                                 |
| 8     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 9     | 82.0                            | 3.7                 | 80.1                | 5.6                          | 1.005                            | .71                                              | 2.09                                                                    | .84                                                                 |
| 10    | 82.5                            | 4.8                 | 80.1                | 7.2                          | .005                             | .69                                              | .72                                                                     | .80                                                                 |
| 11    | 83.1                            | 5.7                 | 80.2                | 8.6                          | .008                             | .68                                              | 3.32                                                                    | .76                                                                 |
| 12    | 82.4                            | 4.6                 | 80.1                | 6.9                          | .005                             | .69                                              | 2.60                                                                    | .80                                                                 |
| 13    | 81.6                            | 5.4                 | 78.9                | 8.1                          | 0.967                            | .30                                              | .99                                                                     | .78                                                                 |
| 14    | 80.7                            | 4.7                 | 78.3                | 7.1                          | .949                             | .14                                              | .54                                                                     | .80                                                                 |
| 15    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 16    | 79.8                            | 2.8                 | 78.4                | 4.2                          | .952                             | .23                                              | 1.45                                                                    | .88                                                                 |
| 17    | 80.3                            | 2.9                 | 78.8                | 4.4                          | .964                             | .36                                              | .53                                                                     | .87                                                                 |
| 18    | 80.5                            | 3.2                 | 78.9                | 4.8                          | .967                             | .37                                              | .70                                                                     | .86                                                                 |
| 19    | 80.2                            | 3.5                 | 78.4                | 5.3                          | .952                             | .21                                              | .86                                                                     | .85                                                                 |
| 20    | 80.4                            | 2.6                 | 79.1                | 3.9                          | .973                             | .45                                              | .37                                                                     | .88                                                                 |
| 21    | 80.8                            | 2.5                 | 79.5                | 3.8                          | .986                             | .57                                              | .36                                                                     | .89                                                                 |
| 22    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 23    | 77.8                            | 1.6                 | 77.0                | 2.4                          | .910                             | 9.85                                             | 0.77                                                                    | .93                                                                 |
| 24    | 78.5                            | 2.2                 | 77.4                | 3.3                          | .922                             | .95                                              | 1.09                                                                    | .90                                                                 |
| 25    | 79.2                            | 1.5                 | 78.4                | 2.3                          | .952                             | 10.27                                            | 0.77                                                                    | .93                                                                 |
| 26    | 78.7                            | 0.9                 | 78.2                | 1.4                          | .946                             | .24                                              | .45                                                                     | .96                                                                 |
| 27    | 79.5                            | 2.1                 | 78.4                | 3.2                          | .952                             | .25                                              | 1.09                                                                    | .90                                                                 |
| 28    | 79.2                            | 2.6                 | 77.9                | 3.9                          | .937                             | .08                                              | .32                                                                     | .88                                                                 |
| 29    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 30    | 79.7                            | 2.6                 | 78.4                | 3.9                          | .952                             | .23                                              | .35                                                                     | .88                                                                 |
| 31    | 80.3                            | 2.6                 | 79.0                | 3.9                          | .970                             | .42                                              | .37                                                                     | .88                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.

*Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of July, 1860.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

| Hour.      | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | o                          | o                                                        | o    | o     |
| Mid-night. | 29.549                                    | 29.630                                                 | 29.459  | 0.171   | 82.1                       | 86.0                                                     | 78.4 | 7.6   |
| 1          | .537                                      | .609                                                   | .447    | .162    | 81.7                       | 85.8                                                     | 77.3 | 8.5   |
| 2          | .530                                      | .605                                                   | .436    | .169    | 81.4                       | 85.4                                                     | 77.8 | 7.6   |
| 3          | .519                                      | .602                                                   | .420    | .182    | 81.2                       | 84.8                                                     | 77.6 | 7.2   |
| 4          | .518                                      | .597                                                   | .421    | .176    | 80.7                       | 84.6                                                     | 77.0 | 7.6   |
| 5          | .524                                      | .600                                                   | .431    | .169    | 80.7                       | 84.4                                                     | 77.6 | 6.8   |
| 6          | .537                                      | .608                                                   | .450    | .158    | 80.6                       | 84.2                                                     | 77.8 | 6.4   |
| 7          | .551                                      | .623                                                   | .469    | .154    | 81.3                       | 85.2                                                     | 78.2 | 7.0   |
| 8          | .564                                      | .644                                                   | .479    | .165    | 83.4                       | 87.8                                                     | 78.6 | 9.2   |
| 9          | .569                                      | .643                                                   | .490    | .153    | 84.6                       | 89.4                                                     | 78.0 | 11.4  |
| 10         | .568                                      | .631                                                   | .484    | .147    | 86.1                       | 91.6                                                     | 78.6 | 13.0  |
| 11         | .563                                      | .637                                                   | .477    | .160    | 87.0                       | 93.7                                                     | 79.6 | 14.1  |
| Noon.      | .547                                      | .616                                                   | .457    | .159    | 87.6                       | 95.0                                                     | 79.5 | 15.5  |
| 1          | .531                                      | .613                                                   | .437    | .176    | 87.6                       | 96.4                                                     | 79.6 | 16.8  |
| 2          | .508                                      | .588                                                   | .414    | .174    | 87.3                       | 96.8                                                     | 80.4 | 16.4  |
| 3          | .493                                      | .569                                                   | .401    | .168    | 86.7                       | 96.8                                                     | 80.4 | 16.4  |
| 4          | .479                                      | .547                                                   | .373    | .174    | 86.4                       | 96.8                                                     | 80.4 | 16.4  |
| 5          | .479                                      | .541                                                   | .376    | .165    | 85.9                       | 94.4                                                     | 80.6 | 13.8  |
| 6          | .490                                      | .552                                                   | .392    | .160    | 85.0                       | 92.2                                                     | 80.6 | 11.6  |
| 7          | .509                                      | .579                                                   | .398    | .181    | 84.1                       | 91.4                                                     | 78.8 | 12.6  |
| 8          | .529                                      | .597                                                   | .436    | .161    | 83.6                       | 88.8                                                     | 79.3 | 9.5   |
| 9          | .548                                      | .616                                                   | .458    | .158    | 83.0                       | 86.6                                                     | 79.6 | 7.0   |
| 10         | .558                                      | .637                                                   | .472    | .165    | 82.7                       | 86.4                                                     | 79.0 | 7.4   |
| 11         | .560                                      | .637                                                   | .469    | .168    | 82.4                       | 86.0                                                     | 78.8 | 7.2   |

The Mean Height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1860.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb<br>Thermometer. | Dry Bulb above Wet. | Computed Dew point. | Dry Bulb above Dew<br>point. | Mean Elastic force of<br>Vapour. | Mean Weight of Va-<br>pour in a Cubic foot<br>of Air. | Additional Weight of<br>vapour required for<br>complete saturation. | Mean degree of Hu-<br>midity, complete satu-<br>ration being unity. |
|----------------|-------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                             | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                           |                                                                     |
| Mid-<br>night. | 80.0                          | 2.1                 | 78.9                | 3.2                          | 0.967                            | 10.41                                                 | 1.10                                                                | 0.90                                                                |
| 1              | 79.7                          | 2.0                 | 78.7                | 3.0                          | .961                             | .35                                                   | .02                                                                 | .91                                                                 |
| 2              | 79.5                          | 1.9                 | 78.5                | 2.9                          | .955                             | .29                                                   | 0.98                                                                | .91                                                                 |
| 3              | 79.3                          | 1.9                 | 78.3                | 2.9                          | .949                             | .22                                                   | .99                                                                 | .91                                                                 |
| 4              | 79.0                          | 1.7                 | 78.1                | 2.6                          | .943                             | .16                                                   | .88                                                                 | .92                                                                 |
| 5              | 79.0                          | 1.7                 | 78.1                | 2.6                          | .943                             | .16                                                   | .88                                                                 | .92                                                                 |
| 6              | 79.0                          | 1.6                 | 78.2                | 2.4                          | .946                             | .21                                                   | .80                                                                 | .93                                                                 |
| 7              | 79.6                          | 1.7                 | 78.7                | 2.6                          | .961                             | .35                                                   | .89                                                                 | .92                                                                 |
| 8              | 80.7                          | 2.7                 | 79.3                | 4.1                          | .979                             | .51                                                   | 1.45                                                                | .88                                                                 |
| 9              | 81.3                          | 3.3                 | 79.6                | 5.0                          | .989                             | .58                                                   | .81                                                                 | .85                                                                 |
| 10             | 81.9                          | 4.2                 | 79.8                | 6.3                          | .995                             | .62                                                   | 2.33                                                                | .82                                                                 |
| 11             | 82.3                          | 4.7                 | 79.9                | 7.1                          | .998                             | .63                                                   | .66                                                                 | .80                                                                 |
| Noon.          | 82.5                          | 5.1                 | 79.9                | 7.7                          | .998                             | .61                                                   | .91                                                                 | .79                                                                 |
| 1              | 82.4                          | 5.2                 | 79.8                | 7.8                          | .995                             | .58                                                   | .94                                                                 | .78                                                                 |
| 2              | 82.4                          | 4.9                 | 79.9                | 7.4                          | .998                             | .63                                                   | .78                                                                 | .79                                                                 |
| 3              | 81.7                          | 5.0                 | 79.2                | 7.5                          | .976                             | .39                                                   | .79                                                                 | .79                                                                 |
| 4              | 81.7                          | 4.7                 | 79.3                | 7.1                          | .979                             | .44                                                   | .62                                                                 | .80                                                                 |
| 5              | 81.5                          | 4.4                 | 79.3                | 6.6                          | .979                             | .44                                                   | .43                                                                 | .81                                                                 |
| 6              | 80.9                          | 4.1                 | 78.8                | 6.2                          | .964                             | .31                                                   | .22                                                                 | .82                                                                 |
| 7              | 80.7                          | 3.4                 | 79.0                | 5.1                          | .970                             | .40                                                   | 1.81                                                                | .85                                                                 |
| 8              | 80.5                          | 3.1                 | 78.9                | 4.7                          | .967                             | .37                                                   | .66                                                                 | .86                                                                 |
| 9              | 80.2                          | 2.8                 | 78.8                | 4.2                          | .964                             | .36                                                   | .46                                                                 | .88                                                                 |
| 10             | 80.2                          | 2.5                 | 78.9                | 3.8                          | .967                             | .39                                                   | .33                                                                 | .89                                                                 |
| 11             | 80.1                          | 2.3                 | 78.9                | 3.5                          | .967                             | .39                                                   | .22                                                                 | .90                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1860.

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                      |
|-------|-----------------------|---------------------------------|-----------------------------------|-------------------------------------------------------------------------------------------------|
| 1     | o                     | Inches.                         |                                   |                                                                                                 |
| 2     | Sunday.<br>130.8      | 0.80                            | S. & S. E.                        | Cloudless till 6 A. M. Scatd. \i & \i afterwards; also drizzling at 1 & at 5 P. M.              |
| 3     | ..                    | 0.86                            | S.                                | Scatd. \i & \i till 6 P. M. cloudless afterwards; also raining at 4 A. M.                       |
| 4     | ..                    | 0.09                            | S. & S. E.                        | Cloudless till 4 A. M. cloudy afterwards; also constantly drizzling between 2 & 8 P. M.         |
| 5     | ..                    | 0.60                            | S.                                | Cloudy; also raining between 8 A. M. & 1 P. M.                                                  |
| 6     | 115.0                 | ..                              | S.                                | Cloudy; also slightly raining at 4 A. M.                                                        |
| 7     | ..                    | 1.38                            | S.                                | Scatd. \i till 5 A. M. cloudy afterwards; also raining after intervals between 1 & 10 P. M.     |
| 8     | Sunday.               |                                 |                                   |                                                                                                 |
| 9     | ..                    | ..                              | S. & S. W.                        | Cloudy.                                                                                         |
| 10    | 120.0                 | ..                              | S. & S. W.                        | Scatd. \i till 1 P. M. Scatd. clouds till 7 P. M. cloudless afterwards.                         |
| 11    | 135.0                 | ..                              | S. W. & S.                        | Scatd. \i & \i till 7 A. M. cloudless till 1 P. M. Scatd. \i till 7 P. M. cloudless afterwards. |
| 12    | 123.7                 | ..                              | S.                                | Cloudy.                                                                                         |
| 13    | 128.0                 | ..                              | S. E. & S.                        | Cloudless till 9 A. M. Scatd. \i & \i afterwards.                                               |
| 14    | ..                    | ..                              | S. E. & S. & E.                   | Cloudless till 4 A. M. cloudy till 7 P. M. cloudless afterwards.                                |
| 15    | Sunday.               | 1.60                            |                                   |                                                                                                 |
| 16    | ..                    | 0.22                            | S. & S. E.                        | Scatd. \i till 10 A. M. cloudy afterwards; also drizzling at Noon & 3 P. M.                     |
| 17    | ..                    | 0.42                            | S. & S. E.                        | Cloudy; also raining at Midnight & between 10 A. M. & 1 P. M.                                   |
| 18    | ..                    | 0.26                            | S. & S. E.                        | Cloudy; also raining at 1 A. M. & 10 & 11 A. M.                                                 |
| 19    | ..                    | ..                              | S. & S. W.                        | Cloudless till 7 A. M. Scatd. \i till 6 P. M. Scatd. \i & \i afterwards.                        |
| 20    | ..                    | ..                              | S. E.                             | Cloudy till 7 P. M. cloudless afterwards; also drizzling at 9 A. M.                             |
| 21    | ..                    | 0.15                            | S. & S. W. & S. E.                | Cloudless till 8 A. M. cloudy afterwards; also raining at 10 A. M.                              |
| 22    | Sunday.               | 1.86                            |                                   |                                                                                                 |
| 23    | ..                    | 1.85                            | S. & S. E.                        | Cloudy; also constantly raining before 1 P. M.                                                  |

Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1860.

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                           |
|-------|-----------------------|---------------------------------|-----------------------------------|------------------------------------------------------|
| 24    | ..                    | 0.12                            | S. E. & S.                        | Cloudy; also constantly raining.                     |
| 25    | ..                    | 2.84                            | S. E. & W. & S.                   | Cloudy; also constantly raining.                     |
| 26    | ..                    | 2.02                            | S.                                | Cloudy, with rain the whole day.                     |
| 27    | ..                    | ..                              | S. & S. E.                        | Cloudy; also drizzling at 6 A. M.                    |
| 28    | ..                    | 1.10                            | S. & S. E.                        | Cloudy; also incessantly raining between 2 & 8 A. M. |
| 29    | <i>Sunday.</i>        | 0.28                            |                                   |                                                      |
| 30    | .                     | 0.49                            | S. & S. E.                        | Cloudy; also occasionally drizzling.                 |
| 31    | 117.0                 | 0.98                            | E. & S.                           | Cloudy; also raining at 3 & 7 P. M.                  |

∩i Cirri, ∪i Cirro strati, ∩i Cumuli, ∪i Cumulo strati, ∪i Nimbi, —i Strati, ∪i Cirro cumuli.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1860.*

MONTHLY RESULTS.

|                                                               |    |    | Inches |
|---------------------------------------------------------------|----|----|--------|
| Mean height of the Barometer for the month,                   | .. | .. | 29.532 |
| Max. height of the Barometer occurred at 8 A. M. on the 18th, | .. | .. | 29.644 |
| Min. height of the Barometer occurred at 4 P. M. on the 11th, | .. | .. | 29.373 |
| <i>Extreme range</i> of the Barometer during the month,       | .. | .. | 0.271  |
| Mean of the Daily Max. Pressures,                             | .. | .. | 29.579 |
| Ditto ditto Min. ditto,                                       | .. | .. | 29.475 |
| <i>Mean daily range</i> of the Barometer during the month,    | .. | .. | 0.104  |

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|                                                              |    |    | °    |
|--------------------------------------------------------------|----|----|------|
| Mean Dry Bulb Thermometer for the month,                     | .. | .. | 83.9 |
| Max. Temperature occurred at 2 & 3 P. M. on the 11th,        | .. | .. | 96.8 |
| Min. Temperature occurred at 4 A. M. on the 23rd,            | .. | .. | 77.0 |
| <i>Extreme range</i> of the Temperature during the month,    | .. | .. | 19.8 |
| Mean of the daily Max. Temperature,                          | .. | .. | 88.8 |
| Ditto ditto Min. ditto,                                      | .. | .. | 80.3 |
| <i>Mean daily range</i> of the Temperature during the month, | .. | .. | 8.5  |
| Mean Wet bulb Thermometer for the month,                     | .. | .. | 80.7 |
| Mean Dry bulb Thermometer above mean Wet bulb Thermometer,   | .. | .. | 3.2  |
| Computed Mean-Dew point for the month,                       | .. | .. | 79.1 |
| Mean Dry bulb Thermometer above computed mean Dew-point,     | .. | .. | 4.8  |

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|                                             |    |    | Inches |
|---------------------------------------------|----|----|--------|
| Mean Elastic force of Vapour for the month, | .. | .. | 0.973  |

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|                                                                         |    |    | Troy grains |
|-------------------------------------------------------------------------|----|----|-------------|
| Mean Weight of Vapour for the month,                                    | .. | .. | 10.42       |
| Additional Weight of Vapour required for complete saturation,           | .. | .. | 1.71        |
| Mean degree of humidity for the month, complete saturation being unity, | .. | .. | 0.86        |

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|                                                    |    |    | Inches     |
|----------------------------------------------------|----|----|------------|
| Rained 23 days, Max. fall of rain during 24 hours, | .. | .. | 2.84       |
| Total amount of rain during the month,             | .. | .. | 17.92      |
| Prevailing direction of the Wind,                  | .. | .. | S. & S. E. |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1860.*

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind  
blew, together with the number of days on which at the same hour,  
when any particular wind was blowing, it rained.

| Hour.     | N.           | Rain on.<br>N. E. | Rain on. | E. | Rain on.<br>S. E. | Rain on.<br>S. | Rain on.<br>S. W. | Rain on.<br>W. | Rain on.<br>N. W. | Rain on.<br>Calm. | Rain on. | Missed. |
|-----------|--------------|-------------------|----------|----|-------------------|----------------|-------------------|----------------|-------------------|-------------------|----------|---------|
|           | No. of days. |                   |          |    |                   |                |                   |                |                   |                   |          |         |
| Midnight. |              |                   |          |    | 8                 | 2              | 16                | 1              |                   |                   |          | 1       |
| 1         |              |                   |          | 1  | 9                 | 2              | 15                | 3              | 1                 |                   |          |         |
| 2         |              |                   |          | 1  | 9                 | 1              | 15                | 3              | 1                 |                   |          |         |
| 3         |              |                   |          | 2  | 8                 | 2              | 14                | 2              | 1                 |                   |          | 1       |
| 4         |              |                   |          | 2  | 1                 | 8              | 3                 | 12             | 2                 |                   |          | 2       |
| 5         |              |                   |          | 1  | 6                 | 2              | 14                | 1              | 2                 |                   |          | 3       |
| 6         |              | 1                 |          | 1  | 8                 | 2              | 14                | 2              | 2                 |                   |          |         |
| 7         |              | 1                 |          | 3  | 7                 | 2              | 13                | 1              | 2                 |                   |          |         |
| 8         |              |                   |          | 4  | 1                 | 4              | 16                | 1              | 1                 | 1                 | 1        |         |
| 9         |              |                   |          | 3  | 6                 | 1              | 12                | 2              | 4                 | 1                 | 1        |         |
| 10        |              |                   |          | 1  | 3                 |                | 15                | 4              | 6                 | 1                 | 1        |         |
| 11        |              |                   |          | 1  | 5                 |                | 15                | 5              | 3                 | 2                 | 1        |         |
| Noon.     |              | 1                 |          |    | 7                 |                | 13                | 4              | 3                 |                   | 2        | 1       |
| 1         |              | 1                 |          | 1  | 7                 | 1              | 11                | 4              | 5                 | 1                 | 1        |         |
| 2         | 1            |                   |          | 3  | 5                 |                | 11                | 2              | 6                 | 2                 |          |         |
| 3         |              |                   |          | 2  | 1                 | 6              | 2                 | 11             | 2                 | 6                 | 2        |         |
| 4         |              |                   |          | 2  | 1                 | 3              |                   | 15             | 1                 | 4                 |          |         |
| 5         |              |                   |          | 1  | 3                 |                | 20                | 4              | 1                 |                   |          | 1       |
| 6         |              |                   |          | 1  | 5                 |                | 19                | 3              | 1                 |                   |          |         |
| 7         |              |                   |          | 1  | 1                 | 7              | 1                 | 15             | 1                 | 3                 |          |         |
| 8         |              |                   |          |    | 8                 | 2              | 17                | 2              | 1                 |                   |          |         |
| 9         |              |                   |          |    | 7                 | 1              | 18                | 2              | 1                 |                   |          |         |
| 10        |              |                   |          |    | 7                 | 1              | 17                | 3              | 1                 |                   |          | 1       |
| 11        |              |                   |          |    | 7                 | 1              | 16                | 1              | 1                 |                   | 1        | 1       |

*Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August, 1860.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

| Date. | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer during the day. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature during the day. |      |       |
|-------|-------------------------------------------|----------------------------------------|---------|---------|----------------------------|------------------------------------------|------|-------|
|       |                                           | Max.                                   | Min.    | Diff.   |                            | Max.                                     | Min. | Diff. |
|       | Inches.                                   | Inches.                                | Inches. | Inches. | o                          | o                                        | o    | o     |
| 1     | 29.536                                    | 29.571                                 | 29.479  | 0.092   | 82.6                       | 87.0                                     | 79.6 | 7.4   |
| 2     | .454                                      | .546                                   | .365    | .181    | 83.5                       | 88.2                                     | 80.8 | 7.4   |
| 3     | .403                                      | .455                                   | .363    | .092    | 81.6                       | 85.4                                     | 79.2 | 6.2   |
| 4     | .471                                      | .519                                   | .409    | .140    | 82.4                       | 85.8                                     | 79.2 | 6.6   |
| 5     | <i>Sunday.</i>                            |                                        |         |         |                            |                                          |      |       |
| 6     | .539                                      | .583                                   | .483    | .100    | 84.1                       | 88.4                                     | 81.0 | 7.4   |
| 7     | .594                                      | .644                                   | .548    | .096    | 82.1                       | 85.7                                     | 79.8 | 5.9   |
| 8     | .621                                      | .661                                   | .573    | .088    | 81.6                       | 84.8                                     | 79.0 | 5.8   |
| 9     | .627                                      | .681                                   | .541    | .140    | 85.3                       | 92.0                                     | 79.4 | 12.6  |
| 10    | .603                                      | .678                                   | .524    | .154    | 87.2                       | 92.8                                     | 82.6 | 10.2  |
| 11    | .515                                      | .564                                   | .424    | .140    | 88.5                       | 95.6                                     | 84.2 | 11.4  |
| 12    | <i>Sunday.</i>                            |                                        |         |         |                            |                                          |      |       |
| 13    | .514                                      | .573                                   | .470    | .103    | 83.5                       | 87.4                                     | 80.6 | 6.8   |
| 14    | .565                                      | .613                                   | .511    | .102    | 83.5                       | 88.0                                     | 80.6 | 7.4   |
| 15    | .587                                      | .615                                   | .526    | .119    | 83.9                       | 87.6                                     | 80.6 | 7.0   |
| 16    | .558                                      | .600                                   | .486    | .114    | 84.1                       | 88.8                                     | 81.2 | 7.6   |
| 17    | .575                                      | .630                                   | .530    | .100    | 81.5                       | 82.7                                     | 79.8 | 2.9   |
| 18    | .664                                      | .722                                   | .607    | .115    | 80.7                       | 83.5                                     | 78.8 | 4.7   |
| 19    | <i>Sunday.</i>                            |                                        |         |         |                            |                                          |      |       |
| 20    | .701                                      | .748                                   | .653    | .095    | 82.7                       | 86.8                                     | 79.4 | 7.4   |
| 21    | .652                                      | .710                                   | .583    | .127    | 80.8                       | 82.6                                     | 78.7 | 3.9   |
| 22    | .635                                      | .678                                   | .591    | .087    | 82.4                       | 86.2                                     | 79.2 | 7.0   |
| 23    | .663                                      | .696                                   | .605    | .091    | 82.3                       | 88.6                                     | 79.2 | 9.4   |
| 24    | .675                                      | .745                                   | .617    | .128    | 83.2                       | 88.4                                     | 79.6 | 8.8   |
| 25    | .719                                      | .777                                   | .667    | .110    | 82.5                       | 85.1                                     | 80.0 | 5.1   |
| 26    | <i>Sunday.</i>                            |                                        |         |         |                            |                                          |      |       |
| 27    | .751                                      | .826                                   | .702    | .124    | 82.6                       | 86.0                                     | 79.0 | 7.0   |
| 28    | .722                                      | .784                                   | .640    | .144    | 85.5                       | 92.6                                     | 81.0 | 11.6  |
| 29    | .669                                      | .734                                   | .585    | .149    | 86.4                       | 93.0                                     | 82.2 | 10.8  |
| 30    | .652                                      | .708                                   | .580    | .128    | 86.6                       | 91.8                                     | 82.8 | 9.0   |
| 31    | .683                                      | .748                                   | .615    | .133    | 86.3                       | 91.5                                     | 82.6 | 8.9   |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly observations made during the day.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of August, 1860.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Thermometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew Point. | Mean Elastic force of Vapour. | Mean Weight of Vapour in a cubic foot of Air. | Additional Weight of Vapour required for complete saturation. | Mean degree of Humidity, complete saturation being unity. |
|-------|----------------------------|---------------------|---------------------|---------------------------|-------------------------------|-----------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------|
|       | °                          | °                   | °                   | °                         | Inches.                       | T. gr.                                        | T. gr.                                                        |                                                           |
| 1     | 80.3                       | 2.3                 | 79.1                | 3.5                       | .973                          | 10.43                                         | 1.23                                                          | .90                                                       |
| 2     | 80.9                       | 2.6                 | 79.6                | 3.9                       | .989                          | .60                                           | .40                                                           | .88                                                       |
| 3     | 79.3                       | 2.3                 | 78.1                | 3.5                       | .943                          | .14                                           | .20                                                           | .89                                                       |
| 4     | 79.8                       | 2.6                 | 78.5                | 3.9                       | .955                          | .27                                           | .34                                                           | .89                                                       |
| 5     | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 6     | 80.0                       | 4.1                 | 77.9                | 6.2                       | .937                          | .04                                           | 2.17                                                          | .82                                                       |
| 7     | 79.2                       | 2.9                 | 77.7                | 4.4                       | .931                          | .02                                           | 1.49                                                          | .87                                                       |
| 8     | 79.2                       | 2.4                 | 78.0                | 3.6                       | .940                          | .11                                           | .23                                                           | .89                                                       |
| 9     | 81.1                       | 4.2                 | 79.0                | 6.3                       | .970                          | .37                                           | 2.27                                                          | .82                                                       |
| 10    | 82.3                       | 4.9                 | 79.8                | 7.4                       | .995                          | .60                                           | .77                                                           | .79                                                       |
| 11    | 83.4                       | 5.1                 | 80.8                | 7.7                       | 1.027                         | .89                                           | .99                                                           | .79                                                       |
| 12    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 13    | 80.5                       | 3.0                 | 79.0                | 4.5                       | 0.970                         | .40                                           | 1.60                                                          | .87                                                       |
| 14    | 80.4                       | 3.1                 | 78.8                | 4.7                       | .964                          | .34                                           | .66                                                           | .86                                                       |
| 15    | 80.9                       | 3.0                 | 79.4                | 4.5                       | .983                          | .51                                           | .62                                                           | .87                                                       |
| 16    | 81.1                       | 3.0                 | 79.6                | 4.5                       | .989                          | .58                                           | .63                                                           | .87                                                       |
| 17    | 80.0                       | 1.5                 | 79.2                | 2.3                       | .976                          | .52                                           | 0.79                                                          | .93                                                       |
| 18    | 79.2                       | 1.5                 | 78.4                | 2.3                       | .952                          | .27                                           | .77                                                           | .93                                                       |
| 19    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 20    | 80.4                       | 2.3                 | 79.2                | 3.5                       | .976                          | .48                                           | 1.24                                                          | .89                                                       |
| 21    | 79.5                       | 1.3                 | 78.8                | 2.0                       | .964                          | .40                                           | 0.67                                                          | .94                                                       |
| 22    | 78.7                       | 3.7                 | 76.8                | 5.6                       | .905                          | 9.71                                          | 1.90                                                          | .84                                                       |
| 23    | 79.1                       | 3.2                 | 77.5                | 4.8                       | .925                          | .94                                           | .61                                                           | .86                                                       |
| 24    | 80.0                       | 3.2                 | 78.4                | 4.8                       | .952                          | 10.21                                         | .68                                                           | .86                                                       |
| 25    | 80.1                       | 2.4                 | 78.9                | 3.6                       | .967                          | .39                                           | .25                                                           | .89                                                       |
| 26    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 27    | 80.8                       | 1.8                 | 79.9                | 2.7                       | .998                          | .72                                           | 0.96                                                          | .92                                                       |
| 28    | 82.0                       | 3.5                 | 80.2                | 5.3                       | 1.008                         | .77                                           | 1.95                                                          | .85                                                       |
| 29    | 81.9                       | 4.5                 | 79.6                | 6.8                       | 0.989                         | .54                                           | 2.52                                                          | .81                                                       |
| 30    | 82.3                       | 4.3                 | 80.1                | 6.5                       | 1.005                         | .69                                           | .45                                                           | .81                                                       |
| 31    | 82.1                       | 4.2                 | 80.0                | 6.3                       | .001                          | .68                                           | .34                                                           | .82                                                       |

All the Hygrometrical elements are computed by the Greenwich Constants.

*Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August, 1860.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

| Hour.      | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | o                          | o                                                        | o    | o     |
| Mid-night. | 29.621                                    | 29.750                                                 | 29.407  | 0.343   | 81.9                       | 85.0                                                     | 79.6 | 5.4   |
| 1          | .606                                      | .750                                                   | .403    | .347    | 81.7                       | 84.8                                                     | 79.4 | 5.4   |
| 2          | .596                                      | .724                                                   | .398    | .326    | 81.4                       | 84.7                                                     | 79.2 | 5.5   |
| 3          | .589                                      | .724                                                   | .385    | .339    | 81.2                       | 84.6                                                     | 79.0 | 5.6   |
| 4          | .591                                      | .726                                                   | .378    | .348    | 80.7                       | 83.4                                                     | 78.7 | 4.7   |
| 5          | .592                                      | .741                                                   | .396    | .345    | 80.8                       | 84.2                                                     | 79.0 | 5.2   |
| 6          | .609                                      | .745                                                   | .397    | .348    | 80.6                       | 84.2                                                     | 78.8 | 5.4   |
| 7          | .625                                      | .763                                                   | .416    | .347    | 81.2                       | 84.8                                                     | 78.8 | 6.0   |
| 8          | .640                                      | .794                                                   | .423    | .371    | 82.6                       | 86.2                                                     | 79.0 | 7.2   |
| 9          | .651                                      | .816                                                   | .435    | .381    | 84.1                       | 88.2                                                     | 79.3 | 8.9   |
| 10         | .652                                      | .826                                                   | .430    | .396    | 85.2                       | 90.4                                                     | 79.2 | 11.2  |
| 11         | .645                                      | .816                                                   | .426    | .390    | 86.0                       | 92.2                                                     | 79.8 | 12.4  |
| Noon.      | .631                                      | .796                                                   | .410    | .386    | 86.3                       | 93.6                                                     | 80.6 | 13.0  |
| 1          | .610                                      | .778                                                   | .389    | .389    | 86.6                       | 94.4                                                     | 80.4 | 14.0  |
| 2          | .586                                      | .746                                                   | .377    | .369    | 87.2                       | 95.6                                                     | 79.6 | 16.0  |
| 3          | .565                                      | .724                                                   | .363    | .361    | 87.1                       | 94.0                                                     | 81.2 | 12.8  |
| 4          | .554                                      | .716                                                   | .369    | .347    | 86.7                       | 95.4                                                     | 80.2 | 15.2  |
| 5          | .549                                      | .702                                                   | .365    | .337    | 85.9                       | 94.2                                                     | 80.4 | 13.8  |
| 6          | .559                                      | .709                                                   | .372    | .337    | 84.7                       | 92.4                                                     | 79.7 | 12.7  |
| 7          | .576                                      | .718                                                   | .383    | .335    | 83.5                       | 88.0                                                     | 79.4 | 8.6   |
| 8          | .602                                      | .752                                                   | .405    | .347    | 82.9                       | 87.0                                                     | 79.2 | 7.8   |
| 9          | .621                                      | .767                                                   | .425    | .342    | 82.7                       | 86.8                                                     | 79.4 | 7.4   |
| 10         | .636                                      | .768                                                   | .434    | .334    | 82.2                       | 86.0                                                     | 79.2 | 6.8   |
| 11         | .626                                      | .767                                                   | .429    | .338    | 82.2                       | 85.6                                                     | 79.2 | 6.4   |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of August, 1860.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force<br>of Vapour. | Mean Weight of Va-<br>pour in a Cubic<br>foot of Air. | Additional Weight of<br>Vapour required<br>for complete satu-<br>ration. | Mean degree of Hu-<br>midity, complete<br>saturation being<br>unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                                |                                                                      |
| Mid-<br>night. | 80.0                            | 1.9                 | 79.0                | 2.9                          | 0.970                            | 10.44                                                 | 1.00                                                                     | 0.91                                                                 |
| 1              | 79.8                            | 1.9                 | 78.8                | 2.9                          | .964                             | .38                                                   | 0.99                                                                     | .91                                                                  |
| 2              | 79.6                            | 1.8                 | 78.7                | 2.7                          | .961                             | .35                                                   | .92                                                                      | .92                                                                  |
| 3              | 79.5                            | 1.7                 | 78.6                | 2.6                          | .958                             | .32                                                   | .89                                                                      | .92                                                                  |
| 4              | 79.2                            | 1.5                 | 78.4                | 2.3                          | .952                             | .27                                                   | .77                                                                      | .93                                                                  |
| 5              | 79.2                            | 1.6                 | 78.4                | 2.4                          | .952                             | .27                                                   | .80                                                                      | .93                                                                  |
| 6              | 79.1                            | 1.5                 | 78.3                | 2.3                          | .949                             | .24                                                   | .77                                                                      | .93                                                                  |
| 7              | 79.4                            | 1.8                 | 78.5                | 2.7                          | .955                             | .29                                                   | .92                                                                      | .92                                                                  |
| 8              | 80.0                            | 2.6                 | 78.7                | 3.9                          | .961                             | .33                                                   | 1.35                                                                     | .88                                                                  |
| 9              | 80.9                            | 3.2                 | 79.3                | 4.8                          | .979                             | .48                                                   | .73                                                                      | .86                                                                  |
| 10             | 81.2                            | 4.0                 | 79.2                | 6.0                          | .976                             | .43                                                   | 2.18                                                                     | .83                                                                  |
| 11             | 81.5                            | 4.5                 | 79.2                | 6.8                          | .976                             | .41                                                   | .50                                                                      | .81                                                                  |
| Noon.          | 81.6                            | 4.7                 | 79.2                | 7.1                          | .976                             | .41                                                   | .61                                                                      | .80                                                                  |
| 1              | 81.8                            | 4.8                 | 79.4                | 7.2                          | .983                             | .47                                                   | .67                                                                      | .80                                                                  |
| 2              | 82.1                            | 5.1                 | 79.5                | 7.7                          | .986                             | .49                                                   | .88                                                                      | .79                                                                  |
| 3              | 81.9                            | 5.2                 | 79.3                | 7.8                          | .979                             | .42                                                   | .91                                                                      | .78                                                                  |
| 4              | 81.7                            | 5.0                 | 79.2                | 7.5                          | .976                             | .39                                                   | .79                                                                      | .79                                                                  |
| 5              | 81.5                            | 4.4                 | 79.3                | 6.6                          | .979                             | .44                                                   | .43                                                                      | .81                                                                  |
| 6              | 81.2                            | 3.5                 | 79.4                | 5.3                          | .983                             | .51                                                   | 1.91                                                                     | .85                                                                  |
| 7              | 80.5                            | 3.0                 | 79.0                | 4.5                          | .970                             | .40                                                   | .60                                                                      | .87                                                                  |
| 8              | 80.2                            | 2.7                 | 78.8                | 4.1                          | .964                             | .36                                                   | .43                                                                      | .88                                                                  |
| 9              | 80.3                            | 2.4                 | 79.1                | 3.6                          | .973                             | .45                                                   | .27                                                                      | .89                                                                  |
| 10             | 80.1                            | 2.1                 | 79.0                | 3.2                          | .970                             | .44                                                   | .10                                                                      | .91                                                                  |
| 11             | 80.1                            | 2.1                 | 79.0                | 3.2                          | .970                             | .44                                                   | .10                                                                      | .91                                                                  |

All the Hygrometrical elements are computed by the Greenwich Constants.



Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August, 1860.

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                         |
|-------|-----------------------|---------------------------------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------|
| 1     | o                     | Inches                          |                                   |                                                                                                                    |
| 2     | ...                   | 2.13                            | S. & E.                           | Cloudy and heavy rain in the morning.                                                                              |
| 3     | ...                   | ..                              | N. & E. & S.                      | Scatd. clouds with slight drizzling between 5 & 6 P. M.                                                            |
| 4     | ...                   | 0.35                            | N. E. & S. & E.                   | Scatd. clouds & occasionally drizzling.                                                                            |
| 5     | ...                   | 0.38                            | S. & E.                           | Cloudy with rain between 2 & 5 A. M.                                                                               |
| 6     | Sunday.               |                                 |                                   |                                                                                                                    |
| 7     | 121.0                 | ..                              | N. E. & E.                        | Cloudy with slight drizzling at 11 A. M. & 7 P. M.                                                                 |
| 8     | 112.0                 | 0.12                            | E. & S. E.                        | Cloudy & occasionally drizzling.                                                                                   |
| 9     | ...                   | 0.29                            | E. & S.                           | Cloudy with occasional drizzling.                                                                                  |
| 10    | 135.8                 | 0.05                            | S & S. E.                         | Scatd. $\cup$ i & $\cap$ i.                                                                                        |
| 11    | 129.5                 | ..                              | W. & S. W.                        | Scatd. clouds of various kinds till 6 P. M. cloudless afterwards.                                                  |
| 12    | 139.0                 | 1.29                            | W. & E.                           | Cloudless till 5 A. M. Scatd. $\cup$ i & $\cap$ i till 6 P. M. cloudy afterwards; also raining between 7 & 9 P. M. |
| 13    | Sunday.               | 1.16                            |                                   |                                                                                                                    |
| 14    | ...                   | 0.15                            | S. & E.                           | Cloudy; also drizzling at 2 & 7 & 8 P. M.                                                                          |
| 15    | ...                   | 0.26                            | S. & S. E.                        | Scatd. clouds; also drizzling at 1 & 11 A. M.; also raining at 10 P. M.                                            |
| 16    | ...                   | ..                              | S. & S. E.                        | Cloudy till 7 P. M. cloudless afterwards; also drizzling at 1 & 2 & 10 A. M.                                       |
| 17    | ...                   | 1.18                            | S. & S. E.                        | Cloudy; also drizzling between Midnight & 3 A. M.; also raining between 8 & 11 P. M.                               |
| 18    | ...                   | 1.09                            | S. & S. E.                        | Cloudy; also constantly raining between 3 A. M. & 3 P. M.                                                          |
| 19    | ...                   | 0.43                            | S. & E.                           | Cloudy; also constantly raining.                                                                                   |
| 20    | Sunday.               |                                 |                                   |                                                                                                                    |
| 21    | ...                   | 1.12                            | S. & E.                           | Cloudy; also raining between 3 & 6 P. M.                                                                           |
| 22    | ...                   | 0.87                            | S. W. & S.                        | Cloudy; also constantly raining between 1 A. M. & 4 P. M.                                                          |
| 23    | ...                   | 0.27                            | W. & S. & S. W.                   | Cloudy; also drizzling at 4 & 5 A. M. & at Noon.                                                                   |
| 24    | ...                   | 0.93                            | S. & S. W.                        | Cloudless till 5 A. M. cloudy afterwards between 4 & 11 P. M.                                                      |
| 25    | ...                   | ..                              | S. & S. W.                        | Cloudy; also drizzling at midnight; also constantly raining.                                                       |
| 26    | ...                   | ..                              | N. W. & S. E.                     | Cloudy & drizzling occasionally.                                                                                   |
| 27    | Sunday.               | 1.76                            |                                   |                                                                                                                    |
| 28    | ...                   | 0.57                            | E. & S.                           | Cloudy; also constantly raining between 3 & 6 A. M.; also drizzling at 10 A. M.                                    |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of August, 1860.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                        |
|-------|-----------------------|---------------------------------|-----------------------------------|---------------------------------------------------|
|       |                       | Inches.                         |                                   |                                                   |
| 28    | 135.8                 | ..                              | S. E. & S.                        | Scatd. \i & ci till 7 P. M. cloudless afterwards. |
| 29    | 134.0                 | ..                              | S. & W.                           | Scatd. \i & ci.                                   |
| 30    | 132.8                 | ..                              | S. & S. W.                        | Scatd. \i & \i.                                   |
| 31    | 140.4                 | 0.25                            | S. & S. E. & E.                   | Scatd. \i & ci.                                   |

\i Cirri, \i Cirro strati, ci Cumuli, ci Cumulo strati, \i Nimbi, \i Strati, \i Cirro cumuli.

*Abstract of the Results of the Hourly Metcorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of August, 1860.*

MONTHLY RESULTS.

|                                                                 |    |    | Inches |
|-----------------------------------------------------------------|----|----|--------|
| Mean height of the Barometer for the month,                     | .. | .. | 29.605 |
| Max. height of the Barometer, occurred at 10 A. M. on the 27th, | .. | .. | 29.826 |
| Min. height of the Barometer, occurred at 3 P. M. on the 3rd,   | .. | .. | 29.363 |
| <i>Extreme range</i> of the Barometer during the month,         | .. | .. | 0.463  |
| Mean of the Daily Max. Pressures,                               | .. | .. | 29.662 |
| Ditto ditto Min. ditto, .                                       | .. | .. | 29.544 |
| <i>Mean daily range</i> of the Barometer during the month,      | .. | .. | 0.118  |

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|                                                              |    |    | o    |
|--------------------------------------------------------------|----|----|------|
| Mean Dry Bulb Thermometer for the month,                     | .. | .. | 83.6 |
| Max. Temperature occurred at 2 P. M. on the 11th,            | .. | .. | 95.6 |
| Min. Temperature occurred at 4 A. M. on the 21st,            | .. | .. | 78.7 |
| <i>Extreme range</i> of the Temperature during the month,    | .. | .. | 16.9 |
| Mean of the daily Max. Temperature,                          | .. | .. | 88.0 |
| Ditto ditto Min. ditto,                                      | .. | .. | 80.4 |
| <i>Mean daily range</i> of the Temperature during the month, | .. | .. | 7.6  |

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|                                                               |    |    | o      |
|---------------------------------------------------------------|----|----|--------|
| Mean Wet Bulb Thermometer for the month,                      | .. | .. | 80.5   |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, .. |    |    | 3.1    |
| Computed Mean Dew Point for the month,                        | .. | .. | 78.9   |
| Mean Dry Bulb Thermometer above computed Mean Dew-point, ..   |    |    | 4.7    |
|                                                               |    |    | Inches |
| Mean Elastic force of vapour for the month, ..                | .. | .. | 0.967  |

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|                                                                         |    |    | Troy grains |
|-------------------------------------------------------------------------|----|----|-------------|
| Mean weight of Vapour for the month,                                    | .. | .. | 10.37       |
| Additional weight of Vapour required for complete saturation,           | .. |    | 1.66        |
| Mean degree of humidity for the month, complete saturation being unity, |    |    | 0.86        |

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|                                                    |    |    | Inches  |
|----------------------------------------------------|----|----|---------|
| Rained 25 days, Max. fall of rain during 24 hours, | .. | .. | 2.13    |
| Total amount of rain during the month,             | .. | .. | 14.65   |
| Prevailing direction of the Wind,                  | .. | .. | S. & E. |



*Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of September, 1860.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

| Date. | Mean Height of the Barometer at 32° Fahrt. | Range of the Barometer during the day. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature during the day. |      |       |
|-------|--------------------------------------------|----------------------------------------|---------|---------|----------------------------|------------------------------------------|------|-------|
|       |                                            | Max.                                   | Min.    | Diff.   |                            | Max.                                     | Min. | Diff. |
|       | Inches.                                    | Inches.                                | Inches. | Inches. | o                          | o                                        | o    | o     |
| 1     | 29.687                                     | 29.737                                 | 29.611  | 0.126   | 84.2                       | 89.6                                     | 81.5 | 8.1   |
| 2     | <i>Sunday.</i>                             |                                        |         |         |                            |                                          |      |       |
| 3     | .686                                       | .740                                   | .640    | .100    | 84.0                       | 89.6                                     | 80.8 | 8.8   |
| 4     | .691                                       | .752                                   | .625    | .127    | 84.5                       | 89.4                                     | 80.8 | 8.6   |
| 5     | .712                                       | .762                                   | .666    | .096    | 83.5                       | 87.4                                     | 81.2 | 6.2   |
| 6     | .724                                       | .791                                   | .669    | .122    | 83.2                       | 88.6                                     | 81.2 | 7.4   |
| 7     | .660                                       | .724                                   | .574    | .150    | 83.9                       | 89.5                                     | 80.2 | 9.3   |
| 8     | .586                                       | .643                                   | .507    | .136    | 82.2                       | 86.0                                     | 79.4 | 6.6   |
| 9     | <i>Sunday.</i>                             |                                        |         |         |                            |                                          |      |       |
| 10    | .724                                       | .794                                   | .658    | .136    | 81.9                       | 83.8                                     | 81.0 | 2.8   |
| 11    | .706                                       | .774                                   | .621    | .153    | 83.6                       | 89.2                                     | 80.0 | 9.2   |
| 12    | .684                                       | .736                                   | .613    | .123    | 84.6                       | 91.0                                     | 81.0 | 10.0  |
| 13    | .710                                       | .767                                   | .660    | .107    | 84.5                       | 89.6                                     | 80.8 | 8.8   |
| 14    | .701                                       | .766                                   | .641    | .125    | 84.1                       | 89.0                                     | 80.4 | 8.6   |
| 15    | .627                                       | .683                                   | .567    | .116    | 83.2                       | 88.4                                     | 80.6 | 7.8   |
| 16    | <i>Sunday.</i>                             |                                        |         |         |                            |                                          |      |       |
| 17    | .588                                       | .650                                   | .536    | .114    | 84.2                       | 89.1                                     | 81.4 | 7.7   |
| 18    | .563                                       | .610                                   | .504    | .106    | 83.1                       | 90.0                                     | 80.0 | 10.0  |
| 19    | .509                                       | .558                                   | .443    | .115    | 81.6                       | 85.6                                     | 79.4 | 6.2   |
| 20    | .505                                       | .608                                   | .417    | .191    | 80.6                       | 82.8                                     | 78.2 | 4.6   |
| 21    | .653                                       | .717                                   | .563    | .154    | 81.0                       | 86.2                                     | 77.2 | 9.0   |
| 22    | .694                                       | .745                                   | .635    | .110    | 85.0                       | 91.2                                     | 79.0 | 12.2  |
| 23    | <i>Sunday.</i>                             |                                        |         |         |                            |                                          |      |       |
| 24    | .694                                       | .756                                   | .620    | .136    | 84.7                       | 89.2                                     | 82.4 | 6.8   |
| 25    | .718                                       | .787                                   | .635    | .152    | 84.9                       | 91.1                                     | 81.3 | 9.8   |
| 26    | .725                                       | .793                                   | .671    | .122    | 82.2                       | 88.4                                     | 80.4 | 8.0   |
| 27    | .714                                       | .772                                   | .653    | .119    | 82.5                       | 89.8                                     | 79.6 | 10.2  |
| 28    | .719                                       | .796                                   | .642    | .154    | 83.2                       | 88.2                                     | 79.8 | 8.4   |
| 29    | .703                                       | .777                                   | .630    | .147    | 84.2                       | 91.2                                     | 80.4 | 10.8  |
| 30    | <i>Sunday.</i>                             |                                        |         |         |                            |                                          |      |       |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly observations made during the day.

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taken at the Surveyor General's Office, Calcutta,  
in the month of September, 1860.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
| 1     | 80.9                            | 3.3                 | 79.2                | 5.0                          | Inches.<br>0.976                 | T. gr.<br>10.45                                  | T. gr.<br>1.79                                                          | 0.85                                                                |
| 2     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 3     | 81.1                            | 2.9                 | 79.6                | 4.4                          | .989                             | .60                                              | .57                                                                     | .87                                                                 |
| 4     | 80.8                            | 3.7                 | 78.9                | 5.6                          | .967                             | .34                                              | 2.01                                                                    | .84                                                                 |
| 5     | 80.7                            | 2.8                 | 79.3                | 4.2                          | .979                             | .51                                              | 1.49                                                                    | .88                                                                 |
| 6     | 80.9                            | 2.3                 | 79.7                | 3.5                          | .992                             | .63                                              | .26                                                                     | .89                                                                 |
| 7     | 80.6                            | 3.3                 | 78.9                | 5.0                          | .967                             | .37                                              | .76                                                                     | .86                                                                 |
| 8     | 79.6                            | 2.6                 | 78.3                | 3.9                          | .949                             | .20                                              | .34                                                                     | .88                                                                 |
| 9     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 10    | 80.4                            | 1.5                 | 79.6                | 2.3                          | .989                             | .65                                              | 0.79                                                                    | .93                                                                 |
| 11    | 81.0                            | 2.6                 | 79.7                | 3.9                          | .992                             | .63                                              | 1.40                                                                    | .88                                                                 |
| 12    | 81.3                            | 3.3                 | 79.6                | 5.0                          | .989                             | .58                                              | .81                                                                     | .85                                                                 |
| 13    | 80.7                            | 3.8                 | 78.8                | 5.7                          | .964                             | .31                                              | 2.04                                                                    | .84                                                                 |
| 14    | 80.8                            | 3.3                 | 79.1                | 5.0                          | .973                             | .42                                              | 1.79                                                                    | .85                                                                 |
| 15    | 80.5                            | 2.7                 | 79.1                | 4.1                          | .973                             | .45                                              | .44                                                                     | .88                                                                 |
| 16    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 17    | 81.2                            | 3.0                 | 79.7                | 4.5                          | .992                             | .61                                              | .63                                                                     | .87                                                                 |
| 18    | 80.4                            | 2.7                 | 79.0                | 4.1                          | .970                             | .42                                              | .44                                                                     | .88                                                                 |
| 19    | 79.5                            | 2.1                 | 78.4                | 3.2                          | .952                             | .25                                              | .09                                                                     | .90                                                                 |
| 20    | 78.8                            | 1.8                 | 77.9                | 2.7                          | .937                             | .10                                              | 0.91                                                                    | .92                                                                 |
| 21    | 77.9                            | 3.1                 | 76.3                | 4.7                          | .890                             | 9.59                                             | 1.55                                                                    | .86                                                                 |
| 22    | 80.9                            | 4.1                 | 78.8                | 6.2                          | .964                             | 10.31                                            | 2.22                                                                    | .82                                                                 |
| 23    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 24    | 81.7                            | 3.0                 | 80.2                | 4.5                          | 1.008                            | .77                                              | 1.65                                                                    | .87                                                                 |
| 25    | 81.1                            | 3.8                 | 79.2                | 5.7                          | 0.976                            | .43                                              | 2.06                                                                    | .84                                                                 |
| 26    | 79.7                            | 2.5                 | 78.4                | 3.8                          | .952                             | .23                                              | 1.31                                                                    | .89                                                                 |
| 27    | 79.8                            | 2.7                 | 78.4                | 4.1                          | .952                             | .23                                              | .41                                                                     | .88                                                                 |
| 28    | 80.2                            | 3.0                 | 78.7                | 4.5                          | .961                             | .31                                              | .58                                                                     | .87                                                                 |
| 29    | 80.9                            | 3.3                 | 79.2                | 5.0                          | .976                             | .45                                              | .79                                                                     | .85                                                                 |
| 30    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of September, 1860.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

| Hour.      | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | o                          | o                                                        | o    | o     |
| Mid-night. | 29.683                                    | 29.740                                                 | 29.543  | 0.197   | 81.7                       | 84.6                                                     | 78.0 | 6.6   |
| 1          | .666                                      | .724                                                   | .454    | .270    | 81.4                       | 84.2                                                     | 77.8 | 6.4   |
| 2          | .656                                      | .718                                                   | .442    | .276    | 81.2                       | 84.7                                                     | 77.4 | 7.3   |
| 3          | .648                                      | .715                                                   | .427    | .288    | 80.9                       | 84.4                                                     | 77.2 | 7.2   |
| 4          | .647                                      | .711                                                   | .417    | .294    | 80.7                       | 84.0                                                     | 77.2 | 6.8   |
| 5          | .653                                      | .724                                                   | .442    | .282    | 80.7                       | 83.8                                                     | 77.6 | 6.2   |
| 6          | .671                                      | .750                                                   | .444    | .306    | 80.6                       | 83.6                                                     | 77.2 | 6.4   |
| 7          | .690                                      | .764                                                   | .464    | .300    | 81.3                       | 84.2                                                     | 77.8 | 6.4   |
| 8          | .710                                      | .790                                                   | .513    | .277    | 83.1                       | 85.6                                                     | 79.8 | 5.8   |
| 9          | .722                                      | .794                                                   | .516    | .278    | 84.4                       | 87.2                                                     | 80.0 | 7.2   |
| 10         | .723                                      | .796                                                   | .523    | .273    | 85.5                       | 88.2                                                     | 81.0 | 7.2   |
| 11         | .712                                      | .780                                                   | .530    | .250    | 86.3                       | 89.6                                                     | 81.0 | 8.6   |
| Noon.      | .691                                      | .761                                                   | .513    | .248    | 86.9                       | 89.6                                                     | 81.8 | 7.8   |
| 1          | .664                                      | .743                                                   | .497    | .246    | 87.0                       | 91.0                                                     | 81.6 | 9.4   |
| 2          | .641                                      | .725                                                   | .467    | .258    | 86.9                       | 91.2                                                     | 81.2 | 10.0  |
| 3          | .619                                      | .720                                                   | .444    | .276    | 86.1                       | 91.2                                                     | 80.6 | 10.6  |
| 4          | .610                                      | .700                                                   | .450    | .250    | 85.5                       | 91.0                                                     | 80.0 | 11.0  |
| 5          | .613                                      | .705                                                   | .443    | .262    | 84.6                       | 89.8                                                     | 79.8 | 10.0  |
| 6          | .626                                      | .709                                                   | .450    | .259    | 83.6                       | 86.5                                                     | 79.6 | 6.9   |
| 7          | .644                                      | .728                                                   | .461    | .267    | 83.0                       | 86.4                                                     | 79.4 | 7.0   |
| 8          | .668                                      | .746                                                   | .488    | .258    | 82.6                       | 85.8                                                     | 79.6 | 6.2   |
| 9          | .685                                      | .746                                                   | .499    | .247    | 82.4                       | 85.0                                                     | 79.6 | 5.4   |
| 10         | .687                                      | .752                                                   | .521    | .231    | 82.0                       | 84.6                                                     | 78.8 | 5.8   |
| 11         | .683                                      | .761                                                   | .502    | .259    | 81.8                       | 84.2                                                     | 78.2 | 6.0   |

The Mean Height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of September, 1860.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb<br>Thermometer. | Dry Bulb above Wet. | Computed Dew point. | Dry Bulb above Dew<br>point. | Mean Elastic force of<br>Vapour. | Mean Weight of Va-<br>pour in a Cubic foot<br>of Air. | Additional Weight of<br>vapour required for<br>complete saturation. | Mean degree of Hu-<br>midity, complete satu-<br>ration being unity. |
|----------------|-------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                             | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                           |                                                                     |
| Mid-<br>night. | 79.9                          | 1.8                 | 79.0                | 2.7                          | 0.970                            | 10.44                                                 | 0.93                                                                | 0.92                                                                |
| 1              | 79.8                          | 1.6                 | 79.0                | 2.4                          | .970                             | .46                                                   | .81                                                                 | .93                                                                 |
| 2              | 79.6                          | 1.6                 | 78.8                | 2.4                          | .964                             | .40                                                   | .81                                                                 | .93                                                                 |
| 3              | 79.5                          | 1.4                 | 78.8                | 2.1                          | .964                             | .40                                                   | .70                                                                 | .94                                                                 |
| 4              | 79.4                          | 1.3                 | 78.7                | 2.0                          | .961                             | .37                                                   | .67                                                                 | .94                                                                 |
| 5              | 79.4                          | 1.3                 | 78.7                | 2.0                          | .961                             | .37                                                   | .67                                                                 | .94                                                                 |
| 6              | 79.3                          | 1.3                 | 78.6                | 2.0                          | .958                             | .34                                                   | .67                                                                 | .94                                                                 |
| 7              | 79.8                          | 1.5                 | 79.0                | 2.3                          | .970                             | .46                                                   | .78                                                                 | .93                                                                 |
| 8              | 80.5                          | 2.6                 | 79.2                | 3.9                          | .976                             | .48                                                   | 1.38                                                                | .88                                                                 |
| 9              | 81.0                          | 3.4                 | 79.3                | 5.1                          | .979                             | .48                                                   | .83                                                                 | .85                                                                 |
| 10             | 81.3                          | 4.2                 | 79.2                | 6.3                          | .976                             | .43                                                   | 2.29                                                                | .82                                                                 |
| 11             | 81.4                          | 4.9                 | 78.9                | 7.4                          | .967                             | .32                                                   | .70                                                                 | .79                                                                 |
| Noon.          | 81.6                          | 5.3                 | 78.9                | 8.0                          | .967                             | .30                                                   | .95                                                                 | .78                                                                 |
| 1              | 81.5                          | 5.5                 | 78.7                | 8.3                          | .961                             | .24                                                   | 3.05                                                                | .77                                                                 |
| 2              | 81.6                          | 5.3                 | 78.9                | 8.0                          | .967                             | .30                                                   | 2.95                                                                | .78                                                                 |
| 3              | 81.2                          | 4.9                 | 78.7                | 7.4                          | .961                             | .26                                                   | .69                                                                 | .79                                                                 |
| 4              | 81.1                          | 4.4                 | 78.9                | 6.6                          | .967                             | .32                                                   | .40                                                                 | .81                                                                 |
| 5              | 80.9                          | 3.7                 | 79.0                | 5.6                          | .970                             | .37                                                   | .02                                                                 | .84                                                                 |
| 6              | 80.6                          | 3.0                 | 79.1                | 4.5                          | .973                             | .42                                                   | 1.61                                                                | .87                                                                 |
| 7              | 80.5                          | 2.5                 | 79.2                | 3.8                          | .976                             | .48                                                   | .34                                                                 | .89                                                                 |
| 8              | 80.3                          | 2.3                 | 79.1                | 3.5                          | .973                             | .45                                                   | .23                                                                 | .90                                                                 |
| 9              | 80.3                          | 2.1                 | 79.2                | 3.2                          | .976                             | .50                                                   | .11                                                                 | .90                                                                 |
| 10             | 80.2                          | 1.8                 | 79.3                | 2.7                          | .979                             | .53                                                   | 0.94                                                                | .92                                                                 |
| 11             | 80.0                          | 1.8                 | 79.1                | 2.7                          | .973                             | .47                                                   | .93                                                                 | .92                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of September, 1860.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                                                   |
|-------|-----------------------|---------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | o                     | Inches.<br>..                   | S. & E.                           | Scatd. $\nabla$ i & $\searrow$ i till 1 P. M. cloudy afterwards; also drizzling at 3 & 5 P. M.                                               |
| 2     | Sunday.               | 0.44                            |                                   |                                                                                                                                              |
| 3     | 131.4                 | ..                              | S. & S. E.                        | Scatd. clouds; also drizzling at 1 P. M.                                                                                                     |
| 4     | 127.0                 | ..                              | S. & S. E.                        | Scatd. $\searrow$ i & $\swarrow$ i.                                                                                                          |
| 5     | ..                    | 0.12                            | S. E. & S.                        | Scatd. $\nabla$ i & $\searrow$ i till 6 P. M. cloudless afterwards.                                                                          |
| 6     | ..                    | 0.15                            | E. & S.                           | Scatd. $\nabla$ i & $\searrow$ i till 9 A. M. cloudy till 6 P. M. cloudless afterwards; also constantly drizzling between 10 A. M. & 5 P. M. |
| 7     | ..                    | ..                              | S.                                | Cloudless till 6 A. M. Scatd. clouds till 7 P. M. cloudless afterwards.                                                                      |
| 8     | ..                    | 0.35                            | E. & W.                           | Cloudy & constantly raining in the afternoon.                                                                                                |
| 9     | Sunday.               | 1.25                            |                                   |                                                                                                                                              |
| 10    | ..                    | ..                              | S. E. & S.                        | Cloudy, & slightly drizzling between 3 & 4 A. M. & also at 9 A. M.                                                                           |
| 11    | ..                    | ..                              | S.                                | Scatd. clouds till 6 P. M. cloudless afterwards.                                                                                             |
| 12    | 130.4                 | ..                              | S.                                | Cloudless till 8 A. M. Scatd. clouds till 6 P. M. cloudless afterwards.                                                                      |
| 13    | ..                    | ..                              | S. & S. E. & S. W.                | Cloudless till 5 A. M. Scatd. $\searrow$ i till 9 A. M. cloudy till 9 P. M. cloudless afterwards; also drizzling between 4 & 5 P. M.         |
| 14    | ..                    | ..                              | S.                                | Cloudless till 6 A. M. Scatd. clouds till 6 P. M. cloudless afterwards.                                                                      |
| 15    | ..                    | 1.02                            | S. E. & S.                        | Cloudy till 7 P. M. cloudless afterwards; also raining at 1 & 3 & 4 P. M.                                                                    |
| 16    | Sunday.               |                                 |                                   |                                                                                                                                              |
| 17    | ..                    | ..                              | S. E. & S.                        | Cloudy till 7 P. M. cloudless afterwards; also slightly drizzling at 1 P. M.                                                                 |
| 18    | ..                    | 0.21                            | E.                                | Cloudless till 5 A. M. cloudy afterwards; also constantly drizzling between 2 & 8 P. M.                                                      |
| 19    | ..                    | 0.58                            | E. & N. E.                        | Cloudy; also constantly raining between 1 & 9 P. M.                                                                                          |
| 20    | ..                    | 0.30                            | S. W. & S. & E.                   | Cloudy; also constantly drizzling between 1 & 4 A. M. & also at 4 P. M.                                                                      |
| 21    | ..                    | ..                              | S. W. & W. & N.                   | Scatd. clouds till 4 P. M. Scatd. $\searrow$ i afterwards.                                                                                   |
| 22    | 139.7                 | ..                              | N. & S.                           | Cloudless till 8 A. M. Scatd. $\swarrow$ i till 8 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, 1860.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                               |
|-------|-----------------------|---------------------------------|-----------------------------------|------------------------------------------------------------------------------------------|
| 23    | <i>Sunday.</i>        |                                 |                                   |                                                                                          |
| 24    | 125.0                 | 0.09                            | S.                                | Cloudy, also drizzling at 9 A. M. & 5 & 6 P. M.                                          |
| 25    | 135.0                 | ..                              | S. & S. E.                        | Scatd. clouds; also slightly drizzling at 10 A. M.                                       |
| 26    | ..                    | 1.07                            | S. W. & E. & N.                   | Cloudless till 8 A. M. cloudy afterwards; also raining at 11 A. M. & between 1 & 3 P. M. |
| 27    | ..                    | 0.09                            | S. & E.                           | Cloudy; also drizzling at 2 & 6 & 7 P. M.                                                |
| 28    | ..                    | 1.46                            | E. & S. W. & S. E.                | Scatd. clouds; also raining between 8 & 9 P. M.                                          |
| 29    | ..                    | ..                              | E. & S. E. & S.                   | Cloudless till 5 A. M. Scatd. clouds afterwards.                                         |
| 30    | <i>Sunday.</i>        |                                 |                                   |                                                                                          |

∩i Cirri, ∩i Cirro strati, ∩i Cunuli, ∩l Cumulo strati, ∩i Nimbi, —i Strati  
∩ i Cirro cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of September, 1860.*

MONTHLY RESULTS.

|                                                                |    |    | Inches |
|----------------------------------------------------------------|----|----|--------|
| Mean height of the Barometer for the month,                    | .. | .. | 29.667 |
| Max. height of the Barometer occurred at 10 A. M. on the 28th, | .. | .. | 29.796 |
| Min. height of the Barometer occurred at 4 A. M. on the 20th,  | .. | .. | 29.417 |
| <i>Extreme range</i> of the Barometer during the month,        | .. | .. | 0.379  |
| Mean of the Daily Max. Pressures,                              | .. | .. | 29.730 |
| Ditto ditto Min. ditto,                                        | .. | .. | 29.600 |
| <i>Mean daily range</i> of the Barometer during the month,     | .. | .. | 0.130  |

|                                                               |    |    | o    |
|---------------------------------------------------------------|----|----|------|
| Mean Dry Bulb Thermometer for the month,                      | .. | .. | 83.4 |
| Max. Temperature occurred at 2 & 3 P. M. on the 22nd & 29th,  | .. | .. | 91.2 |
| Min. Temperature occurred at 4 A. M. on the 21st,             | .. | .. | 77.2 |
| <i>Extreme range</i> of the Temperature during the month,     | .. | .. | 14.0 |
| Mean of the daily Max. Temperature,                           | .. | .. | 88.5 |
| Ditto ditto Min. ditto,                                       | .. | .. | 80.3 |
| <i>Mean daily range</i> of the Temperature during the month,  | .. | .. | 8.2  |
| Mean Wet Bulb Thermometer for the month, ..                   | .. | .. | 80.4 |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, .. | .. | .. | 3.0  |
| Computed Mean Dew-point for the month, ..                     | .. | .. | 78.9 |
| Mean Dry Bulb Thermometer above computed Mean Dew-point, ..   | .. | .. | 4.5  |

|                                                |    |    | Inches |
|------------------------------------------------|----|----|--------|
| Mean Elastic force of Vapour for the month, .. | .. | .. | 0.967  |

|                                                                         |    |    | Troy grains |
|-------------------------------------------------------------------------|----|----|-------------|
| Mean Weight of Vapour for the month, ..                                 | .. | .. | 10.37       |
| Additional Weight of Vapour required for complete saturation, ..        | .. | .. | 1.59        |
| Mean degree of humidity for the month, complete saturation being unity, | .. | .. | 0.87        |

|                                                       |    |    | Inches          |
|-------------------------------------------------------|----|----|-----------------|
| Rained 19 days, Max. fall of rain during 24 hours, .. | .. | .. | 1.46            |
| Total amount of rain during the month, ..             | .. | .. | 7.13            |
| Prevailing direction of the Wind, ..                  | .. | .. | S. & E. & S. E. |

*Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of September, 1860.*

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

| Hour.     | N.           | Rain on. | N. E. | Rain on. | E. | Rain on. | S. E. | Rain on. | S. | Rain on. | S. W. | Rain on. | W. | Rain on. | N. W. | Rain on. | Calm. | Rain on. | Missed. |
|-----------|--------------|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|-------|----------|---------|
|           | No. of days. |          |       |          |    |          |       |          |    |          |       |          |    |          |       |          |       |          |         |
| Midnight. | 1            |          |       |          | 3  | 4        |       | 12       |    |          | 2     |          |    |          |       |          | 1     |          | 2       |
| 1         | 1            |          |       |          | 3  | 1        | 4     | 14       |    | 2        |       |          |    |          |       |          | 1     |          |         |
| 2         | 1            |          |       |          | 3  | 1        | 4     | 13       |    | 2        |       |          |    |          |       |          | 1     |          | 1       |
| 3         | 1            | 1        |       |          | 4  | 1        | 2     | 15       |    | 2        |       |          |    |          |       |          | 1     |          |         |
| 4         | 1            |          |       |          | 4  | 1        | 2     | 13       |    | 1        |       |          |    |          |       |          |       |          | 4       |
| 5         | 1            |          |       |          | 4  | 1        | 2     | 13       |    | 2        |       |          |    |          |       |          |       |          | 2       |
| 6         | 1            |          | 1     |          | 3  |          | 6     | 11       |    |          |       |          | 1  |          |       |          |       |          |         |
| 7         |              |          | 3     |          | 7  |          | 6     | 8        |    |          |       |          | 1  |          |       |          |       |          |         |
| 8         |              |          | 1     |          | 9  |          | 6     | 5        |    |          |       |          | 1  |          |       |          |       |          | 3       |
| 9         |              |          | 1     |          | 9  |          | 6     | 5        |    | 1        | 1     |          |    | 1        |       |          |       |          |         |
| 10        |              |          | 1     |          | 8  | 1        | 4     | 10       |    |          |       |          |    | 2        |       |          |       |          |         |
| 11        |              |          | 1     |          | 6  | 2        | 8     | 8        |    |          |       |          |    | 2        |       |          |       |          |         |
| Noon.     |              |          | 2     |          | 4  | 2        | 6     | 12       |    |          |       |          |    | 1        |       |          |       |          |         |
| 1         | 1            |          | 3     | 2        | 5  | 5        | 2     | 8        |    | 1        | 1     |          |    | 1        |       |          |       |          |         |
| 2         | 1            |          | 3     | 1        | 2  | 1        | 6     | 9        |    | 2        | 2     |          |    | 1        |       |          |       |          |         |
| 3         | 1            | 1        | 2     |          | 3  | 1        | 5     | 8        |    | 4        | 4     | 2        |    | 1        |       |          |       |          |         |
| 4         | 1            |          | 2     | 1        | 4  | 1        | 3     | 1        |    | 3        | 1     | 1        | 2  | 2        |       |          |       |          | 2       |
| 5         |              |          | 1     | 1        | 7  | 3        | 3     | 7        |    | 4        | 1     | 1        | 2  | 1        |       |          |       |          |         |
| 6         | 2            |          | 1     |          | 6  | 1        | 4     | 7        |    | 4        | 4     | 4        | 1  | 1        |       |          |       |          |         |
| 7         | 2            |          |       |          | 5  | 1        | 4     | 9        |    | 1        |       |          | 1  | 1        |       |          |       |          |         |
| 8         | 2            |          |       |          | 4  | 2        | 4     | 10       |    |          | 3     | 3        | 1  | 1        |       |          |       | 1        |         |
| 9         | 2            |          |       |          | 3  | 1        | 4     | 10       |    |          | 3     | 3        | 1  | 1        |       |          |       | 1        | 1       |
| 10        | 2            |          |       |          | 5  |          | 4     | 10       |    |          | 3     | 3        |    | 1        |       |          |       |          |         |
| 11        | 2            |          |       |          | 5  |          | 4     | 10       |    |          | 3     | 3        |    | 1        |       |          |       |          |         |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of October, 1860.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Faht. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | 29.659                                          | 29.717                                    | 29.600  | 0.117   | 82.1                          | 88.2                                          | 80.0 | 8.2   |
| 2     | .632                                            | .679                                      | .570    | .109    | 80.8                          | 83.4                                          | 78.7 | 4.7   |
| 3     | .616                                            | .697                                      | .594    | .103    | 83.5                          | 87.8                                          | 80.0 | 7.8   |
| 4     | .712                                            | .766                                      | .655    | .111    | 82.9                          | 85.8                                          | 81.0 | 4.8   |
| 5     | .760                                            | .810                                      | .706    | .104    | 83.4                          | 88.5                                          | 79.6 | 8.9   |
| 6     | .831                                            | .883                                      | .786    | .097    | 84.5                          | 91.2                                          | 79.4 | 11.8  |
| 7     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 8     | .851                                            | .927                                      | .810    | .117    | 84.1                          | 89.4                                          | 79.2 | 10.2  |
| 9     | .816                                            | .885                                      | .743    | .142    | 81.7                          | 84.6                                          | 79.6 | 5.0   |
| 10    | .807                                            | .872                                      | .760    | .112    | 80.0                          | 81.6                                          | 78.4 | 3.2   |
| 11    | .848                                            | .920                                      | .792    | .128    | 82.9                          | 88.3                                          | 78.8 | 9.5   |
| 12    | .874                                            | .940                                      | .811    | .129    | 82.9                          | 89.0                                          | 78.8 | 10.2  |
| 13    | .890                                            | .959                                      | .829    | .130    | 83.0                          | 90.4                                          | 79.0 | 11.4  |
| 14    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 15    | .848                                            | .925                                      | .794    | .131    | 82.7                          | 90.4                                          | 79.6 | 10.8  |
| 16    | .847                                            | .917                                      | .792    | .125    | 82.6                          | 87.6                                          | 79.2 | 8.4   |
| 17    | .849                                            | .916                                      | .801    | .115    | 83.2                          | 89.4                                          | 79.0 | 10.4  |
| 18    | .872                                            | .946                                      | .817    | .129    | 82.5                          | 89.2                                          | 77.2 | 12.0  |
| 19    | .876                                            | .950                                      | .827    | .123    | 81.6                          | 88.4                                          | 75.4 | 13.0  |
| 20    | .855                                            | .921                                      | .811    | .110    | 81.5                          | 88.6                                          | 74.8 | 13.8  |
| 21    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 22    | .865                                            | .945                                      | .809    | .136    | 82.4                          | 89.0                                          | 76.4 | 12.6  |
| 23    | .857                                            | .933                                      | .802    | .131    | 81.3                          | 86.4                                          | 76.4 | 10.0  |
| 24    | .859                                            | .930                                      | .809    | .121    | 81.8                          | 88.8                                          | 75.4 | 13.4  |
| 25    | .854                                            | .933                                      | .791    | .142    | 82.0                          | 88.8                                          | 75.8 | 13.0  |
| 26    | .827                                            | .908                                      | .758    | .150    | 81.0                          | 87.8                                          | 76.0 | 11.8  |
| 27    | .801                                            | .870                                      | .737    | .133    | 78.8                          | 85.0                                          | 72.6 | 12.4  |
| 28    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 29    | .749                                            | .802                                      | .702    | .100    | 79.3                          | 85.2                                          | 74.4 | 10.8  |
| 30    | .780                                            | .840                                      | .719    | .121    | 80.3                          | 87.2                                          | 74.6 | 12.6  |
| 31    | .800                                            | .871                                      | .741    | .130    | 79.1                          | 85.8                                          | 74.0 | 11.8  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly observations made during the day.

Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of October, 1860.

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of Air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity,<br>complete saturation be-<br>ing unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                   |
| 1     | 80.0                            | 2.1                 | 78.9                | 3.2                          | .0967                            | 10.41                                            | 1.10                                                                    | .90                                                               |
| 2     | 78.7                            | 2.1                 | 77.6                | 3.2                          | .928                             | .01                                              | .06                                                                     | .90                                                               |
| 3     | 79.5                            | 4.0                 | 77.5                | 6.0                          | .925                             | 9.92                                             | 2.08                                                                    | .83                                                               |
| 4     | 78.6                            | 4.3                 | 76.4                | 6.5                          | .893                             | .58                                              | .21                                                                     | .81                                                               |
| 5     | 79.3                            | 4.1                 | 77.2                | 6.2                          | .916                             | .83                                              | .13                                                                     | .82                                                               |
| 6     | 79.1                            | 5.4                 | 76.4                | 8.1                          | .893                             | .56                                              | .79                                                                     | .77                                                               |
| 7     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 8     | 78.9                            | 5.2                 | 76.3                | 7.8                          | .890                             | .53                                              | .68                                                                     | .78                                                               |
| 9     | 79.1                            | 2.6                 | 77.8                | 3.9                          | .934                             | 10.05                                            | 1.32                                                                    | .88                                                               |
| 10    | 77.9                            | 2.1                 | 76.8                | 3.2                          | .905                             | 9.77                                             | .04                                                                     | .90                                                               |
| 11    | 78.5                            | 4.4                 | 76.3                | 6.6                          | .890                             | .55                                              | 2.24                                                                    | .81                                                               |
| 12    | 78.6                            | 4.3                 | 76.4                | 6.5                          | .893                             | .58                                              | .21                                                                     | .81                                                               |
| 13    | 79.1                            | 3.9                 | 77.1                | 5.9                          | .913                             | .80                                              | .02                                                                     | .83                                                               |
| 14    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 15    | 78.8                            | 3.9                 | 76.8                | 5.9                          | .905                             | .71                                              | .01                                                                     | .83                                                               |
| 16    | 79.1                            | 3.5                 | 77.3                | 5.3                          | .919                             | .88                                              | 1.80                                                                    | .85                                                               |
| 17    | 78.2                            | 5.0                 | 75.7                | 7.5                          | .873                             | .36                                              | 2.53                                                                    | .79                                                               |
| 18    | 76.2                            | 6.3                 | 73.0                | 9.5                          | .801                             | 8.58                                             | 3.06                                                                    | .74                                                               |
| 19    | 74.7                            | 6.9                 | 71.2                | 10.4                         | .756                             | .13                                              | .21                                                                     | .72                                                               |
| 20    | 75.6                            | 5.9                 | 72.6                | 8.9                          | .790                             | .50                                              | 2.81                                                                    | .75                                                               |
| 21    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 22    | 75.9                            | 6.5                 | 72.6                | 9.8                          | .790                             | .49                                              | 3.12                                                                    | .73                                                               |
| 23    | 75.5                            | 5.8                 | 72.6                | 8.7                          | .790                             | .50                                              | 2.74                                                                    | .76                                                               |
| 24    | 75.7                            | 6.1                 | 72.6                | 9.2                          | .790                             | .50                                              | .90                                                                     | .75                                                               |
| 25    | 76.2                            | 5.8                 | 73.3                | 8.7                          | .809                             | .68                                              | .79                                                                     | .76                                                               |
| 26    | 73.2                            | 7.8                 | 69.3                | 11.7                         | .711                             | 7.64                                             | 3.50                                                                    | .69                                                               |
| 27    | 71.1                            | 7.7                 | 67.2                | 11.6                         | .664                             | .17                                              | .27                                                                     | .69                                                               |
| 28    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 29    | 74.4                            | 4.9                 | 71.9                | 7.4                          | .773                             | 8.36                                             | 2.23                                                                    | .79                                                               |
| 30    | 74.7                            | 5.6                 | 71.9                | 8.4                          | .773                             | .34                                              | .57                                                                     | .76                                                               |
| 31    | 71.2                            | 7.9                 | 67.2                | 11.9                         | .664                             | 7.17                                             | 3.36                                                                    | .68                                                               |

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October, 1860.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

| Hour.      | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | o                          | o                                                        | o    | o     |
| Mid-night. | 29.803                                    | 29.888                                                 | 29.655  | 0.233   | 79.6                       | 83.2                                                     | 76.6 | 6.6   |
| 1          | .795                                      | .880                                                   | .633    | .247    | 79.3                       | 82.8                                                     | 75.6 | 7.2   |
| 2          | .789                                      | .873                                                   | .621    | .252    | 78.8                       | 82.5                                                     | 74.6 | 7.9   |
| 3          | .788                                      | .850                                                   | .623    | .227    | 78.4                       | 82.3                                                     | 74.0 | 8.3   |
| 4          | .785                                      | .869                                                   | .613    | .256    | 78.3                       | 82.6                                                     | 73.5 | 9.1   |
| 5          | .810                                      | .884                                                   | .613    | .271    | 77.6                       | 81.2                                                     | 72.6 | 8.6   |
| 6          | .818                                      | .900                                                   | .635    | .265    | 77.8                       | 82.2                                                     | 72.8 | 9.4   |
| 7          | .839                                      | .919                                                   | .658    | .261    | 78.3                       | 81.8                                                     | 73.2 | 8.6   |
| 8          | .857                                      | .945                                                   | .682    | .263    | 80.4                       | 81.0                                                     | 75.4 | 8.6   |
| 9          | .875                                      | .956                                                   | .679    | .277    | 82.4                       | 85.4                                                     | 78.4 | 7.0   |
| 10         | .873                                      | .959                                                   | .671    | .288    | 83.7                       | 87.0                                                     | 79.2 | 7.8   |
| 11         | .855                                      | .944                                                   | .663    | .281    | 85.2                       | 88.2                                                     | 79.2 | 9.0   |
| Noon.      | .831                                      | .909                                                   | .647    | .262    | 86.3                       | 89.6                                                     | 79.4 | 10.2  |
| 1          | .806                                      | .885                                                   | .604    | .281    | 86.7                       | 90.6                                                     | 80.2 | 10.4  |
| 2          | .779                                      | .851                                                   | .589    | .262    | 86.9                       | 91.2                                                     | 81.3 | 9.9   |
| 3          | .766                                      | .837                                                   | .570    | .267    | 86.4                       | 90.4                                                     | 81.2 | 9.2   |
| 4          | .761                                      | .835                                                   | .580    | .255    | 86.0                       | 89.3                                                     | 81.6 | 7.7   |
| 5          | .761                                      | .835                                                   | .586    | .249    | 81.9                       | 89.2                                                     | 81.2 | 8.0   |
| 6          | .772                                      | .856                                                   | .599    | .257    | 83.2                       | 86.2                                                     | 80.4 | 5.8   |
| 7          | .791                                      | .887                                                   | .611    | .276    | 82.0                       | 85.4                                                     | 78.8 | 6.6   |
| 8          | .806                                      | .893                                                   | .648    | .245    | 81.2                       | 84.2                                                     | 77.6 | 6.6   |
| 9          | .821                                      | .896                                                   | .657    | .239    | 80.7                       | 83.6                                                     | 76.4 | 7.2   |
| 10         | .825                                      | .903                                                   | .673    | .230    | 80.2                       | 83.6                                                     | 76.0 | 7.6   |
| 11         | .828                                      | .903                                                   | .674    | .229    | 79.8                       | 83.6                                                     | 75.2 | 8.4   |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of October, 1860.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force<br>of Vapour. | Mean Weight of Va-<br>pour in a Cubic<br>foot of Air. | Additional Weight of<br>Vapour required<br>for complete satu-<br>ration. | Mean degree of Hu-<br>midity, complete<br>saturation being<br>unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                                |                                                                      |
| Mid-<br>night. | 76.9                            | 2.7                 | 75.5                | 4.1                          | 0.868                            | 9.38                                                  | 1.31                                                                     | 0.88                                                                 |
| 1              | 77.0                            | 2.3                 | 75.8                | 3.5                          | .876                             | .46                                                   | .13                                                                      | .89                                                                  |
| 2              | 76.5                            | 2.3                 | 75.3                | 3.5                          | .862                             | .32                                                   | .12                                                                      | .89                                                                  |
| 3              | 76.2                            | 2.2                 | 75.1                | 3.3                          | .857                             | .28                                                   | .03                                                                      | .90                                                                  |
| 4              | 76.2                            | 2.1                 | 75.1                | 3.2                          | .857                             | .28                                                   | .00                                                                      | .90                                                                  |
| 5              | 75.5                            | 2.1                 | 74.4                | 3.2                          | .838                             | .10                                                   | 0.97                                                                     | .90                                                                  |
| 6              | 75.8                            | 2.0                 | 74.8                | 3.0                          | .849                             | .20                                                   | .93                                                                      | .91                                                                  |
| 7              | 76.1                            | 2.2                 | 75.0                | 3.3                          | .854                             | .25                                                   | 1.03                                                                     | .90                                                                  |
| 8              | 76.5                            | 3.9                 | 74.5                | 5.9                          | .840                             | .07                                                   | .87                                                                      | .83                                                                  |
| 9              | 77.1                            | 5.3                 | 74.4                | 8.0                          | .838                             | .00                                                   | 2.61                                                                     | .78                                                                  |
| 10             | 77.2                            | 6.5                 | 73.9                | 9.8                          | .824                             | 8.83                                                  | 3.24                                                                     | .73                                                                  |
| 11             | 77.6                            | 7.6                 | 73.8                | 11.4                         | .822                             | .78                                                   | .83                                                                      | .70                                                                  |
| Noon.          | 77.7                            | 8.6                 | 73.4                | 12.9                         | .811                             | .64                                                   | 4.38                                                                     | .66                                                                  |
| 1              | 77.7                            | 9.0                 | 73.2                | 13.5                         | .806                             | .57                                                   | .61                                                                      | .65                                                                  |
| 2              | 77.7                            | 9.2                 | 73.1                | 13.8                         | .803                             | .54                                                   | .71                                                                      | .65                                                                  |
| 3              | 77.3                            | 9.1                 | 72.7                | 13.7                         | .792                             | .44                                                   | .62                                                                      | .65                                                                  |
| 4              | 77.1                            | 8.9                 | 72.6                | 13.4                         | .790                             | .43                                                   | .48                                                                      | .65                                                                  |
| 5              | 77.2                            | 7.7                 | 73.3                | 11.6                         | .809                             | .63                                                   | 3.86                                                                     | .69                                                                  |
| 6              | 77.6                            | 5.6                 | 74.8                | 8.4                          | .819                             | 9.11                                                  | 2.78                                                                     | .77                                                                  |
| 7              | 77.4                            | 4.6                 | 75.1                | 6.9                          | .857                             | .21                                                   | .26                                                                      | .80                                                                  |
| 8              | 77.2                            | 4.0                 | 75.2                | 6.0                          | .860                             | .26                                                   | 1.95                                                                     | .83                                                                  |
| 9              | 77.1                            | 3.6                 | 75.3                | 5.4                          | .862                             | .31                                                   | .73                                                                      | .84                                                                  |
| 10             | 76.9                            | 3.3                 | 75.2                | 5.0                          | .860                             | .28                                                   | .60                                                                      | .85                                                                  |
| 11             | 76.7                            | 3.1                 | 75.1                | 4.7                          | .857                             | .25                                                   | .50                                                                      | .86                                                                  |

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of October, 1860.

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                    |
|-------|-----------------------|---------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------|
| 1     | o<br>...              | Inches.<br>0.42                 | S.                                | Scatd. \-i till 6 A. M. cloudy afterwards also raining at Noon & 1 & 3 P. M.                                  |
| 2     | ...                   | ..                              | S. & E.                           | Cloudy also drizzling at 3 & 4 & 7 P. M.                                                                      |
| 3     | 136.0                 | ...                             | S.                                | Scatd. clouds.                                                                                                |
| 4     | ...                   | ...                             | S. W. & S.                        | Cloudy.                                                                                                       |
| 5     | 135.4                 | ...                             | S. W. & S.                        | Cloudy till 7 A. M. Scatd. clouds till 4 P. M. Scatd. \-i afterwards.                                         |
| 6     | 144.0                 | ...                             | S. W. & N. E. & N.                | Scatd. \-i till 3 P. M. cloudless afterwards:                                                                 |
| 7     | Sunday.               | ...                             |                                   |                                                                                                               |
| 8     | 137.0                 | ...                             | S. & W. & S. W.                   | Cloudless till 8 A. M. Scatd. clouds till 6 P. M. cloudless afterwards.                                       |
| 9     | ...                   | ...                             | N. & S. W.                        | Scatd. \-i till 5 A. M. cloudy till 6 P. M. cloudless afterwards also drizzling between 6 & 9 A. M.           |
| 10    | ...                   | 1.26                            | S. W. & S.                        | Cloudy, also raining after intervals between 2 & 10 A. M.                                                     |
| 11    | 139.0                 | ...                             | S. & E. & S. W.                   | Scatd. \-i.                                                                                                   |
| 12    | 127.6                 | ...                             | W. & S. E. & E.                   | Scatd. clouds.                                                                                                |
| 13    | 147.0                 | ...                             | S.                                | Cloudless till 6 A. M. Scatd. clouds till 6 P. M. cloud less afterwards, also slightly drizzling at 3 P. M.   |
| 14    | Sunday.               | ...                             |                                   |                                                                                                               |
| 15    | 149.0                 | ...                             | S.                                | Cloudless till 8 A. M. Scatd. clouds till 9 P. M. cloudless afterwards.                                       |
| 16    | 125.0                 | ...                             | S. & W.                           | Cloudless till 5 A. M. Scatd. clouds till 6 P. M. cloudless afterwards, also drizzling between noon & 1 P. M. |
| 17    | 142.2                 | ...                             | W. & S. & S. W.                   | Cloudless till 5 A. M. Scatd. clouds till 2 P. M. cloudless afterwards.                                       |
| 18    | 140.0                 | ...                             | S. W & S. & W.                    | Cloudless.                                                                                                    |
| 19    | 141.7                 | ...                             | W. & N. W. & S. }<br>W. & N. E. } | Cloudless.                                                                                                    |
| 20    | 140.0                 | ...                             | N. E. & W. & S.                   | Cloudless till 10 A. M. Scatd. clouds afterwards.                                                             |
| 21    | Sunday.               | ...                             |                                   |                                                                                                               |
| 22    | 148.4                 | ...                             | S. E. & N. E.                     | Cloudless till 8 A. M. Scatd. \-i & \-i afterwards.                                                           |
| 23    | ...                   | ...                             | S. & E.                           | Scatd. \-i till 4 A. M. cloudless till 9 A. M. Scatd. clouds till 4 P. M. cloudless afterwards.               |
| 24    | 146.0                 | ...                             | N. E. & N. & W.                   | Cloudless till 11 A. M. Scatd \-i till 4 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 October, 1860.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                    |
|-------|-----------------------|---------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------|
|       |                       | Inches.                         |                                   |                                                                                               |
| 25    | 140.0                 | ...                             | N. & N. W.                        | Cloudless till 10 A. M. Scatd. $\searrow$ i & $\swarrow$ i till 9 P. M. cloudless afterwards. |
| 26    | 143.0                 | ...                             | N. & N. W.                        | Cloudless till 6 A. M. Scatd. $\searrow$ i till 3 P. M. cloudless afterwards.                 |
| 27    | 123.0                 | ...                             | N. & N. W.                        | Scatd. $\searrow$ i & $\swarrow$ i.                                                           |
| 28    | <i>Sunday.</i>        | ...                             |                                   |                                                                                               |
| 29    | ...                   | ...                             | N.                                | Scatd. $\searrow$ i till 6 A. M. cloudy afterwards.                                           |
| 30    | 144.0                 | ...                             | N. W. & N.                        | Scatd. $\searrow$ i & $\swarrow$ i till 9 P. M. cloudless afterwards.                         |
| 31    | 140.0                 | ..                              | N. & W.                           | Cloudless till 5 A. M. Scatd. $\searrow$ i & $\swarrow$ i till 4 P. M. cloudless afterwards.  |

$\searrow$ i Cirri,  $\swarrow$ i Cirro strati,  $\sim$ i Cumuli,  $\sim$ i Cumulo strati,  $\sim$ i Nimbi,—i Strati,  $\sim$ i Cirro cumuli.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of October, 1860.*

MONTHLY RESULTS.

|                                                                 |    |    | Inches. |
|-----------------------------------------------------------------|----|----|---------|
| Mean height of the Barometer for the month,                     | .. | .. | 29.810  |
| Max. height of the Barometer, occurred at 10 A. M. on the 13th, | .. | .. | 29.959  |
| Min. height of the Barometer, occurred at 3 P. M. on the 2nd,   | .. | .. | 29.570  |
| <i>Extreme range</i> of the Barometer during the month,         | .. | .. | 0.389   |
| Mean of the Daily Max. Pressures,                               | .. | .. | 29.876  |
| Ditto ditto Min. ditto,                                         | .. | .. | 29.754  |
| <i>Mean daily range</i> of the Barometer during the month,      | .. | .. | 0.122   |

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|                                                              |    |    |      |
|--------------------------------------------------------------|----|----|------|
|                                                              |    |    | 0    |
| Mean Dry Bulb Thermometer for the month,                     | .. | .. | 81.9 |
| Max. Temperature occurred at 2 P. M. on the 6th,             | .. | .. | 91.2 |
| Min. Temperature occurred at 5 A. M. on the 27th,            | .. | .. | 72.6 |
| <i>Extreme range</i> of the Temperature during the month,    | .. | .. | 18.6 |
| Mean of the daily Max. Temperature,                          | .. | .. | 87.6 |
| Ditto ditto Min. ditto,                                      | .. | .. | 77.5 |
| <i>Mean daily range</i> of the Temperature during the month, | .. | .. | 10.1 |

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|                                                            |    |    |        |
|------------------------------------------------------------|----|----|--------|
|                                                            |    |    | 0      |
| Mean Wet Bulb Thermometer for the month,                   | .. | .. | 76.9   |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, | .. | .. | 5.0    |
| Computed Mean Dew Point for the month,                     | .. | .. | 74.4   |
| Mean Dry Bulb Thermometer above computed Mean Dew-point,   | .. | .. | 7.5    |
|                                                            |    |    | Inches |
| Mean Elastic force of vapour for the month,                | .. | .. | 0.838  |

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|                                                                         |    |    |             |
|-------------------------------------------------------------------------|----|----|-------------|
|                                                                         |    |    | Troy grains |
| Mean weight of Vapour for the month,                                    | .. | .. | 9.00        |
| Additional weight of Vapour required for complete saturation,           | .. | .. | 2.44        |
| Mean degree of humidity for the month, complete saturation being unity, | .. | .. | 0.79        |

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|                                                   |    |    |         |
|---------------------------------------------------|----|----|---------|
|                                                   |    |    | Inches  |
| Rained 6 days, Max. fall of rain during 24 hours, | .. | .. | 1.26    |
| Total amount of rain during the month,            | .. | .. | 1.68    |
| Prevailing direction of the Wind,                 | .. | .. | S. & N. |

*Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October, 1860.*

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

| Hour.     | N.           |          | N. E.    |          | E. | S. E.    |          | S. | S. W.    |          | W. | N. W. |   | Calm. | Missed. |
|-----------|--------------|----------|----------|----------|----|----------|----------|----|----------|----------|----|-------|---|-------|---------|
|           | Rain on.     | Rain on. | Rain on. | Rain on. |    | Rain on. | Rain on. |    | Rain on. | Rain on. |    |       |   |       |         |
|           | No. of days. |          |          |          |    |          |          |    |          |          |    |       |   |       |         |
| Midnight. | 7            | 3        |          |          |    |          |          | 11 | 3        |          | 1  |       |   |       | 2       |
| 1         | 6            | 4        |          |          |    | 1        |          | 11 | 3        |          |    |       |   |       | 2       |
| 2         | 7            | 4        | 1        |          | 1  | 1        |          | 9  | 3        |          | 1  |       |   |       | 1       |
| 3         | 7            | 4        |          |          | 1  | 1        |          | 8  | 3        |          | 1  |       |   |       | 2       |
| 4         | 5            | 4        |          |          | 1  | 1        |          | 9  | 3        |          | 1  |       |   |       | 3       |
| 5         | 6            | 3        |          |          |    | 1        |          | 9  | 3        | 1        | 1  |       |   |       | 4       |
| 6         | 7            | 3        | 1        |          | 3  | 2        | 1        | 8  | 4        |          |    |       |   |       |         |
| 7         | 6            | 2        | 1        |          | 3  | 2        | 1        | 7  | 5        |          | 2  |       |   |       |         |
| 8         | 8            | 1        |          |          | 5  | 2        |          | 4  | 2        |          | 2  |       |   |       | 3       |
| 9         | 6            | 1        |          |          | 4  | 2        | 1        | 7  | 2        |          | 2  |       | 1 |       |         |
| 10        | 6            | 3        |          |          | 2  | 3        | 1        | 5  | 4        |          | 3  |       | 1 |       |         |
| 11        | 5            | 2        |          |          | 1  | 2        |          | 5  | 6        |          | 3  |       | 3 |       |         |
| Noon.     | 6            | 1        |          |          | 3  | 1        |          | 6  | 5        |          | 5  |       | 2 |       |         |
| 1         | 7            | 1        |          |          | 1  |          | 1        | 4  | 4        |          | 7  |       | 3 |       |         |
| 2         | 7            |          |          |          | 1  | 2        |          | 3  | 4        |          | 8  |       | 2 |       |         |
| 3         | 6            |          |          |          | 3  | 2        | 1        | 3  | 5        |          | 4  |       | 4 |       |         |
| 4         | 2            | 1        |          |          | 1  | 2        |          | 3  | 4        | 1        | 7  |       | 6 |       | 1       |
| 5         | 2            | 1        |          |          | 1  | 1        |          | 6  | 3        |          | 8  |       | 5 |       |         |
| 6         | 3            |          |          |          | 1  | 1        |          | 8  | 2        |          | 7  |       | 5 |       |         |
| 7         | 3            |          |          |          | 2  | 1        |          | 8  | 3        | 1        | 5  |       | 5 |       |         |
| 8         | 3            |          |          |          |    | 1        |          | 9  | 4        |          | 4  |       | 5 |       | 1       |
| 9         | 3            |          |          |          | 1  | 1        |          | 9  | 4        |          | 4  |       | 5 |       |         |
| 10        | 4            |          |          |          | 1  | 1        |          | 9  | 4        |          | 3  |       | 5 |       |         |
| 11        | 5            |          |          |          | 1  | 1        |          | 8  | 3        |          | 3  |       | 4 |       | 2       |

Abstract of the Results of the Hourly Meteorological Observations  
 taken at the Surveyor General's Office, Calcutta,  
 in the month of November, 1860.

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
 dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | 29.792                                          | 29.865                                    | 29.741  | 0.124   | 78.1                          | 85.5                                          | 71.8 | 13.7  |
| 2     | .813                                            | .888                                      | .772    | .116    | 77.1                          | 86.2                                          | 70.0 | 16.2  |
| 3     | .851                                            | .931                                      | .803    | .128    | 76.1                          | 85.8                                          | 68.0 | 17.8  |
| 4     | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 5     | .935                                            | .992                                      | .898    | .094    | 78.1                          | 85.4                                          | 71.8 | 13.6  |
| 6     | .913                                            | .968                                      | .856    | .112    | 78.8                          | 85.0                                          | 74.6 | 10.4  |
| 7     | .886                                            | .951                                      | .820    | .131    | 78.1                          | 85.6                                          | 73.0 | 12.6  |
| 8     | .880                                            | .947                                      | .825    | .122    | 78.9                          | 85.0                                          | 74.9 | 10.1  |
| 9     | .908                                            | .975                                      | .860    | .115    | 78.5                          | 86.2                                          | 72.4 | 13.8  |
| 10    | .939                                            | 30.000                                    | .877    | .123    | 77.8                          | 85.2                                          | 71.4 | 13.8  |
| 11    | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 12    | .964                                            | .043                                      | .891    | .152    | 77.8                          | 85.8                                          | 71.0 | 14.8  |
| 13    | .975                                            | .042                                      | .917    | .125    | 76.6                          | 85.5                                          | 69.6 | 15.9  |
| 14    | .960                                            | .034                                      | .889    | .145    | 76.7                          | 86.6                                          | 69.3 | 17.3  |
| 15    | .908                                            | 29.973                                    | .840    | .133    | 76.6                          | 86.6                                          | 69.5 | 17.1  |
| 16    | .874                                            | .923                                      | .820    | .103    | 78.0                          | 85.8                                          | 72.6 | 13.2  |
| 17    | .841                                            | .914                                      | .758    | .156    | 79.0                          | 87.2                                          | 73.2 | 14.0  |
| 18    | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 19    | .782                                            | .837                                      | .740    | .097    | 79.4                          | 88.6                                          | 72.8 | 15.8  |
| 20    | .871                                            | .939                                      | .806    | .133    | 78.1                          | 87.0                                          | 72.0 | 15.0  |
| 21    | .932                                            | 30.006                                    | .887    | .119    | 77.0                          | 85.6                                          | 70.8 | 14.8  |
| 22    | .958                                            | .029                                      | .913    | .116    | 72.5                          | 82.1                                          | 67.0 | 15.1  |
| 23    | .975                                            | .036                                      | .928    | .108    | 70.0                          | 80.9                                          | 62.9 | 18.0  |
| 24    | 30.001                                          | .079                                      | .951    | .128    | 69.6                          | 80.3                                          | 61.4 | 18.9  |
| 25    | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 26    | .028                                            | .087                                      | .978    | .109    | 69.9                          | 80.6                                          | 62.4 | 18.2  |
| 27    | .081                                            | .167                                      | 30.031  | .136    | 69.7                          | 81.2                                          | 60.4 | 20.8  |
| 28    | .077                                            | .149                                      | .017    | .132    | 69.4                          | 80.6                                          | 60.8 | 19.8  |
| 29    | .043                                            | .116                                      | 29.956  | .160    | 70.2                          | 80.4                                          | 62.8 | 17.6  |
| 30    | .017                                            | .106                                      | .938    | .168    | 70.9                          | 80.6                                          | 63.2 | 17.4  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly observations made during the day.

Meteorological Observations.

Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of November, 1860.

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of Air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity,<br>complete saturation be-<br>ing unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                   |
| 1     | 69.4                            | 8.7                 | 65.0                | 13.1                         | 0.617                            | 6.69                                             | 3.53                                                                    | 0.66                                                              |
| 2     | 69.2                            | 7.9                 | 65.2                | 11.9                         | .621                             | .74                                              | .18                                                                     | .68                                                               |
| 3     | 69.0                            | 7.1                 | 65.4                | 10.7                         | .626                             | .80                                              | 2.83                                                                    | .71                                                               |
| 4     | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 5     | 70.9                            | 7.2                 | 67.3                | 10.8                         | .666                             | 7.21                                             | 3.01                                                                    | .71                                                               |
| 6     | 73.2                            | 5.6                 | 70.4                | 8.4                          | .736                             | .97                                              | 2.47                                                                    | .76                                                               |
| 7     | 73.6                            | 4.5                 | 71.3                | 6.8                          | .758                             | 8.21                                             | .01                                                                     | .80                                                               |
| 8     | 73.7                            | 5.2                 | 71.1                | 7.8                          | .753                             | .15                                              | .32                                                                     | .78                                                               |
| 9     | 71.8                            | 6.7                 | 68.4                | 10.1                         | .690                             | 7.47                                             | .88                                                                     | .72                                                               |
| 10    | 71.0                            | 6.8                 | 67.6                | 10.2                         | .672                             | .29                                              | .84                                                                     | .72                                                               |
| 11    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 12    | 70.3                            | 7.5                 | 66.5                | 11.3                         | .648                             | .03                                              | 3.10                                                                    | .69                                                               |
| 13    | 69.0                            | 7.6                 | 65.2                | 11.4                         | .621                             | 6.76                                             | .01                                                                     | .69                                                               |
| 14    | 69.6                            | 7.1                 | 66.0                | 10.7                         | .638                             | .92                                              | 2.88                                                                    | .71                                                               |
| 15    | 69.9                            | 6.7                 | 66.5                | 10.1                         | .648                             | 7.05                                             | .72                                                                     | .72                                                               |
| 16    | 72.3                            | 5.7                 | 69.4                | 8.6                          | .713                             | .72                                              | .47                                                                     | .76                                                               |
| 17    | 73.9                            | 5.1                 | 71.3                | 7.7                          | .758                             | 8.20                                             | .30                                                                     | .78                                                               |
| 18    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 19    | 73.4                            | 6.0                 | 70.4                | 9.0                          | .736                             | 7.95                                             | .67                                                                     | .75                                                               |
| 20    | 70.4                            | 7.7                 | 66.5                | 11.6                         | .648                             | .02                                              | 3.20                                                                    | .69                                                               |
| 21    | 68.2                            | 8.8                 | 63.8                | 13.2                         | .593                             | 6.44                                             | .45                                                                     | .65                                                               |
| 22    | 64.8                            | 7.7                 | 60.9                | 11.6                         | .539                             | 5.90                                             | 2.73                                                                    | .68                                                               |
| 23    | 62.5                            | 7.5                 | 58.7                | 11.3                         | .501                             | .52                                              | .48                                                                     | .69                                                               |
| 24    | 61.4                            | 8.2                 | 57.3                | 12.3                         | .478                             | .26                                              | .64                                                                     | .67                                                               |
| 25    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 26    | 62.8                            | 7.1                 | 59.2                | 10.7                         | .509                             | .60                                              | .38                                                                     | .70                                                               |
| 27    | 60.6                            | 9.1                 | 56.0                | 13.7                         | .458                             | .03                                              | .90                                                                     | .63                                                               |
| 28    | 61.3                            | 8.1                 | 57.2                | 12.2                         | .476                             | .24                                              | .62                                                                     | .67                                                               |
| 29    | 63.5                            | 6.7                 | 60.1                | 10.1                         | .525                             | .77                                              | .28                                                                     | .72                                                               |
| 30    | 64.7                            | 6.2                 | 61.6                | 9.3                          | .552                             | 6.06                                             | .17                                                                     | .74                                                               |

All the Hygrometrical elements are computed by the Greenwich Constants.

*Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of November, 1860.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

| Hour.      | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | o                          | o                                                        | o    | o     |
| Mid-night. | 29.926                                    | 30.092                                                 | 29.773  | 0.319   | 72.1                       | 76.8                                                     | 64.2 | 12.6  |
| 1          | .923                                      | .080                                                   | .768    | .312    | 71.3                       | 76.4                                                     | 63.3 | 13.1  |
| 2          | .915                                      | .070                                                   | .760    | .310    | 70.8                       | 76.0                                                     | 62.1 | 13.9  |
| 3          | .916                                      | .058                                                   | .760    | .298    | 70.1                       | 75.7                                                     | 61.0 | 14.7  |
| 4          | .905                                      | .057                                                   | .755    | .302    | 70.0                       | 75.0                                                     | 61.3 | 13.7  |
| 5          | .910                                      | .062                                                   | .765    | .297    | 69.4                       | 74.7                                                     | 61.2 | 13.5  |
| 6          | .936                                      | .083                                                   | .772    | .311    | 68.9                       | 75.0                                                     | 60.4 | 14.6  |
| 7          | .956                                      | .114                                                   | .796    | .318    | 69.3                       | 75.8                                                     | 61.2 | 14.6  |
| 8          | .983                                      | .138                                                   | .817    | .321    | 71.9                       | 77.8                                                     | 62.6 | 15.2  |
| 9          | .998                                      | .161                                                   | .836    | .325    | 74.6                       | 79.8                                                     | 66.4 | 13.4  |
| 10         | .995                                      | .167                                                   | .836    | .331    | 77.8                       | 81.8                                                     | 71.0 | 10.8  |
| 11         | .976                                      | .146                                                   | .837    | .309    | 80.4                       | 84.4                                                     | 74.6 | 9.8   |
| Noon.      | .950                                      | .114                                                   | .792    | .322    | 82.5                       | 86.3                                                     | 76.6 | 9.7   |
| 1          | .919                                      | .080                                                   | .767    | .313    | 83.8                       | 88.0                                                     | 79.4 | 8.6   |
| 2          | .896                                      | .046                                                   | .744    | .302    | 84.2                       | 88.6                                                     | 80.3 | 8.3   |
| 3          | .881                                      | .031                                                   | .740    | .291    | 83.6                       | 86.6                                                     | 79.2 | 7.4   |
| 4          | .876                                      | .034                                                   | .746    | .288    | 81.9                       | 85.2                                                     | 77.5 | 7.7   |
| 5          | .884                                      | .035                                                   | .740    | .295    | 79.9                       | 83.2                                                     | 75.0 | 8.2   |
| 6          | .894                                      | .039                                                   | .746    | .293    | 77.8                       | 82.2                                                     | 71.8 | 10.4  |
| 7          | .917                                      | .058                                                   | .773    | .285    | 75.8                       | 80.4                                                     | 70.0 | 10.4  |
| 8          | .932                                      | .074                                                   | .791    | .283    | 74.7                       | 79.4                                                     | 68.0 | 11.4  |
| 9          | .943                                      | .084                                                   | .798    | .286    | 73.7                       | 78.6                                                     | 66.9 | 11.7  |
| 10         | .948                                      | .091                                                   | .807    | .284    | 72.8                       | 77.9                                                     | 65.6 | 12.3  |
| 11         | .943                                      | .101                                                   | .803    | .298    | 72.4                       | 77.6                                                     | 64.8 | 12.8  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of November, 1860.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force<br>of Vapour. | Mean Weight of Va-<br>pour in a Cubic<br>foot of Air. | Additional Weight of<br>Vapour required<br>for complete satu-<br>ration. | Mean degree of Hu-<br>midity, complete<br>saturation being<br>unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                                |                                                                      |
| Mid-<br>night. | 67.9                            | 4.2                 | 65.8                | 6.3                          | .634                             | 6.96                                                  | 1.57                                                                     | 0.82                                                                 |
| 1              | 67.3                            | 4.0                 | 65.3                | 6.0                          | .623                             | .85                                                   | .48                                                                      | .82                                                                  |
| 2              | 66.8                            | 4.0                 | 64.8                | 6.0                          | .613                             | .75                                                   | .45                                                                      | .82                                                                  |
| 3              | 66.2                            | 3.9                 | 64.2                | 5.9                          | .601                             | .61                                                   | .42                                                                      | .82                                                                  |
| 4              | 66.2                            | 3.8                 | 64.3                | 5.7                          | .603                             | .64                                                   | .36                                                                      | .83                                                                  |
| 5              | 65.8                            | 3.6                 | 64.0                | 5.4                          | .597                             | .58                                                   | .28                                                                      | .84                                                                  |
| 6              | 65.1                            | 3.8                 | 63.2                | 5.7                          | .582                             | .41                                                   | .33                                                                      | .83                                                                  |
| 7              | 65.2                            | 4.1                 | 63.1                | 6.2                          | .580                             | .39                                                   | .44                                                                      | .82                                                                  |
| 8              | 66.5                            | 5.4                 | 63.8                | 8.1                          | .593                             | .50                                                   | .98                                                                      | .77                                                                  |
| 9              | 68.0                            | 6.6                 | 64.7                | 9.9                          | .611                             | .66                                                   | 2.54                                                                     | .72                                                                  |
| 10             | 69.0                            | 8.8                 | 64.6                | 13.2                         | .609                             | .60                                                   | 3.53                                                                     | .65                                                                  |
| 11             | 70.1                            | 10.3                | 64.9                | 15.5                         | .615                             | .63                                                   | 4.31                                                                     | .61                                                                  |
| Noon.          | 70.5                            | 12.0                | 64.5                | 18.0                         | .607                             | .52                                                   | 5.12                                                                     | .56                                                                  |
| 1              | 71.0                            | 12.8                | 64.6                | 19.2                         | .609                             | .52                                                   | .58                                                                      | .54                                                                  |
| 2              | 71.0                            | 13.2                | 64.4                | 19.8                         | .605                             | .47                                                   | .77                                                                      | .53                                                                  |
| 3              | 70.7                            | 12.9                | 64.2                | 19.4                         | .601                             | .44                                                   | .59                                                                      | .54                                                                  |
| 4              | 70.3                            | 11.6                | 64.5                | 17.4                         | .607                             | .53                                                   | 4.91                                                                     | .57                                                                  |
| 5              | 70.3                            | 9.6                 | 65.5                | 14.4                         | .628                             | .78                                                   | .00                                                                      | .63                                                                  |
| 6              | 70.6                            | 7.2                 | 67.0                | 10.8                         | .659                             | 7.14                                                  | 2.99                                                                     | .71                                                                  |
| 7              | 69.9                            | 5.9                 | 66.9                | 8.9                          | .657                             | .15                                                   | .39                                                                      | .75                                                                  |
| 8              | 69.4                            | 5.3                 | 66.7                | 8.0                          | .653                             | .11                                                   | .12                                                                      | .77                                                                  |
| 9              | 69.0                            | 4.7                 | 66.6                | 7.1                          | .651                             | .11                                                   | 1.85                                                                     | .79                                                                  |
| 10             | 68.2                            | 4.6                 | 65.9                | 6.9                          | .636                             | 6.96                                                  | .75                                                                      | .80                                                                  |
| 11             | 67.9                            | 4.5                 | 65.6                | 6.8                          | .630                             | .90                                                   | .70                                                                      | .80                                                                  |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of November, 1860.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                |
|-------|-----------------------|---------------------------------|-----------------------------------|---------------------------------------------------------------------------|
|       | o                     | Inches.                         |                                   |                                                                           |
| 1     | 149.4                 | ...                             | W. & N. & N. E.                   | Cloudless.                                                                |
| 2     | 142.0                 | ...                             | W. & N. E. & N.                   | Cloudless.                                                                |
| 3     | 144.5                 | ...                             | W. & S. W. & N. E.                | Cloudless.                                                                |
| 4     | <i>Sunday.</i>        | ...                             |                                   |                                                                           |
| 5     | 140.0                 | ..                              | N. & N. W. & W.                   | Cloudy till 7 A. M. Scatd. \i & \i afterwards.                            |
| 6     | ...                   | ...                             | N. & W.                           | Scatd. clouds.                                                            |
| 7     | ...                   | ...                             | E. & N. E. & N. W.                | Cloudless till 5 A. M. Scatd. clouds till 8 P. M. cloudless afterwards.   |
| 8     | 123.0                 | ...                             | N. & N. W.                        | Scatd. clouds till 5 P. M. cloudless afterwards.                          |
| 9     | 141.7                 | ...                             | N.                                | Cloudless.                                                                |
| 10    | 141.5                 | ...                             | N.                                | Cloudless till 11 A. M. Scatd. \i & \i afterwards.                        |
| 11    | <i>Sunday.</i>        | ...                             |                                   |                                                                           |
| 12    | 139.5                 | ...                             | N. W. & N.                        | Cloudless till 8 A. M. Scatd. \i till 4 P. M. cloudless afterwards.       |
| 13    | 144.5                 | ...                             | N. & W. & N. W.                   | Cloudless till 4 A. M. Scatd. \i & \i till 11 A. M. cloudless afterwards. |
| 14    | 142.0                 | ...                             | N. & N. W.                        | Cloudless till 11 A. M. Scatd. \i & \i till 6 P. M. cloudless afterwards. |
| 15    | 144.8                 | ...                             | N.                                | Cloudless till 7 A. M. Scatd. \i till 3 P. M. cloudless afterwards.       |
| 16    | 139.0                 | ...                             | N. & E.                           | Cloudless till 2 A. M. Scatd. \i & \i afterwards.                         |
| 17    | 146.0                 | ...                             | N. E.                             | Scatd. clouds.                                                            |
| 18    | <i>Sunday.</i>        | ...                             |                                   |                                                                           |
| 19    | 147.4                 | ...                             | N. & W.                           | Scatd. clouds till 6 P. M. cloudless afterwards.                          |
| 20    | 146.4                 | ...                             | N. & N. W.                        | Cloudless.                                                                |
| 21    | 144.4                 | ...                             | N.                                | Cloudless.                                                                |
| 22    | 139.0                 | ...                             | N. & N. W.                        | Cloudless.                                                                |
| 23    | 139.2                 | ...                             | N. W. & N.                        | Cloudless till 11 A. M. Scatd. \i & \i till 6 P. M. cloudless afterwards. |
| 24    | 141.0                 | ...                             | N. W. & N.                        | Cloudless.                                                                |
| 25    | <i>Sunday.</i>        | ...                             |                                   |                                                                           |
| 26    | 139.0                 | ...                             | N. W. & W.                        | Cloudless.                                                                |
| 27    | 138.0                 | ...                             | N. W. & W. & N.                   | Cloudless.                                                                |
| 28    | 140.0                 | ...                             | N. & W.                           | Cloudless.                                                                |
| 29    | 136.0                 | ..                              | N. W.                             | Cloudless till 5 A. M. Scatd. \i & \i afterwards.                         |
| 30    | 136.0                 | ...                             | N. W. & N. & S. W.                | Scatd. clouds of different kinds.                                         |

\i Cirri, \i Cirro strati, \i Cumuli, \i Cumulo strati, \i Nimbi,—i Strati  
 \i Cirro cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of November, 1860.*

## MONTHLY RESULTS.

|                                                                    |    |    | Inches. |
|--------------------------------------------------------------------|----|----|---------|
| Mean height of the Barometer for the month,                        | .. | .. | 29.930  |
| Max. height of the Barometer, occurred at 10 A. M. on the 27th,    | .. | .. | 30.167  |
| Min. height of the Barometer, occurred at 3 & 5 P. M. on the 19th, | .. | .. | 29.740  |
| <i>Extreme range</i> of the Barometer during the month,            | .. | .. | 0.427   |
| Mean of the Daily Max. Pressures,                                  | .. | .. | 30.000  |
| Ditto ditto Min. ditto,                                            | .. | .. | 29.874  |
| <i>Mean daily range</i> of the Barometer during the month,         | .. | .. | 0.126   |

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|                                                              |    |    | °    |
|--------------------------------------------------------------|----|----|------|
| Mean Dry Bulb Thermometer for the month,                     | .. | .. | 75.5 |
| Max. Temperature occurred at 2 P. M. on the 19th,            | .. | .. | 88.6 |
| Min. Temperature occurred at 6 A. M. on the 27th,            | .. | .. | 60.4 |
| <i>Extreme range</i> of the Temperature during the month,    | .. | .. | 28.2 |
| Mean of the daily Max. Temperature,                          | .. | .. | 84.4 |
| Ditto ditto Min. ditto,                                      | .. | .. | 68.8 |
| <i>Mean daily range</i> of the Temperature during the month, | .. | .. | 15.6 |

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|                                                               |    |    | °      |
|---------------------------------------------------------------|----|----|--------|
| Mean Wet Bulb Thermometer for the month,                      | .. | .. | 68.5   |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, .. |    |    | 7.0    |
| Computed Mean Dew-point for the month,                        | .. | .. | 65.0   |
| Mean Dry Bulb Thermometer above computed Mean Dew-point,      | .. | .. | 10.5   |
|                                                               |    |    | Inches |
| Mean Elastic force of vapour for the month, ..                | .. | .. | 0.617  |

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|                                                                         |    |    | Troy grains |
|-------------------------------------------------------------------------|----|----|-------------|
| Mean weight of Vapour for the month,                                    | .. | .. | 6.72        |
| Additional weight of Vapour required for complete saturation,           | .. | .. | 2.74        |
| Mean degree of humidity for the month, complete saturation being unity, | .. | .. | 0.71        |

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|                                                   |    |    | Inches     |
|---------------------------------------------------|----|----|------------|
| Rained No day, Max. fall of rain during 24 hours, | .. | .. | Nil.       |
| Total amount of rain during the month,            | .. | .. | Nil.       |
| Prevailing direction of the Wind,                 | .. | .. | N. & N. W. |

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taken at the Surveyor General's Office, Calcutta,  
in the month of November, 1860.*

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind  
blew, together with the number of days on which at the same hour,  
when any particular wind was blowing, it rained.

| Hour.     | N.           |          | N. E.    |          | E. | S. E.    |          | S. | S. W.    |          | W. | N. W. |   | Calm. | Rain on. | Missed. |
|-----------|--------------|----------|----------|----------|----|----------|----------|----|----------|----------|----|-------|---|-------|----------|---------|
|           | Rain on.     | Rain on. | Rain on. | Rain on. |    | Rain on. | Rain on. |    | Rain on. | Rain on. |    |       |   |       |          |         |
|           | No. of days. |          |          |          |    |          |          |    |          |          |    |       |   |       |          |         |
| Midnight. | 15           | 1        |          |          |    |          |          |    | 1        |          | 3  |       | 4 |       |          | 2       |
| 1         | 17           | 1        |          |          |    |          |          |    | 1        |          | 3  |       | 4 |       |          |         |
| 2         | 17           | 1        |          |          |    |          |          |    | 1        |          | 3  |       | 4 |       |          |         |
| 3         | 16           | 1        |          |          |    |          |          |    | 1        |          | 3  |       | 4 |       |          | 1       |
| 4         | 14           | 2        |          |          |    |          |          |    |          |          | 2  |       | 3 |       |          | 3       |
| 5         | 12           | 2        |          |          |    |          |          |    | 1        |          | 3  |       | 5 |       |          | 3       |
| 6         | 14           | 3        |          |          |    |          |          |    | 1        |          | 2  |       | 6 |       |          |         |
| 7         | 13           | 4        |          |          |    |          |          |    | 1        |          | 2  |       | 6 |       |          |         |
| 8         | 13           | 4        |          |          |    |          |          |    | 1        |          | 1  |       | 7 |       |          |         |
| 9         | 13           | 1        |          |          | 1  |          |          |    | 1        |          | 3  |       | 7 |       |          |         |
| 10        | 12           |          |          |          | 2  |          |          |    |          |          | 3  |       | 9 |       |          |         |
| 11        | 11           | 1        |          |          | 1  |          |          |    |          | 1        | 4  |       | 8 |       |          |         |
| Noon.     | 10           | 4        |          |          | 1  |          |          |    |          | 1        | 3  |       | 7 |       |          |         |
| 1         | 11           | 2        |          |          | 1  |          |          |    |          | 1        | 4  |       | 7 |       |          |         |
| 2         | 10           | 1        |          |          | 1  |          |          | 1  |          | 1        | 5  |       | 7 |       |          |         |
| 3         | 10           | 3        |          |          | 2  |          |          |    |          | 2        | 2  |       | 7 |       |          |         |
| 4         | 11           | 2        |          |          | 1  |          |          |    |          | 2        | 1  |       | 8 |       |          | 1       |
| 5         | 8            | 2        |          |          | 1  |          |          |    |          |          | 6  |       | 9 |       |          |         |
| 6         | 5            | 5        |          |          | 2  |          |          | 1  |          |          | 6  |       | 7 |       |          |         |
| 7         | 7            | 4        |          |          | 2  |          |          | 1  |          |          | 5  |       | 7 |       |          |         |
| 8         | 9            | 4        |          |          | 2  |          |          | 1  |          |          | 5  |       | 5 |       |          |         |
| 9         | 9            | 4        |          |          | 2  |          |          | 1  |          |          | 5  |       | 5 |       |          |         |
| 10        | 8            | 3        |          |          | 1  |          |          | 1  |          |          | 5  |       | 4 |       |          | 4       |
| 11        | 8            | 3        |          |          | 2  |          |          | 1  |          |          | 5  |       | 6 |       |          | 1       |



Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of December, 1860.

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

| Date. | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer during the day. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature during the day. |      |       |
|-------|-------------------------------------------|----------------------------------------|---------|---------|----------------------------|------------------------------------------|------|-------|
|       |                                           | Max.                                   | Min.    | Diff.   |                            | Max.                                     | Min. | Diff. |
|       | Inches.                                   | Inches.                                | Inches. | Inches. | o                          | o                                        | o    | o     |
| 1     | 29.984                                    | 30.058                                 | 29.931  | 0.127   | 70.3                       | 80.4                                     | 63.4 | 17.0  |
| 2     | Sunday.                                   |                                        |         |         |                            |                                          |      |       |
| 3     | .999                                      | .056                                   | .950    | .106    | 68.7                       | 79.0                                     | 60.8 | 18.2  |
| 4     | .989                                      | .075                                   | .943    | .132    | 68.9                       | 77.0                                     | 60.4 | 16.6  |
| 5     | .991                                      | .069                                   | .937    | .132    | 69.7                       | 78.6                                     | 62.6 | 16.0  |
| 6     | .977                                      | .048                                   | .926    | .122    | 69.6                       | 79.2                                     | 62.1 | 17.1  |
| 7     | .967                                      | .049                                   | .905    | .144    | 70.3                       | 80.0                                     | 63.0 | 17.0  |
| 8     | .994                                      | .090                                   | .947    | .143    | 69.4                       | 79.9                                     | 61.2 | 18.7  |
| 9     | Sunday.                                   |                                        |         |         |                            |                                          |      |       |
| 10    | 30.016                                    | .092                                   | .964    | .128    | 67.5                       | 77.6                                     | 60.2 | 17.4  |
| 11    | .014                                      | .100                                   | .951    | .149    | 66.2                       | 77.2                                     | 57.0 | 20.2  |
| 12    | 29.993                                    | .072                                   | .932    | .140    | 65.7                       | 77.2                                     | 58.0 | 19.2  |
| 13    | .980                                      | .069                                   | .935    | .134    | 65.5                       | 77.0                                     | 56.6 | 20.4  |
| 14    | .998                                      | .080                                   | .946    | .131    | 66.4                       | 78.6                                     | 58.0 | 20.6  |
| 15    | 30.050                                    | .149                                   | .994    | .155    | 65.8                       | 77.8                                     | 57.2 | 20.6  |
| 16    | Sunday.                                   |                                        |         |         |                            |                                          |      |       |
| 17    | 29.993                                    | .078                                   | .932    | .146    | 65.1                       | 76.6                                     | 56.7 | 19.9  |
| 18    | .984                                      | .072                                   | .925    | .147    | 65.1                       | 76.4                                     | 56.2 | 20.2  |
| 19    | .992                                      | .063                                   | .937    | .126    | 66.3                       | 77.0                                     | 57.6 | 19.4  |
| 20    | 30.007                                    | .083                                   | .937    | .146    | 66.9                       | 77.6                                     | 59.6 | 18.0  |
| 21    | .033                                      | .097                                   | .975    | .122    | 67.1                       | 78.0                                     | 59.9 | 18.1  |
| 22    | .050                                      | .133                                   | .973    | .160    | 63.8                       | 75.4                                     | 55.0 | 20.4  |
| 23    | Sunday.                                   |                                        |         |         |                            |                                          |      |       |
| 24    | .050                                      | .124                                   | 30.009  | .115    | 67.7                       | 78.6                                     | 58.4 | 20.2  |
| 25    | .048                                      | .126                                   | .003    | .123    | 67.8                       | 78.7                                     | 59.0 | 19.7  |
| 26    | .034                                      | .120                                   | 29.974  | .146    | 66.9                       | 77.6                                     | 58.2 | 19.4  |
| 27    | .028                                      | .110                                   | .990    | .120    | 68.5                       | 79.4                                     | 58.8 | 20.6  |
| 28    | .023                                      | .095                                   | .980    | .115    | 67.7                       | 78.8                                     | 58.9 | 19.9  |
| 29    | .044                                      | .119                                   | 30.001  | .118    | 67.8                       | 78.6                                     | 59.8 | 18.8  |
| 30    | Sunday.                                   |                                        |         |         |                            |                                          |      |       |
| 31    | .086                                      | .172                                   | .035    | .137    | 63.6                       | 75.6                                     | 54.0 | 21.6  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly observations made during the day.

Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of December, 1860.

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
| 1     | 64.1                            | 6.2                 | 61.0                | 9.3                          | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| 2     | <i>Sunday.</i>                  |                     |                     |                              | 0.541                            | 5.95                                             | 2.13                                                                    | 0.74                                                                |
| 3     | 61.9                            | 6.8                 | 58.5                | 10.2                         | .498                             | .549                                             | .20                                                                     | .71                                                                 |
| 4     | 63.1                            | 5.8                 | 60.2                | 8.7                          | .527                             | .80                                              | 1.94                                                                    | .75                                                                 |
| 5     | 64.5                            | 5.2                 | 61.9                | 7.8                          | .557                             | 6.13                                             | .80                                                                     | .77                                                                 |
| 6     | 64.9                            | 4.7                 | 62.5                | 7.1                          | .568                             | .26                                              | .64                                                                     | .79                                                                 |
| 7     | 64.0                            | 6.3                 | 60.8                | 9.5                          | .537                             | 5.90                                             | 2.18                                                                    | .73                                                                 |
| 8     | 63.4                            | 6.0                 | 60.4                | 9.0                          | .530                             | .84                                              | .02                                                                     | .74                                                                 |
| 9     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 10    | 60.6                            | 6.9                 | 56.5                | 11.0                         | .465                             | .14                                              | .28                                                                     | .69                                                                 |
| 11    | 59.6                            | 6.6                 | 55.6                | 10.6                         | .452                             | .01                                              | .11                                                                     | .70                                                                 |
| 12    | 59.3                            | 6.4                 | 55.5                | 10.2                         | .450                             | .00                                              | .02                                                                     | .71                                                                 |
| 13    | 58.9                            | 6.6                 | 54.9                | 10.6                         | .441                             | 4.89                                             | .09                                                                     | .70                                                                 |
| 14    | 59.4                            | 7.0                 | 55.2                | 11.2                         | .445                             | .94                                              | .23                                                                     | .69                                                                 |
| 15    | 58.9                            | 6.9                 | 54.8                | 11.0                         | .440                             | .87                                              | .17                                                                     | .69                                                                 |
| 16    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 17    | 58.5                            | 6.6                 | 54.5                | 10.6                         | .435                             | .83                                              | .06                                                                     | .70                                                                 |
| 18    | 59.1                            | 6.0                 | 55.5                | 9.6                          | .450                             | 5.00                                             | 1.89                                                                    | .73                                                                 |
| 19    | 60.0                            | 6.3                 | 56.2                | 10.1                         | .461                             | .11                                              | 2.04                                                                    | .72                                                                 |
| 20    | 60.8                            | 6.1                 | 57.1                | 9.8                          | .475                             | .25                                              | .03                                                                     | .72                                                                 |
| 21    | 59.1                            | 8.0                 | 54.3                | 12.8                         | .432                             | 4.78                                             | .54                                                                     | .65                                                                 |
| 22    | 56.4                            | 7.4                 | 51.2                | 12.6                         | .389                             | .33                                              | .28                                                                     | .66                                                                 |
| 23    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 24    | 62.1                            | 5.6                 | 58.7                | 9.0                          | .501                             | 5.54                                             | 1.92                                                                    | .74                                                                 |
| 25    | 61.7                            | 6.1                 | 58.0                | 9.8                          | .489                             | .40                                              | 2.08                                                                    | .72                                                                 |
| 26    | 61.0                            | 5.9                 | 57.5                | 9.4                          | .481                             | .33                                              | 1.95                                                                    | .73                                                                 |
| 27    | 62.0                            | 6.5                 | 58.7                | 9.8                          | .501                             | .53                                              | 2.12                                                                    | .72                                                                 |
| 28    | 61.1                            | 6.6                 | 57.1                | 10.6                         | .475                             | .24                                              | .22                                                                     | .70                                                                 |
| 29    | 60.2                            | 7.6                 | 55.6                | 12.2                         | .452                             | .00                                              | .48                                                                     | .67                                                                 |
| 30    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 31    | 56.1                            | 7.5                 | 50.8                | 12.8                         | .383                             | 4.28                                             | .29                                                                     | .65                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of December, 1860.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>for each hour during<br>the month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Temperature<br>for each hour during<br>the month. |      |       |
|----------------|-------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|----------------------------------------------------------------|------|-------|
|                |                                                 | Max.                                                         | Min.    | Diff.   |                               | Max.                                                           | Min. | Diff. |
|                | Inches.                                         | Inches.                                                      | Inches. | Inches. | o                             | o                                                              | o    | o     |
| Mid-<br>night. | 30.006                                          | 30.100                                                       | 29.964  | 0.136   | 62.6                          | 66.4                                                           | 57.8 | 8.6   |
| 1              | .001                                            | .090                                                         | .949    | .141    | 62.0                          | 66.0                                                           | 57.0 | 9.0   |
| 2              | 29.994                                          | .075                                                         | .945    | .130    | 61.3                          | 65.2                                                           | 56.5 | 8.7   |
| 3              | .988                                            | .067                                                         | .938    | .129    | 60.7                          | 64.4                                                           | 56.1 | 8.3   |
| 4              | .984                                            | .051                                                         | .949    | .102    | 60.2                          | 63.8                                                           | 56.8 | 7.0   |
| 5              | .999                                            | .079                                                         | .963    | .116    | 59.7                          | 64.0                                                           | 54.1 | 9.9   |
| 6              | 30.019                                          | .108                                                         | .989    | .119    | 59.2                          | 63.4                                                           | 54.0 | 9.4   |
| 7              | .041                                            | .131                                                         | 30.005  | .126    | 59.3                          | 64.8                                                           | 54.4 | 10.4  |
| 8              | .068                                            | .129                                                         | .029    | .100    | 62.6                          | 66.8                                                           | 58.1 | 8.7   |
| 9              | .090                                            | .172                                                         | .041    | .131    | 65.9                          | 71.4                                                           | 61.4 | 10.0  |
| 10             | .087                                            | .159                                                         | .034    | .125    | 69.8                          | 74.2                                                           | 61.6 | 9.6   |
| 11             | .071                                            | .140                                                         | .021    | .119    | 73.1                          | 77.0                                                           | 68.8 | 8.2   |
| Noon.          | .039                                            | .116                                                         | 29.987  | .129    | 75.6                          | 78.5                                                           | 72.4 | 6.1   |
| 1              | .006                                            | .096                                                         | .952    | .144    | 77.1                          | 80.0                                                           | 74.4 | 5.6   |
| 2              | 29.982                                          | .059                                                         | .924    | .135    | 77.9                          | 80.4                                                           | 75.4 | 5.0   |
| 3              | .967                                            | .043                                                         | .911    | .132    | 77.4                          | 79.4                                                           | 74.8 | 4.6   |
| 4              | .961                                            | .037                                                         | .905    | .132    | 75.2                          | 77.0                                                           | 71.0 | 6.0   |
| 5              | .965                                            | .035                                                         | .919    | .116    | 73.2                          | 75.8                                                           | 70.6 | 5.2   |
| 6              | .974                                            | .056                                                         | .927    | .129    | 70.4                          | 73.0                                                           | 66.8 | 6.2   |
| 7              | .991                                            | .063                                                         | .948    | .115    | 68.2                          | 71.7                                                           | 64.4 | 7.3   |
| 8              | 30.006                                          | .075                                                         | .955    | .120    | 66.6                          | 69.8                                                           | 62.4 | 7.4   |
| 9              | .016                                            | .070                                                         | .962    | .108    | 65.4                          | 69.8                                                           | 60.4 | 9.4   |
| 10             | .019                                            | .076                                                         | .977    | .099    | 64.4                          | 68.4                                                           | 59.8 | 8.6   |
| 11             | .016                                            | .067                                                         | .968    | .099    | 63.5                          | 67.2                                                           | 58.9 | 8.3   |

The Mean Height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of December, 1860.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb<br>Thermometer. | Dry Bulb above Wet. | Computed Dew point. | Dry Bulb above Dew<br>point. | Mean Elastic force of<br>Vapour. | Mean Weight of Va-<br>pour in a Cubic foot<br>of Air. | Additional Weight of<br>vapour required for<br>complete saturation. | Mean degree of Hu-<br>midity, complete satu-<br>ration being unity. |
|----------------|-------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                             | o.                  | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                           |                                                                     |
| Mid-<br>night. | 59.3                          | 3.3                 | 57.0                | 5.6                          | .473                             | 5.28                                                  | 1.09                                                                | 0.83                                                                |
| 1              | 58.8                          | 3.2                 | 56.6                | 5.4                          | .467                             | .23                                                   | .02                                                                 | .84                                                                 |
| 2              | 58.3                          | 3.0                 | 55.9                | 5.4                          | .456                             | .11                                                   | .01                                                                 | .84                                                                 |
| 3              | 57.8                          | 2.9                 | 55.5                | 5.2                          | .450                             | .05                                                   | 0.95                                                                | .84                                                                 |
| 4              | 57.5                          | 2.7                 | 55.3                | 4.9                          | .447                             | .02                                                   | .89                                                                 | .85                                                                 |
| 5              | 56.9                          | 2.8                 | 54.7                | 5.0                          | .438                             | 4.92                                                  | .90                                                                 | .85                                                                 |
| 6              | 56.6                          | 2.6                 | 54.5                | 4.7                          | .435                             | .89                                                   | .84                                                                 | .85                                                                 |
| 7              | 56.6                          | 2.7                 | 54.4                | 4.9                          | .434                             | .87                                                   | .87                                                                 | .85                                                                 |
| 8              | 58.3                          | 4.3                 | 55.3                | 7.3                          | .447                             | 5.00                                                  | 1.37                                                                | .79                                                                 |
| 9              | 60.1                          | 5.8                 | 56.6                | 9.3                          | .467                             | .18                                                   | .88                                                                 | .73                                                                 |
| 10             | 61.9                          | 7.9                 | 57.9                | 11.9                         | .488                             | .36                                                   | 2.59                                                                | .67                                                                 |
| 11             | 63.2                          | 9.9                 | 58.2                | 14.9                         | .493                             | .38                                                   | 3.41                                                                | .61                                                                 |
| Noon.          | 63.7                          | 11.9                | 57.7                | 17.9                         | .485                             | .26                                                   | 4.22                                                                | .56                                                                 |
| 1              | 64.2                          | 12.9                | 57.7                | 19.4                         | .485                             | .25                                                   | .67                                                                 | .53                                                                 |
| 2              | 64.6                          | 13.3                | 57.9                | 20.0                         | .488                             | .27                                                   | .89                                                                 | .52                                                                 |
| 3              | 64.0                          | 13.4                | 57.3                | 20.1                         | .478                             | .17                                                   | .84                                                                 | .52                                                                 |
| 4              | 63.3                          | 11.9                | 57.3                | 17.9                         | .478                             | .20                                                   | .17                                                                 | .56                                                                 |
| 5              | 63.5                          | 9.7                 | 58.6                | 14.6                         | .499                             | .45                                                   | 3.37                                                                | .62                                                                 |
| 6              | 63.5                          | 6.9                 | 60.0                | 10.4                         | .523                             | .75                                                   | 2.35                                                                | .71                                                                 |
| 7              | 62.6                          | 5.6                 | 59.2                | 9.0                          | .509                             | .63                                                   | 1.95                                                                | .74                                                                 |
| 8              | 62.1                          | 4.5                 | 59.4                | 7.2                          | .513                             | .68                                                   | .53                                                                 | .79                                                                 |
| 9              | 61.2                          | 4.2                 | 58.7                | 6.7                          | .501                             | .56                                                   | .39                                                                 | .80                                                                 |
| 10             | 60.6                          | 3.8                 | 57.9                | 6.5                          | .488                             | .41                                                   | .33                                                                 | .80                                                                 |
| 11             | 59.9                          | 3.6                 | 57.4                | 6.1                          | .480                             | .35                                                   | .20                                                                 | .82                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of December, 1860.

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                        |
|-------|-----------------------|---------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------|
|       | o                     | Inches.                         |                                   |                                                                                                   |
| 1     | 138.0                 | ..                              | N. & N. W.                        | Scatd. clouds till 4 P. M. cloudless afterwards.                                                  |
| 2     | <i>Sunday.</i>        |                                 |                                   |                                                                                                   |
| 3     | 135.0                 | ..                              | N. & W.                           | Cloudless.                                                                                        |
| 4     | 121.5                 | ..                              | N.                                | Cloudless till 10 A. M. Scatd. \-i afterwards.                                                    |
| 5     | 130.0                 | ..                              | S. W. & S. E. & N.                | Cloudless till 10 A. M. Scatd. clouds till 4 P. M. cloudless afterwards; also foggy after 9 P. M. |
| 6     | 133.0                 | ..                              | E. & N E. & N.                    | Cloudless till 10 A. M. Scatd. clouds afterwards; also foggy between Midnight & 5 A. M.           |
| 7     | 140.0                 | ..                              | N.                                | Cloudless.                                                                                        |
| 8     | 139.4                 | ..                              | N. W. & N.                        | Cloudless.                                                                                        |
| 9     | <i>Sunday.</i>        |                                 |                                   |                                                                                                   |
| 10    | 134.2                 | ..                              | N. & N. W.                        | Cloudless.                                                                                        |
| 11    | 139.0                 | ..                              | S. W. & N. & W.                   | Cloudless.                                                                                        |
| 12    | 139.0                 | ..                              | S. W. & W.                        | Cloudless.                                                                                        |
| 13    | 135.6                 | ..                              | N. & N. W.                        | Cloudless.                                                                                        |
| 14    | 136.7                 | ..                              | N. & N. W.                        | Cloudless till 5 A. M. Scatd. \-i till 10 A. M. cloudless afterwards.                             |
| 15    | 135.0                 | ..                              | N.                                | Cloudless; also foggy after 9 P. M.                                                               |
| 16    | <i>Sunday.</i>        |                                 |                                   |                                                                                                   |
| 17    | 132.0                 | ..                              | N. & N. W.                        | Cloudless.                                                                                        |
| 18    | 133.0                 | ..                              | W. & N. & N. W.                   | Cloudless till 11 A. M. Scatd. \-i till 5 P. M. cloudless afterwards.                             |
| 19    | 136.4                 | ..                              | N.                                | Cloudless.                                                                                        |
| 20    | 134.0                 | ..                              | N. & N. E.                        | Cloudless till 6 A. M. Scatd. \-i till 4 P. M. cloudless afterwards.                              |
| 21    | 136.0                 | ..                              | N.                                | Cloudless.                                                                                        |
| 22    | 134.0                 | ..                              | N. W. & N.                        | Cloudless till 5 A. M. Scatd. \-i & \-i till 5 P. M. cloudless afterwards.                        |
| 23    | <i>Sunday.</i>        |                                 |                                   |                                                                                                   |
| 24    | 136.0                 | ..                              | N. & N. E.                        | Cloudless.                                                                                        |
| 25    | 135.0                 | ..                              | N. & S.                           | Cloudless till 6 A. M. Scatd. \-i & \-i till 6 P. M. cloudless afterwards.                        |
| 26    | 136.0                 | ..                              | N. & W.                           | Cloudless till 2 A. M. Scatd. \-i & \-i afterwards.                                               |
| 27    | 136.0                 | ..                              | N. & N. W.                        | Cloudless.                                                                                        |
| 28    | 137.2                 | ..                              | N. W. & N.                        | Cloudless.                                                                                        |
| 29    | 137.0                 | ..                              | N. & S. W.                        | Cloudless.                                                                                        |
| 30    | <i>Sunday.</i>        |                                 |                                   |                                                                                                   |
| 31    | 131.4                 | ..                              | N. & W.                           | Cloudless.                                                                                        |

\-i Cirri, \-i Cirro strati, \-i Cumuli, \-l Cumulo strati, \-i Nimbi, \-i Strati  
\-i Cirro eumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of December, 1860.*

## MONTHLY RESULTS.

|                                                               |    |    | Inches |
|---------------------------------------------------------------|----|----|--------|
| Mean height of the Barometer for the month,                   | .. | .. | 30.012 |
| Max. height of the Barometer occurred at 9 A. M. on the 31st, | .. | .. | 30.172 |
| Min. height of the Barometer occurred at 4 P. M. on the 7th,  | .. | .. | 29.905 |
| <i>Extreme range</i> of the Barometer during the month,       | .. | .. | 0.267  |
| Mean of the Daily Max. Pressures,                             | .. | .. | 30.092 |
| Ditto ditto Min. ditto,                                       | .. | .. | 29.959 |
| <i>Mean daily range</i> of the Barometer during the month,    | .. | .. | 0.133  |

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|                                                               |    |    | o    |
|---------------------------------------------------------------|----|----|------|
| Mean Dry Bulb Thermometer for the month,                      | .. | .. | 67.2 |
| Max. Temperature occurred at 2 P. M. on the 1st,              | .. | .. | 80.4 |
| Min. Temperature occurred at 6 A. M. on the 31st,             | .. | .. | 54.0 |
| <i>Extreme range</i> of the Temperature during the month,     | .. | .. | 26.4 |
| Mean of the daily Max. Temperature,                           | .. | .. | 78.0 |
| Ditto ditto Min. ditto,                                       | .. | .. | 58.9 |
| <i>Mean daily range</i> of the Temperature during the month,  | .. | .. | 19.1 |
| Mean Wet Bulb Thermometer for the month, ..                   | .. | .. | 60.8 |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, .. | .. | .. | 6.4  |
| Computed Mean Dew-point for the month, ..                     | .. | .. | 57.0 |
| Mean Dry Bulb Thermometer above computed Mean Dew-point, ..   | .. | .. | 10.2 |

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|                                                |    |    | Inches |
|------------------------------------------------|----|----|--------|
| Mean Elastic force of Vapour for the month, .. | .. | .. | 0.473  |

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|                                                                         |    |    | Troy grains |
|-------------------------------------------------------------------------|----|----|-------------|
| Mean Weight of Vapour for the month, ..                                 | .. | .. | 5.23        |
| Additional Weight of Vapour required for complete saturation, ..        | .. | .. | 2.12        |
| Mean degree of humidity for the month, complete saturation being unity, | .. | .. | 0.71        |

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|                                                        |    |    | Inches     |
|--------------------------------------------------------|----|----|------------|
| Rained No. days, Max. fall of rain during 24 hours, .. | .. | .. | Nil.       |
| Total amount of rain during the month, ..              | .. | .. | Nil.       |
| Prevailing direction of the Wind, ..                   | .. | .. | N. & N. W. |

*Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of December, 1860.*

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

| Hour.     | N.           | Rain on.<br>N. E. | Rain on.<br>E. | Rain on.<br>S. E. | Rain on.<br>S. | Rain on.<br>S. W. | Rain on.<br>W. | Rain on.<br>N. W. | Rain on.<br>Calm. | Rain on. | Missed. |
|-----------|--------------|-------------------|----------------|-------------------|----------------|-------------------|----------------|-------------------|-------------------|----------|---------|
|           | No. of days. |                   |                |                   |                |                   |                |                   |                   |          |         |
| Midnight. | 16           |                   | 1              |                   |                | 1                 |                |                   |                   |          | 3       |
| 1         | 18           |                   | 1              |                   |                | 1                 | 2              | 2                 |                   |          |         |
| 2         | 18           |                   | 1              |                   |                | 1                 | 2              | 2                 |                   |          |         |
| 3         | 16           |                   | 1              |                   | 1              |                   | 2              | 2                 |                   |          | 2       |
| 4         | 18           |                   | 1              |                   |                | 2                 | 2              | 1                 |                   |          | 2       |
| 5         | 17           |                   | 1              |                   |                | 2                 | 2              | 2                 |                   |          | 2       |
| 6         | 16           | 1                 | 1              |                   |                | 1                 | 4              | 3                 |                   |          | 2       |
| 7         | 14           | 2                 |                |                   |                | 2                 | 5              | 3                 |                   |          |         |
| 8         | 11           | 2                 |                |                   | 1              | 1                 | 4              | 5                 |                   |          | 2       |
| 9         | 15           | 2                 |                | 2                 | 1              | 1                 | 1              | 4                 |                   |          |         |
| 10        | 15           | 2                 | 2              |                   | 3              |                   | 2              | 2                 |                   |          |         |
| 11        | 12           | 1                 | 2              | 1                 | 1              | 2                 | 2              | 5                 |                   |          |         |
| Noon.     | 10           | 2                 | 2              |                   |                | 1                 | 3              | 8                 |                   |          |         |
| 1         | 11           | 2                 |                | 1                 |                | 2                 | 3              | 7                 |                   |          |         |
| 2         | 9            | 2                 |                | 1                 |                | 1                 | 3              | 10                |                   |          |         |
| 3         | 7            | 1                 |                | 1                 |                | 1                 | 3              | 13                |                   |          |         |
| 4         | 8            | 1                 |                | 1                 |                |                   | 3              | 12                |                   |          | 1       |
| 5         | 7            | 2                 | 1              | 1                 |                | 2                 | 2              | 11                |                   |          |         |
| 6         | 11           | 2                 | 1              | 1                 | 1              | 2                 | 2              | 6                 |                   |          |         |
| 7         | 12           | 2                 | 1              | 1                 | 1              | 2                 | 2              | 5                 |                   |          |         |
| 8         | 13           | 2                 | 1              | 1                 | 1              | 2                 | 2              | 5                 |                   |          |         |
| 9         | 13           | 2                 | 1              | 1                 | 1              | 2                 | 2              | 5                 |                   |          |         |
| 10        | 13           | 1                 | 1              |                   | 1              | 1                 | 2              | 5                 |                   |          | 1       |
| 11        | 12           | 2                 | 1              |                   | 1              | 2                 | 1              | 5                 |                   |          | 2       |





*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January, 1861.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | 30.061                                          | 30.137                                    | 30.000  | 0.137   | 63.0                          | 76.0                                          | 53.6 | 22.4  |
| 2     | .056                                            | .129                                      | 29.987  | .142    | 64.5                          | 77.8                                          | 54.6 | 23.2  |
| 3     | .040                                            | .118                                      | .988    | .130    | 66.5                          | 78.9                                          | 58.0 | 20.9  |
| 4     | .021                                            | .114                                      | .953    | .161    | 66.5                          | 78.6                                          | 56.6 | 22.0  |
| 5     | 29.975                                          | .066                                      | .914    | .152    | 66.8                          | 79.0                                          | 57.6 | 21.4  |
| 6     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 7     | .934                                            | .008                                      | .877    | .131    | 69.1                          | 79.2                                          | 60.7 | 18.5  |
| 8     | .941                                            | .026                                      | .895    | .131    | 71.1                          | 78.8                                          | 65.3 | 13.5  |
| 9     | .972                                            | .053                                      | .907    | .146    | 71.3                          | 81.8                                          | 65.8 | 16.0  |
| 10    | .970                                            | .045                                      | .904    | .141    | 71.8                          | 80.0                                          | 67.2 | 12.8  |
| 11    | .977                                            | .039                                      | .937    | .102    | 71.4                          | 78.6                                          | 65.8 | 12.8  |
| 12    | 30.029                                          | .114                                      | .961    | .153    | 70.5                          | 77.4                                          | 67.0 | 10.4  |
| 13    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 14    | .025                                            | .085                                      | .984    | .101    | 70.4                          | 77.8                                          | 65.4 | 12.4  |
| 15    | .078                                            | .157                                      | 30.028  | .129    | 70.3                          | 78.8                                          | 63.6 | 15.2  |
| 16    | .016                                            | .112                                      | 29.920  | .192    | 69.3                          | 79.0                                          | 61.2 | 17.8  |
| 17    | 29.930                                          | .006                                      | .861    | .145    | 69.9                          | 79.8                                          | 63.8 | 16.0  |
| 18    | .925                                            | .025                                      | .862    | .163    | 70.8                          | 81.8                                          | 62.2 | 19.6  |
| 19    | .961                                            | .031                                      | .914    | .117    | 73.4                          | 80.2                                          | 68.8 | 11.4  |
| 20    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 21    | .946                                            | .015                                      | .898    | .117    | 70.7                          | 77.6                                          | 66.2 | 11.4  |
| 22    | .973                                            | .075                                      | .914    | .161    | 66.6                          | 74.2                                          | 59.2 | 15.0  |
| 23    | .966                                            | .046                                      | .917    | .129    | 62.5                          | 61.8                                          | 60.6 | 4.2   |
| 24    | .992                                            | .065                                      | .936    | .129    | 64.3                          | 75.0                                          | 57.6 | 17.4  |
| 25    | 30.039                                          | .112                                      | 30.002  | .110    | 62.0                          | 73.0                                          | 54.0 | 19.0  |
| 26    | .002                                            | .088                                      | 29.931  | .157    | 62.0                          | 74.8                                          | 52.7 | 22.1  |
| 27    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 28    | 29.827                                          | 29.911                                    | .736    | .175    | 70.2                          | 83.2                                          | 61.3 | 21.9  |
| 29    | .843                                            | .918                                      | .783    | .135    | 69.1                          | 78.0                                          | 62.2 | 15.8  |
| 30    | .907                                            | .987                                      | .864    | .123    | 65.3                          | 75.6                                          | 58.6 | 17.0  |
| 31    | .962                                            | 30.047                                    | .902    | .145    | 65.3                          | 77.2                                          | 55.2 | 22.0  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly Observations made during the day.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January, 1861.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of Air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity,<br>complete saturation be-<br>ing unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                   |
| 1     | 55.8                            | 7.2                 | 50.8                | 12.2                         | .0383                            | 4.28                                             | 2.17                                                                    | .066                                                              |
| 2     | 57.3                            | 7.2                 | 53.0                | 11.5                         | .414                             | .60                                              | .16                                                                     | .68                                                               |
| 3     | 58.7                            | 7.8                 | 54.0                | 12.5                         | .428                             | .73                                              | .46                                                                     | .66                                                               |
| 4     | 58.9                            | 7.6                 | 54.3                | 12.2                         | .432                             | .79                                              | .40                                                                     | .67                                                               |
| 5     | 60.1                            | 6.7                 | 56.1                | 10.7                         | .459                             | 5.09                                             | .17                                                                     | .70                                                               |
| 6     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 7     | 64.0                            | 5.1                 | 61.4                | 7.7                          | .548                             | 6.04                                             | 1.74                                                                    | .78                                                               |
| 8     | 66.9                            | 4.2                 | 64.8                | 6.3                          | .613                             | .75                                              | .53                                                                     | .82                                                               |
| 9     | 66.9                            | 4.4                 | 64.7                | 6.6                          | .611                             | .70                                              | .63                                                                     | .80                                                               |
| 10    | 67.6                            | 4.2                 | 65.5                | 6.3                          | .628                             | .90                                              | .55                                                                     | .82                                                               |
| 11    | 67.5                            | 3.9                 | 65.5                | 5.9                          | .628                             | .90                                              | .45                                                                     | .83                                                               |
| 12    | 65.4                            | 5.1                 | 62.8                | 7.7                          | .574                             | .31                                              | .82                                                                     | .78                                                               |
| 13    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 14    | 63.9                            | 6.5                 | 60.6                | 9.8                          | .534                             | 5.86                                             | 2.21                                                                    | .72                                                               |
| 15    | 63.7                            | 6.6                 | 60.4                | 9.9                          | .530                             | .83                                              | .25                                                                     | .72                                                               |
| 16    | 62.9                            | 6.4                 | 59.7                | 9.6                          | .518                             | .70                                              | .13                                                                     | .73                                                               |
| 17    | 63.2                            | 6.7                 | 59.8                | 10.1                         | .520                             | .71                                              | .27                                                                     | .72                                                               |
| 18    | 65.5                            | 5.3                 | 62.8                | 8.0                          | .574                             | 6.31                                             | 1.89                                                                    | .77                                                               |
| 19    | 68.3                            | 5.1                 | 65.7                | 7.7                          | .632                             | .91                                              | .96                                                                     | .78                                                               |
| 20    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 21    | 66.0                            | 4.7                 | 63.6                | 7.1                          | .590                             | .48                                              | .70                                                                     | .79                                                               |
| 22    | 58.3                            | 8.3                 | 53.3                | 13.3                         | .418                             | 4.64                                             | 2.57                                                                    | .64                                                               |
| 23    | 58.2                            | 4.3                 | 55.2                | 7.3                          | .445                             | .98                                              | 1.37                                                                    | .78                                                               |
| 24    | 58.6                            | 6.2                 | 51.9                | 9.9                          | .441                             | .90                                              | .93                                                                     | .72                                                               |
| 25    | 54.8                            | 7.2                 | 49.8                | 12.2                         | .371                             | .15                                              | 2.10                                                                    | .66                                                               |
| 26    | 55.6                            | 7.3                 | 50.5                | 12.4                         | .380                             | .25                                              | .18                                                                     | .66                                                               |
| 27    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 28    | 63.3                            | 6.9                 | 59.8                | 10.4                         | .520                             | 5.71                                             | .34                                                                     | .71                                                               |
| 29    | 61.2                            | 7.9                 | 57.2                | 11.9                         | .476                             | .24                                              | .54                                                                     | .67                                                               |
| 30    | 57.2                            | 8.1                 | 52.3                | 13.0                         | .404                             | 4.49                                             | .44                                                                     | .65                                                               |
| 31    | 57.2                            | 8.1                 | 52.3                | 13.0                         | .404                             | .49                                              | .44                                                                     | .65                                                               |

All the Hygrometrical elements are computed by the Greenwich Constants.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer for<br>each hour during the<br>month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture for each hour<br>during the<br>month. |      |       |
|----------------|-------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|---------------------------------------------------------------------|------|-------|
|                |                                                 | Max.                                                         | Min.    | Diff.   |                               | Max.                                                                | Min. | Diff. |
|                | Inches.                                         | Inches.                                                      | Inches. | Inches. | o                             | o                                                                   | o    | o     |
| Mid-<br>night. | 29.966                                          | 30.078                                                       | 29.813  | 0.265   | 64.3                          | 70.2                                                                | 56.9 | 13.3  |
| 1              | .972                                            | .075                                                         | .800    | .275    | 63.6                          | 69.8                                                                | 55.8 | 14.0  |
| 2              | .965                                            | .065                                                         | .797    | .268    | 63.1                          | 69.4                                                                | 55.0 | 14.4  |
| 3              | .958                                            | .061                                                         | .784    | .277    | 62.8                          | 69.0                                                                | 54.2 | 14.8  |
| 4              | .954                                            | .056                                                         | .783    | .273    | 62.3                          | 69.0                                                                | 53.6 | 15.4  |
| 5              | .961                                            | .071                                                         | .802    | .269    | 61.6                          | 69.4                                                                | 52.9 | 16.5  |
| 6              | .976                                            | .090                                                         | .828    | .262    | 61.4                          | 69.2                                                                | 52.8 | 16.4  |
| 7              | .997                                            | .107                                                         | .841    | .266    | 61.1                          | 68.8                                                                | 52.7 | 16.1  |
| 8              | 30.031                                          | .126                                                         | .872    | .254    | 63.5                          | 69.8                                                                | 55.7 | 14.1  |
| 9              | .051                                            | .157                                                         | .906    | .251    | 66.3                          | 72.5                                                                | 60.2 | 12.3  |
| 10             | .055                                            | .152                                                         | .911    | .241    | 69.2                          | 74.0                                                                | 63.2 | 10.8  |
| 11             | .036                                            | .123                                                         | .897    | .226    | 72.4                          | 76.6                                                                | 63.3 | 13.3  |
| Noon.          | .006                                            | .095                                                         | .862    | .233    | 74.9                          | 80.0                                                                | 64.2 | 15.8  |
| 1              | 29.973                                          | .068                                                         | .832    | .236    | 76.3                          | 81.8                                                                | 63.1 | 18.7  |
| 2              | .949                                            | .049                                                         | .798    | .251    | 77.2                          | 81.8                                                                | 63.0 | 18.8  |
| 3              | .930                                            | .031                                                         | .760    | .271    | 77.3                          | 83.2                                                                | 62.8 | 20.4  |
| 4              | .926                                            | .028                                                         | .747    | .281    | 75.6                          | 81.8                                                                | 62.5 | 19.3  |
| 5              | .923                                            | .035                                                         | .749    | .286    | 74.0                          | 80.6                                                                | 61.8 | 18.8  |
| 6              | .931                                            | .037                                                         | .736    | .301    | 71.3                          | 75.8                                                                | 61.6 | 14.2  |
| 7              | .950                                            | .056                                                         | .760    | .296    | 69.2                          | 74.8                                                                | 61.4 | 13.4  |
| 8              | .966                                            | .074                                                         | .774    | .300    | 67.6                          | 73.8                                                                | 61.0 | 12.8  |
| 9              | .975                                            | .082                                                         | .784    | .298    | 66.6                          | 73.6                                                                | 59.6 | 14.0  |
| 10             | .979                                            | .084                                                         | .822    | .262    | 66.3                          | 72.8                                                                | 60.4 | 12.4  |
| 11             | .975                                            | .071                                                         | .819    | .252    | 65.2                          | 72.4                                                                | 59.8 | 12.6  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force<br>of Vapour. | Mean Weight of Va-<br>pour in a Cubic<br>foot of Air. | Additional Weight of<br>Vapour required<br>for complete satu-<br>ration. | Mean degree of Hu-<br>midity, complete<br>saturation being<br>unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                                |                                                                      |
| Mid-<br>night. | 61.0                            | 3.3                 | 58.7                | 5.6                          | 0.501                            | 5.57                                                  | 1.15                                                                     | 0.83                                                                 |
| 1              | 60.4                            | 3.2                 | 58.2                | 5.4                          | .493                             | .49                                                   | .08                                                                      | .84                                                                  |
| 2              | 60.1                            | 3.0                 | 58.0                | 5.1                          | .489                             | .45                                                   | .02                                                                      | .84                                                                  |
| 3              | 60.0                            | 2.8                 | 58.0                | 4.8                          | .489                             | .45                                                   | 0.96                                                                     | .85                                                                  |
| 4              | 59.5                            | 2.8                 | 57.5                | 4.8                          | .481                             | .38                                                   | .93                                                                      | .85                                                                  |
| 5              | 58.7                            | 2.9                 | 56.7                | 4.9                          | .469                             | .24                                                   | .93                                                                      | .85                                                                  |
| 6              | 58.7                            | 2.7                 | 56.5                | 4.9                          | .465                             | .21                                                   | .93                                                                      | .85                                                                  |
| 7              | 58.4                            | 2.7                 | 56.2                | 4.9                          | .461                             | .16                                                   | .92                                                                      | .85                                                                  |
| 8              | 59.7                            | 3.8                 | 57.0                | 6.5                          | .473                             | .27                                                   | 1.28                                                                     | .81                                                                  |
| 9              | 60.8                            | 5.5                 | 57.5                | 8.8                          | .481                             | .33                                                   | .82                                                                      | .75                                                                  |
| 10             | 62.0                            | 7.2                 | 58.4                | 10.8                         | .496                             | .46                                                   | 2.35                                                                     | .70                                                                  |
| 11             | 62.9                            | 9.5                 | 58.1                | 14.3                         | .491                             | .38                                                   | 3.22                                                                     | .63                                                                  |
| Noon.          | 63.8                            | 11.1                | 58.2                | 16.7                         | .493                             | .36                                                   | .92                                                                      | .58                                                                  |
| 1              | 64.3                            | 12.0                | 58.3                | 18.0                         | .494                             | .36                                                   | 4.33                                                                     | .55                                                                  |
| 2              | 64.4                            | 12.8                | 58.0                | 19.2                         | .489                             | .30                                                   | .65                                                                      | .53                                                                  |
| 3              | 64.3                            | 13.0                | 57.8                | 19.5                         | .486                             | .26                                                   | .72                                                                      | .53                                                                  |
| 4              | 64.1                            | 11.5                | 58.3                | 17.3                         | .494                             | .37                                                   | .11                                                                      | .57                                                                  |
| 5              | 64.1                            | 9.9                 | 59.1                | 14.9                         | .508                             | .54                                                   | 3.50                                                                     | .61                                                                  |
| 6              | 64.4                            | 6.9                 | 60.9                | 10.4                         | .539                             | .92                                                   | 2.41                                                                     | .71                                                                  |
| 7              | 63.5                            | 5.7                 | 60.6                | 8.6                          | .534                             | .87                                                   | 1.94                                                                     | .75                                                                  |
| 8              | 62.7                            | 4.9                 | 59.8                | 7.8                          | .520                             | .74                                                   | .70                                                                      | .77                                                                  |
| 9              | 62.2                            | 4.4                 | 59.6                | 7.0                          | .516                             | .72                                                   | .49                                                                      | .79                                                                  |
| 10             | 62.1                            | 4.2                 | 59.6                | 6.7                          | .516                             | .72                                                   | .43                                                                      | .80                                                                  |
| 11             | 61.5                            | 3.7                 | 59.3                | 5.9                          | .511                             | .67                                                   | .24                                                                      | .82                                                                  |

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January, 1861.

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                                         |
|-------|-----------------------|---------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| 1     | o<br>127.0            | Inches.<br>...                  | N. W. & W.                        | Cloudless till 9 A. M. Seatd. \i & \i afterwards; also slightly foggy between 8 P. M. & midnight.                                  |
| 2     | 135.0                 | ...                             | N. & N. W. & E.                   | Cloudless till 5 A. M. Seatd. \i & \i till 6 P. M. cloudless afterwards; also foggy between midnight & 3 A. M.; also after 9 P. M. |
| 3     | 136.8                 | ...                             | N. W. & N.                        | Cloudless.                                                                                                                         |
| 4     | 138.0                 | ...                             | W. & N. & N. W.                   | Cloudless.                                                                                                                         |
| 5     | 139.0                 | ...                             | N. & W. & S. W.                   | Cloudless.                                                                                                                         |
| 6     | <i>Sunday.</i>        |                                 |                                   |                                                                                                                                    |
| 7     | 126.6                 | ...                             | S. & E.                           | Cloudless till 5 A. M. Seatd. \i & \i till 6 P. M. cloudless afterwards.                                                           |
| 8     | 137.0                 | ...                             | S. & S. E.                        | Cloudy till 4 A. M. cloudless & foggy till 9 A. M. Seatd. clouds till 6 P. M. Seatd. \i afterwards.                                |
| 9     | 139.0                 | ...                             | S. & S. E.                        | Cloudless till 7 A. M. Seatd. clouds till 6 P. M. cloudless afterwards.                                                            |
| 10    | 126.0                 | 0.56                            | S.                                | Cloudy till 8 P. M. cloudless afterwards; also raining at 6 & 7 A. M. & at 7 P. M.                                                 |
| 11    | 121.0                 | ...                             | S. & N.                           | Cloudless till 1 A. M. cloudy till 8 A. M. Seatd. \i & \i till 7 P. M. cloudless afterwards.                                       |
| 12    | 133.0                 | ...                             | N.                                | Cloudy till 10 A. M. Seatd. \i till 6 P. M. cloudless afterwards.                                                                  |
| 13    | <i>Sunday.</i>        |                                 |                                   |                                                                                                                                    |
| 14    | 135.0                 | ...                             | N. & N. E.                        | Cloudless till 5 A. M. cloudy till 11 A. M. cloudless afterwards.                                                                  |
| 15    | 136.0                 | ...                             | N.                                | Seatd. clouds till 7 A. M. cloudless afterwards.                                                                                   |
| 16    | 133.0                 | ...                             | N. & S. W.                        | Cloudless till 10 A. M. Seatd. \i till 9 P. M. cloudless afterwards.                                                               |
| 17    | 135.8                 | ...                             | W. & N. W.                        | Cloudless.                                                                                                                         |
| 18    | 139.0                 | ...                             | S. & W.                           | Cloudless till 6 A. M. Seatd. clouds afterwards.                                                                                   |
| 19    | 121.0                 | ...                             | W. & S. E. & S. W.                | Cloudy; also drizzling at 10 P. M.                                                                                                 |
| 20    | <i>Sunday.</i>        |                                 |                                   |                                                                                                                                    |
| 21    | 110.5                 | ...                             | W. & S. E.                        | Seatd. clouds till 5 P. M. cloudless afterwards; also drizzling at 5 A. M.                                                         |
| 22    | 135.8                 | ...                             | N. & N. E. & W.                   | Cloudless till 5 A. M. Seatd. \i till 6 P. M. cloudy afterwards.                                                                   |
| 23    | ...                   | ..                              | E.                                | Cloudy & constantly drizzling.                                                                                                     |
| 24    | 138.0                 | ...                             | N. & S.                           | Cloudy till 6 A. M. cloudless afterwards.                                                                                          |

Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January, 1861.

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.             |
|-------|-----------------------|---------------------------------|-----------------------------------|----------------------------------------|
| 25    | 133.0                 | ...                             | N. W. & N.                        | Cloudless.                             |
| 26    | 134.0                 | ...                             | S. E. & E. & W.                   | Cloudless ; also foggy before sunrise. |
| 27    | <i>Sunday</i>         | ...                             |                                   |                                        |
| 28    | 139.2                 | ...                             | S. W.                             | Cloudless.                             |
| 29    | 132.6                 | ...                             | W. & S. & N. W.                   | Cloudless.                             |
| 30    | 132.4                 | ...                             | N. & S. W.                        | Cloudless.                             |
| 31    | 137.0                 | ...                             | N. E. & N.                        | Cloudless.                             |

∩i Cirri, ∟i Cirro strati, ∪i Cumuli, ∩i Cumulo strati, ∟i Nimbi, —i Strati,  
∩i Cirro cumuli.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January, 1861.*

MONTHLY RESULTS.

|                                                                |    |    | Inches. |
|----------------------------------------------------------------|----|----|---------|
| Mean height of the Barometer for the month,                    | .. | .. | 29.976  |
| Max. height of the Barometer, occurred at 9 A. M. on the 15th, | .. | .. | 30.157  |
| Min. height of the Barometer, occurred at 6 P. M. on the 28th, | .. | .. | 29.736  |
| <i>Extreme range</i> of the Barometer during the month,        | .. | .. | 0.421   |
| Mean of the Daily Max. Pressures,                              | .. | .. | 30.057  |
| Ditto ditto Min. ditto,                                        | .. | .. | 29.918  |
| <i>Mean daily range</i> of the Barometer during the month,     | .. | .. | 0.139   |

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|                                                              |    |    | °    |
|--------------------------------------------------------------|----|----|------|
| Mean Dry Bulb Thermometer for the month,                     | .. | .. | 68.1 |
| Max. Temperature occurred at 3 P. M. on the 28th,            | .. | .. | 83.2 |
| Min. Temperature occurred at 7 A. M. on the 26th,            | .. | .. | 52.7 |
| <i>Extreme range</i> of the Temperature during the month,    | .. | .. | 30.5 |
| Mean of the daily Max. Temperature,                          | .. | .. | 77.7 |
| Ditto ditto Min. ditto,                                      | .. | .. | 60.9 |
| <i>Mean daily range</i> of the Temperature during the month, | .. | .. | 16.8 |

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|                                                            |    |    | °    |
|------------------------------------------------------------|----|----|------|
| Mean Wet Bulb Thermometer for the month,                   | .. | .. | 61.8 |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, | .. | .. | 6.3  |
| Computed Mean Dew-point for the month,                     | .. | .. | 58.0 |
| Mean Dry Bulb Thermometer above computed Mean Dew-point,   | .. | .. | 10.1 |

|                                             |    |    | Inches. |
|---------------------------------------------|----|----|---------|
| Mean Elastic force of Vapour for the month, | .. | .. | 0.489   |

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|                                                                         |    |    | Troy grains. |
|-------------------------------------------------------------------------|----|----|--------------|
| Mean Weight of Vapour for the month,                                    | .. | .. | 5.40         |
| Additional Weight of Vapour required for complete saturation,           | .. | .. | 2.15         |
| Mean degree of humidity for the month, complete saturation being unity, | .. | .. | 0.72         |

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|                                                   |    |    | Inches.      |
|---------------------------------------------------|----|----|--------------|
| Rained 4 days, Max. fall of rain during 24 hours, | .. | .. | 0.56         |
| Total amount of rain during the month,            | .. | .. | 0.56         |
| Prevailing direction of the Wind,                 | .. | .. | N. & W. & S. |

*Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of January, 1861.*

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

| Hour.     | N.           |          | N. E.    |          | E.       |          | S. E.    |          | S.       |          | S. W.    |          | W.       |          | N. W.    |          | Calm.    |          | Missed.  |   |
|-----------|--------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|---|
|           | Rain on.     | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. | Rain on. |   |
|           | No. of days. |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |   |
| Midnight. | 6            |          |          | 1        |          | 2        |          | 7        |          | 1        |          | 4        |          |          |          |          |          |          |          | 3 |
| 1         | 7            |          |          | 1        | 1        | 2        |          | 7        |          | 1        |          | 5        |          |          | 1        |          |          | 3        |          | 3 |
| 2         | 8            |          |          | 1        | 1        | 3        |          | 8        |          | 1        |          | 5        |          |          | 1        |          |          |          |          |   |
| 3         | 8            |          |          | 1        |          | 3        |          | 8        |          |          |          | 5        |          |          | 1        |          |          |          |          |   |
| 4         | 6            |          |          | 1        |          | 3        |          | 6        |          |          |          | 5        |          |          | 2        |          |          |          |          | 1 |
| 5         | 6            |          |          | 2        |          | 3        | 1        | 5        |          |          |          | 6        |          |          | 2        |          |          |          |          | 1 |
| 6         | 7            |          |          | 1        |          | 4        |          | 5        | 1        |          |          | 6        |          |          | 2        |          |          |          |          |   |
| 7         | 8            |          | 1        | 2        |          | 3        |          | 5        | 1        |          |          | 4        |          |          | 3        |          |          |          |          |   |
| 8         | 8            | 1        | 2        | 2        |          | 1        |          | 4        |          |          |          | 3        |          |          | 3        |          |          |          |          |   |
| 9         | 8            | 3        | 2        | 2        | 1        |          |          | 3        |          |          |          | 6        |          |          | 2        |          |          |          |          |   |
| 10        | 5            | 1        | 4        | 4        |          |          |          | 2        |          |          |          | 6        |          |          | 4        |          |          |          |          |   |
| 11        | 6            | 1        | 3        | 1        |          |          |          | 4        |          |          |          | 3        |          |          | 6        |          |          |          |          |   |
| Noon.     | 5            | 1        | 1        | 1        | 1        | 1        |          | 3        |          | 2        |          | 5        |          |          | 9        |          |          |          |          |   |
| 1         | 3            | 1        | 1        | 1        | 1        |          |          | 2        |          | 4        |          | 8        |          |          | 6        |          |          |          |          |   |
| 2         | 2            | 2        | 1        | 1        |          |          |          | 2        |          | 4        |          | 8        |          |          | 6        |          |          |          |          |   |
| 3         | 2            | 2        | 1        | 1        |          |          |          | 3        |          | 3        |          | 8        |          |          | 6        |          |          |          |          |   |
| 4         | 5            | 2        | 1        | 1        | 1        |          |          | 1        |          | 1        |          | 9        |          |          | 3        |          |          |          |          | 4 |
| 5         | 5            | 2        | 3        | 1        | 1        |          |          | 2        |          | 2        |          | 8        |          |          | 3        |          |          |          |          | 1 |
| 6         | 5            | 2        | 4        | 3        | 3        |          |          | 3        |          | 2        |          | 4        |          |          | 3        |          |          |          |          | 1 |
| 7         | 8            | 1        | 5        | 2        | 2        |          |          | 3        | 1        | 2        |          | 3        |          |          | 3        |          |          |          |          | 1 |
| 8         | 8            | 2        | 4        | 2        | 2        |          |          | 3        |          | 2        |          | 3        |          |          | 3        |          |          |          |          |   |
| 9         | 8            | 2        | 4        | 2        | 2        |          |          | 3        |          | 2        |          | 3        |          |          | 4        |          |          |          |          |   |
| 10        | 6            | 2        | 3        | 2        | 1        |          |          | 4        |          | 2        |          | 1        |          |          | 5        |          |          |          |          | 2 |
| 11        | 5            | 2        | 4        | 2        |          |          |          | 4        |          | 2        |          |          |          |          | 5        |          |          |          |          | 3 |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February, 1861.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Height of the Cistern of the Standard Barometer above the Sea level, 18.11 Feet.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

| Date. | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer during the day. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature during the day. |      |       |
|-------|-------------------------------------------|----------------------------------------|---------|---------|----------------------------|------------------------------------------|------|-------|
|       |                                           | Max.                                   | Min.    | Diff.   |                            | Max.                                     | Min. | Diff. |
|       | Inches.                                   | Inches.                                | Inches. | Inches. | °                          | °                                        | °    | °     |
| 1     | 29.967                                    | 30.065                                 | 29.905  | 0.160   | 65.4                       | 77.6                                     | 57.0 | 20.6  |
| 2     | .931                                      | .004                                   | .857    | .147    | 64.9                       | 77.0                                     | 54.4 | 22.6  |
| 3     | <i>Sunday.</i>                            |                                        |         |         |                            |                                          |      |       |
| 4     | .834                                      | 29.917                                 | .765    | .152    | 69.0                       | 80.4                                     | 59.6 | 20.8  |
| 5     | .742                                      | .827                                   | .668    | .159    | 73.7                       | 85.8                                     | 65.8 | 20.0  |
| 6     | .751                                      | .826                                   | .682    | .144    | 75.2                       | 86.0                                     | 66.2 | 19.8  |
| 7     | .884                                      | .961                                   | .808    | .153    | 71.6                       | 82.6                                     | 61.6 | 21.0  |
| 8     | .917                                      | 30.004                                 | .854    | .150    | 71.2                       | 83.0                                     | 61.2 | 21.8  |
| 9     | .890                                      | 29.981                                 | .828    | .153    | 72.5                       | 83.8                                     | 62.8 | 21.0  |
| 10    | <i>Sunday.</i>                            |                                        |         |         |                            |                                          |      |       |
| 11    | .900                                      | .977                                   | .850    | .127    | 71.2                       | 83.4                                     | 61.8 | 21.6  |
| 12    | .912                                      | .994                                   | .859    | .135    | 72.0                       | 83.6                                     | 63.1 | 20.5  |
| 13    | .908                                      | .994                                   | .844    | .150    | 71.3                       | 83.2                                     | 62.6 | 20.6  |
| 14    | .878                                      | .960                                   | .814    | .146    | 73.4                       | 85.6                                     | 63.8 | 21.8  |
| 15    | .808                                      | .884                                   | .724    | .160    | 75.0                       | 88.5                                     | 64.4 | 24.1  |
| 16    | .871                                      | .965                                   | .800    | .165    | 73.3                       | 82.6                                     | 64.7 | 17.9  |
| 17    | <i>Sunday.</i>                            |                                        |         |         |                            |                                          |      |       |
| 18    | 30.035                                    | 30.125                                 | .977    | .148    | 71.6                       | 85.2                                     | 60.4 | 24.8  |
| 19    | .065                                      | .155                                   | 30.017  | .138    | 72.8                       | 85.3                                     | 63.0 | 22.3  |
| 20    | .042                                      | .146                                   | 29.968  | .178    | 72.9                       | 84.0                                     | 62.3 | 21.7  |
| 21    | .011                                      | .096                                   | .949    | .147    | 72.4                       | 84.2                                     | 62.0 | 22.2  |
| 22    | .016                                      | .100                                   | .964    | .136    | 72.8                       | 84.8                                     | 64.8 | 20.0  |
| 23    | 29.989                                    | .093                                   | .914    | .179    | 70.6                       | 84.4                                     | 59.2 | 25.2  |
| 24    | <i>Sunday.</i>                            |                                        |         |         |                            |                                          |      |       |
| 25    | .886                                      | 29.957                                 | .797    | .160    | 76.2                       | 89.6                                     | 66.6 | 23.0  |
| 26    | .897                                      | .973                                   | .842    | .131    | 77.9                       | 89.8                                     | 70.8 | 19.0  |
| 27    | .925                                      | 30.017                                 | .858    | .159    | 77.2                       | 88.9                                     | 66.6 | 22.3  |
| 28    | .873                                      | 29.953                                 | .802    | .151    | 78.9                       | 90.6                                     | 72.0 | 18.6  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly observations made during the day.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February, 1861.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|       | °                               | °                   | °                   | °                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| 1     | 57.7                            | 7.7                 | 53.1                | 12.3                         | .415                             | 4.62                                             | 2.33                                                                    | 0.67                                                                |
| 2     | 57.0                            | 7.9                 | 52.3                | 12.6                         | .404                             | .49                                              | .36                                                                     | .66                                                                 |
| 3     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 4     | 61.4                            | 7.6                 | 57.6                | 11.4                         | .483                             | 5.32                                             | .44                                                                     | .69                                                                 |
| 5     | 67.8                            | 5.9                 | 64.8                | 8.9                          | .613                             | 6.71                                             | .25                                                                     | .75                                                                 |
| 6     | 67.2                            | 8.0                 | 63.2                | 12.0                         | .582                             | .33                                              | 3.04                                                                    | .68                                                                 |
| 7     | 62.2                            | 9.4                 | 57.5                | 14.1                         | .481                             | 5.28                                             | .12                                                                     | .63                                                                 |
| 8     | 62.0                            | 9.2                 | 57.4                | 13.8                         | .480                             | .26                                              | .04                                                                     | .63                                                                 |
| 9     | 62.0                            | 10.5                | 56.7                | 15.8                         | .469                             | .12                                              | .51                                                                     | .59                                                                 |
| 10    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 11    | 61.4                            | 9.8                 | 56.5                | 14.7                         | .465                             | .10                                              | .20                                                                     | .61                                                                 |
| 12    | 62.7                            | 9.3                 | 58.0                | 14.0                         | .489                             | .36                                              | .14                                                                     | .63                                                                 |
| 13    | 62.2                            | 9.1                 | 57.6                | 13.7                         | .483                             | .29                                              | .04                                                                     | .64                                                                 |
| 14    | 62.7                            | 10.7                | 57.3                | 16.1                         | .478                             | .22                                              | .65                                                                     | .59                                                                 |
| 15    | 66.6                            | 8.4                 | 62.4                | 12.6                         | .567                             | 6.17                                             | .14                                                                     | .66                                                                 |
| 16    | 60.4                            | 12.9                | 53.9                | 19.4                         | .426                             | 4.67                                             | 4.17                                                                    | .53                                                                 |
| 17    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 18    | 60.1                            | 11.5                | 54.3                | 17.3                         | .432                             | .74                                              | 3.66                                                                    | .56                                                                 |
| 19    | 62.9                            | 9.9                 | 57.9                | 14.9                         | .488                             | 5.33                                             | .38                                                                     | .61                                                                 |
| 20    | 62.8                            | 10.1                | 57.7                | 15.2                         | .485                             | .30                                              | .43                                                                     | .61                                                                 |
| 21    | 64.4                            | 8.0                 | 60.4                | 12.0                         | .530                             | .81                                              | 2.79                                                                    | .68                                                                 |
| 22    | 62.9                            | 9.9                 | 57.9                | 14.9                         | .488                             | .33                                              | 3.38                                                                    | .61                                                                 |
| 23    | 60.0                            | 10.6                | 54.7                | 15.9                         | .438                             | 4.81                                             | .34                                                                     | .59                                                                 |
| 24    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 25    | 67.0                            | 9.2                 | 62.4                | 13.8                         | .567                             | 6.15                                             | .51                                                                     | .64                                                                 |
| 26    | 68.7                            | 9.2                 | 64.1                | 13.8                         | .599                             | .48                                              | .68                                                                     | .64                                                                 |
| 27    | 67.7                            | 9.5                 | 62.9                | 14.3                         | .576                             | .25                                              | .70                                                                     | .63                                                                 |
| 28    | 70.9                            | 8.0                 | 66.9                | 12.0                         | .657                             | 7.11                                             | .36                                                                     | .68                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>for each hour during<br>the month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Temperature<br>for each hour during<br>the month. |      |       |
|----------------|-------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|----------------------------------------------------------------|------|-------|
|                |                                                 | Max.                                                         | Min.    | Diff.   |                               | Max.                                                           | Min. | Diff. |
|                | Inches.                                         | Inches.                                                      | Inches. | Inches. | o                             | o                                                              | o    | o     |
| Mid-<br>night. | 29.917                                          | 30.070                                                       | 29.710  | 0.360   | 67.3                          | 73.4                                                           | 59.0 | 14.4  |
| 1              | .909                                            | .060                                                         | .707    | .353    | 66.5                          | 73.0                                                           | 58.6 | 14.4  |
| 2              | .902                                            | .057                                                         | .695    | .362    | 65.8                          | 72.8                                                           | 57.8 | 15.0  |
| 3              | .887                                            | .035                                                         | .682    | .353    | 65.3                          | 72.6                                                           | 57.3 | 15.3  |
| 4              | .900                                            | .036                                                         | .732    | .304    | 64.7                          | 72.2                                                           | 57.0 | 15.2  |
| 5              | .901                                            | .040                                                         | .710    | .330    | 64.3                          | 72.2                                                           | 55.2 | 17.0  |
| 6              | .916                                            | .058                                                         | .728    | .330    | 63.7                          | 72.0                                                           | 55.2 | 16.8  |
| 7              | .937                                            | .086                                                         | .754    | .332    | 63.3                          | 72.4                                                           | 54.4 | 18.0  |
| 8              | .963                                            | .114                                                         | .792    | .322    | 65.9                          | 72.9                                                           | 58.4 | 14.5  |
| 9              | .991                                            | .136                                                         | .801    | .335    | 70.7                          | 75.2                                                           | 63.6 | 11.6  |
| 10             | .998                                            | .155                                                         | .824    | .331    | 74.5                          | 79.0                                                           | 68.0 | 11.0  |
| 11             | .987                                            | .137                                                         | .812    | .325    | 78.1                          | 82.8                                                           | 71.4 | 11.4  |
| Noon.          | .959                                            | .109                                                         | .775    | .334    | 81.0                          | 86.6                                                           | 73.7 | 12.9  |
| 1              | .922                                            | .074                                                         | .741    | .333    | 83.0                          | 88.6                                                           | 75.4 | 13.2  |
| 2              | .890                                            | .040                                                         | .716    | .324    | 81.1                          | 89.8                                                           | 77.0 | 12.8  |
| 3              | .869                                            | .022                                                         | .686    | .336    | 84.5                          | 90.2                                                           | 76.8 | 13.4  |
| 4              | .857                                            | .018                                                         | .668    | .350    | 83.5                          | 90.6                                                           | 75.0 | 15.6  |
| 5              | .856                                            | .017                                                         | .675    | .342    | 81.6                          | 89.0                                                           | 73.3 | 15.7  |
| 6              | .863                                            | .025                                                         | .681    | .344    | 77.5                          | 84.0                                                           | 69.3 | 14.7  |
| 7              | .877                                            | .037                                                         | .697    | .340    | 74.4                          | 81.0                                                           | 66.4 | 14.6  |
| 8              | .895                                            | .050                                                         | .708    | .342    | 72.1                          | 79.0                                                           | 64.7 | 14.3  |
| 9              | .912                                            | .084                                                         | .711    | .373    | 70.6                          | 77.2                                                           | 63.3 | 13.9  |
| 10             | .918                                            | .082                                                         | .716    | .366    | 69.5                          | 75.6                                                           | 61.6 | 14.0  |
| 11             | .919                                            | .081                                                         | .714    | .367    | 68.8                          | 74.6                                                           | 61.0 | 13.6  |

The Mean Height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb<br>Thermometer. | Dry Bulb above Wet. | Computed Dew point. | Dry Bulb above Dew<br>point. | Mean Elastic force of<br>Vapour. | Mean Weight of Va-<br>pour in a Cubic foot<br>of Air. | Additional Weight of<br>vapour required for<br>complete saturation. | Mean degree of Hu-<br>midity, complete satu-<br>ration being unity. |
|----------------|-------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                             | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                           |                                                                     |
| Mid-<br>night. | 63.3                          | 4.0                 | 60.9                | 6.4                          | .539                             | 5.97                                                  | 1.40                                                                | .81                                                                 |
| 1              | 62.7                          | 3.8                 | 60.4                | 6.1                          | .530                             | .88                                                   | .31                                                                 | .82                                                                 |
| 2              | 62.3                          | 3.5                 | 60.2                | 5.6                          | .527                             | .84                                                   | .20                                                                 | .83                                                                 |
| 3              | 62.1                          | 3.2                 | 60.2                | 5.1                          | .527                             | .85                                                   | .08                                                                 | .84                                                                 |
| 4              | 61.4                          | 3.3                 | 59.4                | 5.3                          | .513                             | .70                                                   | .10                                                                 | .84                                                                 |
| 5              | 61.1                          | 3.2                 | 58.9                | 5.4                          | .504                             | .61                                                   | .11                                                                 | .84                                                                 |
| 6              | 60.6                          | 3.1                 | 58.4                | 5.3                          | .496                             | .52                                                   | .07                                                                 | .84                                                                 |
| 7              | 60.3                          | 3.0                 | 58.2                | 5.1                          | .493                             | .49                                                   | .02                                                                 | .84                                                                 |
| 8              | 61.4                          | 4.5                 | 58.7                | 7.2                          | .501                             | .56                                                   | .50                                                                 | .79                                                                 |
| 9              | 63.3                          | 7.4                 | 59.6                | 11.1                         | .516                             | .67                                                   | 2.51                                                                | .69                                                                 |
| 10             | 63.9                          | 10.6                | 58.6                | 15.9                         | .499                             | .44                                                   | 3.74                                                                | .59                                                                 |
| 11             | 64.0                          | 14.1                | 56.9                | 21.2                         | .472                             | .10                                                   | 5.12                                                                | .50                                                                 |
| Noon.          | 64.1                          | 16.9                | 55.6                | 25.4                         | .452                             | 4.87                                                  | 6.27                                                                | .44                                                                 |
| 1              | 64.5                          | 18.5                | 55.2                | 27.8                         | .445                             | .77                                                   | 7.05                                                                | .40                                                                 |
| 2              | 64.7                          | 19.4                | 55.0                | 29.1                         | .442                             | .73                                                   | .48                                                                 | .39                                                                 |
| 3              | 64.8                          | 19.7                | 54.9                | 29.6                         | .441                             | .71                                                   | .61                                                                 | .38                                                                 |
| 4              | 64.6                          | 19.9                | 53.6                | 29.9                         | .422                             | .52                                                   | .48                                                                 | .38                                                                 |
| 5              | 65.0                          | 16.6                | 56.7                | 24.9                         | .469                             | 5.03                                                  | 6.31                                                                | .44                                                                 |
| 6              | 66.4                          | 11.1                | 60.8                | 16.7                         | .537                             | .82                                                   | 4.22                                                                | .58                                                                 |
| 7              | 65.2                          | 9.2                 | 60.6                | 13.8                         | .534                             | .81                                                   | 3.34                                                                | .64                                                                 |
| 8              | 64.1                          | 8.0                 | 60.1                | 12.0                         | .525                             | .75                                                   | 2.78                                                                | .67                                                                 |
| 9              | 63.4                          | 7.2                 | 59.8                | 10.8                         | .520                             | .70                                                   | .45                                                                 | .70                                                                 |
| 10             | 63.4                          | 6.1                 | 60.3                | 9.2                          | .528                             | .82                                                   | .06                                                                 | .74                                                                 |
| 11             | 63.9                          | 4.9                 | 61.4                | 7.4                          | .548                             | 6.05                                                  | 1.66                                                                | .79                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February, 1861.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                   |
|-------|-----------------------|---------------------------------|-----------------------------------|----------------------------------------------|
|       | o                     | Inches.                         |                                   |                                              |
| 1     | 134.9                 | ..                              | N. E. & S. W. & W.                | Cloudless.                                   |
| 2     | 134.0                 | ..                              | W.                                | Cloudless.                                   |
| 3     | <i>Sunday.</i>        |                                 |                                   |                                              |
| 4     | 136.7                 | ..                              | N. & S. & S. W.                   | Cloudless.                                   |
| 5     | 141.0                 | ..                              | S. & S. W.                        | Cloudless; also foggy between 3 & 7<br>A. M. |
| 6     | 145.0                 | ..                              | S. & W.                           | Cloudless; also foggy between 2 & 7<br>A. M. |
| 7     | 139.0                 | ..                              | N. W. & W.                        | Cloudless.                                   |
| 8     | 141.0                 | ..                              | N. E. & N. W.                     | Cloudless.                                   |
| 9     | 137.0                 | ..                              | W. & S. W. & N. W.                | Cloudless.                                   |
| 10    | <i>Sunday.</i>        |                                 |                                   |                                              |
| 11    | 137.0                 | ..                              | N. W. & S                         | Cloudless.                                   |
| 12    | 137.4                 | ..                              | S. & S. W. & W.                   | Cloudless.                                   |
| 13    | 138.0                 | ..                              | W. & S. & N. W.                   | Cloudless.                                   |
| 14    | 143.0                 | ..                              | W.                                | Cloudless.                                   |
| 15    | 140.0                 | ..                              | S. W. & W.                        | Cloudless.                                   |
| 16    | 136.0                 | ..                              | N. & W.                           | Cloudless.                                   |
| 17    | <i>Sunday.</i>        |                                 |                                   |                                              |
| 18    | 139.0                 | ..                              | N. & N. W. & E.                   | Cloudless.                                   |
| 19    | 138.0                 | ..                              | N. & S. & S. E.                   | Cloudless.                                   |
| 20    | 135.0                 | ..                              | E. & N.                           | Cloudless.                                   |
| 21    | 137.2                 | ..                              | S. & S. W.                        | Cloudless.                                   |
| 22    | 136.8                 | ..                              | S. & N. E.                        | Cloudless.                                   |
| 23    | 136.8                 | ..                              | W. & N. & N. W.                   | Cloudless.                                   |
| 24    | <i>Sunday.</i>        |                                 |                                   |                                              |
| 25    | 141.0                 | ..                              | S. W. & S. & W.                   | Cloudless.                                   |
| 26    | 139.0                 | ..                              | N. & S. W.                        | Cloudless.                                   |
| 27    | 139.0                 | ..                              | S. & S. W.                        | Cloudless.                                   |
| 28    | 137.4                 | ..                              | S. & W.                           | Cloudless; also foggy between 3 & 7<br>A. M. |

∩i Cirri, ∩i Cirro strati, ∩i Cumuli, ∩i Cumulo strati, ∩i Nimbi, —i Strati, ∩i Cirro cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February, 1861.*

## MONTHLY RESULTS.

|                                                                |    |    | Inches |
|----------------------------------------------------------------|----|----|--------|
| Mean height of the Barometer for the month,                    | .. | .. | 29.914 |
| Max. height of the Barometer occurred at 10 A. M. on the 19th, |    | .. | 30.155 |
| Min. height of the Barometer occurred at 4 P. M. on the 5th,   |    | .. | 29.668 |
| <i>Extreme range</i> of the Barometer during the month,        |    | .. | 0.487  |
| Mean of the Daily Max. Pressures,                              | .. | .. | 29.999 |
| Ditto ditto Min. ditto,                                        | .. | .. | 29.818 |
| <i>Mean daily range</i> of the Barometer during the month,     | .. | .. | 0.151  |

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|                                                              |    |    | °    |
|--------------------------------------------------------------|----|----|------|
| Mean Dry Bulb Thermometer for the month,                     | .. | .. | 72.6 |
| Max. Temperature occurred at 4 P. M. on the 28th,            | .. | .. | 90.6 |
| Min. Temperature occurred at 7 A. M. on the 2nd,             | .. | .. | 51.4 |
| <i>Extreme range</i> of the Temperature during the month,    | .. | .. | 36.2 |
| Mean of the daily Max. Temperature,                          | .. | .. | 84.6 |
| Ditto ditto Min. ditto,                                      | .. | .. | 63.2 |
| <i>Mean daily range</i> of the Temperature during the month, | .. | .. | 21.4 |
| Mean Wet Bulb Thermometer for the month,                     | .. | .. | 63.4 |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer,   | .. | .. | 9.2  |
| Computed Mean Dew-point for the month,                       | .. | .. | 58.8 |
| Mean Dry Bulb Thermometer above computed Mean Dew-point,     | .. | .. | 13.8 |

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|                                             |    |    | Inches |
|---------------------------------------------|----|----|--------|
| Mean Elastic force of Vapour for the month, | .. | .. | 0.503  |

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|                                                                         |    |    | Troy grains |
|-------------------------------------------------------------------------|----|----|-------------|
| Mean Weight of Vapour for the month,                                    | .. | .. | 5.49        |
| Additional Weight of Vapour required for complete saturation,           | .. | .. | 3.17        |
| Mean degree of humidity for the month, complete saturation being unity, | .. | .. | 0.63        |

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|                                                     |    |    | Inches          |
|-----------------------------------------------------|----|----|-----------------|
| Rained No. days, Max. fall of rain during 24 hours, | .. | .. | Nil.            |
| Total amount of rain during the month,              | .. | .. | Nil.            |
| Prevailing direction of the Wind,                   | .. | .. | W. & S. & S. W. |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February, 1861.*

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

| Hour.     | No. of days. |                   |                |                   |                |                   |                |                   |                   |          |         |   |   |  |
|-----------|--------------|-------------------|----------------|-------------------|----------------|-------------------|----------------|-------------------|-------------------|----------|---------|---|---|--|
|           | N.           | Rain on.<br>N. E. | Rain on.<br>E. | Rain on.<br>S. E. | Rain on.<br>S. | Rain on.<br>S. W. | Rain on.<br>W. | Rain on.<br>N. W. | Rain on.<br>Calm. | Rain on. | Missed. |   |   |  |
| Midnight. |              |                   |                |                   |                |                   |                |                   |                   |          |         |   |   |  |
| 1         | 4            | 1                 |                |                   | 7              | 3                 | 4              | 4                 |                   |          |         |   | 1 |  |
| 2         | 5            | 1                 |                |                   | 6              | 4                 | 4              | 3                 |                   |          |         |   |   |  |
| 3         | 5            | 1                 |                |                   | 6              | 4                 | 3              | 5                 |                   |          |         |   |   |  |
| 4         | 6            | 2                 |                |                   | 5              | 2                 | 4              | 5                 |                   |          |         | 1 |   |  |
| 5         | 6            | 3                 |                |                   | 5              | 3                 | 3              | 4                 |                   |          |         | 2 |   |  |
| 6         | 6            | 3                 |                |                   | 5              | 3                 | 3              | 3                 |                   |          |         | 1 |   |  |
| 7         | 6            | 2                 |                | 1                 | 5              | 4                 | 3              | 3                 |                   |          |         |   |   |  |
| 8         | 6            | 4                 | 1              |                   | 5              | 2                 | 4              | 2                 |                   |          |         |   |   |  |
| 9         | 3            | 2                 |                |                   | 10             | 2                 | 3              | 2                 |                   |          |         | 2 |   |  |
| 10        | 4            | 3                 | 1              |                   | 6              | 4                 | 3              | 2                 |                   |          |         | 1 |   |  |
| 11        | 3            | 5                 | 1              | 1                 | 5              | 5                 | 3              | 1                 |                   |          |         |   |   |  |
|           | 5            | 3                 | 1              | 1                 | 1              | 6                 | 5              | 2                 |                   |          |         |   |   |  |
| Noon.     |              |                   |                |                   |                |                   |                |                   |                   |          |         |   |   |  |
| 1         | 3            |                   | 2              |                   | 1              | 6                 | 7              | 4                 |                   |          |         |   |   |  |
| 2         | 2            |                   | 1              | 1                 | 1              | 6                 | 10             | 3                 |                   |          |         |   |   |  |
| 3         | 2            |                   | 1              | 1                 | 1              | 5                 | 9              | 5                 |                   |          |         |   |   |  |
| 4         | 3            |                   | 1              | 1                 | 1              | 5                 | 10             | 3                 |                   |          |         |   |   |  |
| 5         | 3            |                   | 1              | 1                 | 1              | 7                 | 9              | 1                 |                   |          |         |   | 2 |  |
| 6         | 4            |                   | 1              |                   | 1              | 9                 | 8              | 1                 |                   |          |         |   |   |  |
| 7         | 4            | 2                 | 1              |                   | 7              | 4                 | 7              | 1                 |                   |          |         |   |   |  |
| 8         | 3            | 2                 | 1              |                   | 7              | 3                 | 8              | 1                 |                   |          |         |   |   |  |
| 9         | 3            | 1                 | 1              |                   | 7              | 3                 | 7              | 1                 |                   |          |         |   |   |  |
| 10        | 2            | 1                 | 3              |                   | 7              | 3                 | 7              | 1                 |                   |          |         |   |   |  |
| 11        | 2            | 1                 | 3              |                   | 7              | 5                 | 5              | 1                 |                   |          |         |   |   |  |
|           | 1            | 1                 | 3              |                   | 7              | 5                 | 3              | 1                 |                   |          |         |   | 3 |  |



*Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1861.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11  
Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

| Date. | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer during the day. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature during the day. |      |       |
|-------|-------------------------------------------|----------------------------------------|---------|---------|----------------------------|------------------------------------------|------|-------|
|       |                                           | Max.                                   | Min.    | Diff.   |                            | Max.                                     | Min. | Diff. |
|       | Inches.                                   | Inches.                                | Inches. | Inches. | o                          | o                                        | o    | o     |
| 1     | 29.875                                    | 29.918                                 | 29.821  | 0.127   | 79.8                       | 93.2                                     | 68.6 | 24.6  |
| 2     | .863                                      | .936                                   | .815    | .121    | 81.9                       | 95.6                                     | 72.8 | 22.8  |
| 3     | <i>Sunday.</i>                            |                                        |         |         |                            |                                          |      |       |
| 4     | .780                                      | .847                                   | .713    | .134    | 83.1                       | 95.2                                     | 76.2 | 19.0  |
| 5     | .819                                      | .882                                   | .768    | .114    | 80.7                       | 89.6                                     | 74.3 | 15.3  |
| 6     | .822                                      | .888                                   | .754    | .134    | 80.4                       | 89.5                                     | 73.8 | 15.7  |
| 7     | .887                                      | .974                                   | .835    | .139    | 77.3                       | 86.2                                     | 68.3 | 17.9  |
| 8     | .913                                      | 30.004                                 | .862    | .142    | 77.2                       | 88.7                                     | 67.8 | 20.9  |
| 9     | .905                                      | 29.988                                 | .840    | .148    | 78.9                       | 88.8                                     | 71.2 | 17.6  |
| 10    | <i>Sunday.</i>                            |                                        |         |         |                            |                                          |      |       |
| 11    | .951                                      | 30.027                                 | .885    | .142    | 78.4                       | 90.2                                     | 71.6 | 18.6  |
| 12    | .991                                      | .090                                   | .933    | .157    | 75.8                       | 83.6                                     | 69.6 | 14.0  |
| 13    | .955                                      | .054                                   | .877    | .177    | 78.1                       | 89.0                                     | 68.6 | 20.4  |
| 14    | .877                                      | 29.958                                 | .786    | .172    | 80.2                       | 91.2                                     | 69.2 | 22.0  |
| 15    | .799                                      | .868                                   | .725    | .143    | 81.5                       | 93.0                                     | 72.2 | 20.8  |
| 16    | .817                                      | .882                                   | .770    | .112    | 82.9                       | 93.4                                     | 73.2 | 20.2  |
| 17    | <i>Sunday.</i>                            |                                        |         |         |                            |                                          |      |       |
| 18    | .870                                      | .948                                   | .803    | .145    | 82.8                       | 93.4                                     | 74.4 | 19.0  |
| 19    | .833                                      | .913                                   | .776    | .137    | 81.5                       | 92.6                                     | 73.7 | 18.9  |
| 20    | .871                                      | .981                                   | .792    | .189    | 74.0                       | 77.2                                     | 71.4 | 5.8   |
| 21    | .842                                      | .929                                   | .776    | .153    | 78.7                       | 89.6                                     | 69.8 | 19.8  |
| 22    | .814                                      | .887                                   | .755    | .132    | 79.0                       | 83.6                                     | 75.2 | 8.4   |
| 23    | .770                                      | .843                                   | .662    | .181    | 81.5                       | 90.2                                     | 74.4 | 15.8  |
| 24    | <i>Sunday.</i>                            |                                        |         |         |                            |                                          |      |       |
| 25    | .781                                      | .856                                   | .722    | .134    | 82.5                       | 94.2                                     | 75.4 | 18.8  |
| 26    | .820                                      | .924                                   | .738    | .166    | 84.0                       | 95.0                                     | 76.4 | 18.6  |
| 27    | .825                                      | .908                                   | .735    | .173    | 85.1                       | 96.2                                     | 76.4 | 19.8  |
| 28    | .818                                      | .892                                   | .761    | .131    | 84.5                       | 96.2                                     | 76.2 | 20.0  |
| 29    | .826                                      | .905                                   | .741    | .164    | 85.0                       | 97.2                                     | 76.6 | 20.6  |
| 30    | .842                                      | .926                                   | .765    | .161    | 85.8                       | 97.8                                     | 76.4 | 21.4  |
| 31    | <i>Sunday.</i>                            |                                        |         |         |                            |                                          |      |       |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly Observations made during the day.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1861.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of Air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity,<br>complete saturation be-<br>ing unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                   |
| 1     | 69.6                            | 10.2                | 64.5                | 15.3                         | .607                             | 6.56                                             | 4.19                                                                    | 0.61                                                              |
| 2     | 72.8                            | 9.1                 | 68.2                | 13.7                         | .686                             | 7.37                                             | .07                                                                     | .64                                                               |
| 3     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 4     | 75.0                            | 8.1                 | 70.9                | 12.2                         | .748                             | 8.03                                             | 3.83                                                                    | .68                                                               |
| 5     | 74.8                            | 5.9                 | 71.8                | 8.9                          | .771                             | .30                                              | 2.74                                                                    | .75                                                               |
| 6     | 74.9                            | 5.5                 | 72.1                | 8.3                          | .778                             | .39                                              | .55                                                                     | .77                                                               |
| 7     | 64.9                            | 12.4                | 58.7                | 18.6                         | .501                             | 5.43                                             | 4.55                                                                    | .54                                                               |
| 8     | 65.7                            | 11.5                | 59.9                | 17.3                         | .521                             | .65                                              | .30                                                                     | .57                                                               |
| 9     | 70.7                            | 8.2                 | 66.6                | 12.3                         | .651                             | 7.04                                             | 3.43                                                                    | .67                                                               |
| 10    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 11    | 72.1                            | 6.3                 | 68.9                | 9.5                          | .701                             | .59                                              | 2.72                                                                    | .74                                                               |
| 12    | 69.3                            | 6.5                 | 66.0                | 9.8                          | .638                             | 6.94                                             | .60                                                                     | .73                                                               |
| 13    | 69.6                            | 8.5                 | 65.3                | 12.8                         | .623                             | .75                                              | 3.47                                                                    | .66                                                               |
| 14    | 70.3                            | 9.9                 | 65.3                | 14.9                         | .623                             | .72                                              | 4.16                                                                    | .62                                                               |
| 15    | 72.7                            | 8.8                 | 68.3                | 13.2                         | .688                             | 7.40                                             | 3.91                                                                    | .65                                                               |
| 16    | 74.6                            | 8.3                 | 70.4                | 12.5                         | .736                             | .89                                              | .90                                                                     | .67                                                               |
| 17    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 18    | 74.6                            | 8.2                 | 70.5                | 12.3                         | .739                             | .93                                              | .82                                                                     | .68                                                               |
| 19    | 71.6                            | 9.9                 | 66.6                | 14.9                         | .651                             | 6.99                                             | 4.32                                                                    | .62                                                               |
| 20    | 69.4                            | 4.6                 | 67.1                | 6.9                          | .661                             | 7.22                                             | 1.82                                                                    | .80                                                               |
| 21    | 71.2                            | 7.5                 | 67.4                | 11.3                         | .668                             | .23                                              | 3.18                                                                    | .70                                                               |
| 22    | 75.0                            | 4.0                 | 73.0                | 6.0                          | .801                             | 8.65                                             | 1.85                                                                    | .82                                                               |
| 23    | 74.3                            | 7.2                 | 70.7                | 10.8                         | .744                             | .00                                              | 3.31                                                                    | .71                                                               |
| 24    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 25    | 75.0                            | 7.5                 | 71.2                | 11.3                         | .756                             | .12                                              | .52                                                                     | .70                                                               |
| 26    | 76.1                            | 7.9                 | 72.1                | 11.9                         | .778                             | .33                                              | .84                                                                     | .68                                                               |
| 27    | 75.7                            | 9.4                 | 71.0                | 14.1                         | .751                             | .02                                              | 4.55                                                                    | .64                                                               |
| 28    | 76.0                            | 8.5                 | 71.7                | 12.8                         | .768                             | .21                                              | 1.14                                                                    | .67                                                               |
| 29    | 77.5                            | 7.5                 | 73.7                | 11.3                         | .819                             | .76                                              | 3.77                                                                    | .70                                                               |
| 30    | 77.5                            | 8.3                 | 73.3                | 12.5                         | .809                             | .61                                              | 4.22                                                                    | .67                                                               |
| 31    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

| Hour.      | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | o                          | o                                                        | o    | o     |
| Mid-night. | 29.854                                    | 29.987                                                 | 29.767  | 0.220   | 76.2                       | 80.2                                                     | 70.6 | 9.6   |
| 1          | .840                                      | .979                                                   | .758    | .221    | 75.7                       | 79.8                                                     | 70.8 | 9.0   |
| 2          | .831                                      | .969                                                   | .750    | .219    | 75.2                       | 79.2                                                     | 70.0 | 9.2   |
| 3          | .820                                      | .928                                                   | .737    | .191    | 74.5                       | 78.4                                                     | 69.6 | 8.8   |
| 4          | .822                                      | .952                                                   | .734    | .218    | 73.7                       | 77.2                                                     | 69.4 | 7.8   |
| 5          | .835                                      | .969                                                   | .748    | .221    | 73.7                       | 77.4                                                     | 68.0 | 9.4   |
| 6          | .854                                      | .983                                                   | .751    | .232    | 73.1                       | 76.6                                                     | 67.8 | 8.8   |
| 7          | .874                                      | 30.000                                                 | .781    | .219    | 73.4                       | 77.6                                                     | 67.8 | 9.8   |
| 8          | .912                                      | .069                                                   | .828    | .241    | 76.8                       | 80.8                                                     | 70.2 | 10.6  |
| 9          | .928                                      | .074                                                   | .842    | .232    | 79.9                       | 84.4                                                     | 71.6 | 12.8  |
| 10         | .932                                      | .090                                                   | .841    | .249    | 82.7                       | 88.6                                                     | 71.4 | 17.2  |
| 11         | .921                                      | .080                                                   | .824    | .256    | 85.5                       | 91.4                                                     | 72.2 | 19.2  |
| Noon.      | .896                                      | .049                                                   | .796    | .253    | 87.8                       | 94.2                                                     | 72.2 | 22.0  |
| 1          | .866                                      | .022                                                   | .764    | .258    | 89.6                       | 95.6                                                     | 73.0 | 22.6  |
| 2          | .834                                      | 29.984                                                 | .725    | .259    | 90.4                       | 97.0                                                     | 73.6 | 23.4  |
| 3          | .810                                      | .951                                                   | .697    | .254    | 90.3                       | 97.4                                                     | 75.6 | 21.8  |
| 4          | .797                                      | .945                                                   | .672    | .273    | 89.6                       | 97.8                                                     | 75.6 | 22.2  |
| 5          | .793                                      | .940                                                   | .662    | .278    | 87.7                       | 96.6                                                     | 75.6 | 21.0  |
| 6          | .802                                      | .964                                                   | .676    | .288    | 84.7                       | 93.8                                                     | 74.6 | 19.2  |
| 7          | .822                                      | .975                                                   | .700    | .275    | 81.7                       | 88.6                                                     | 73.4 | 15.2  |
| 8          | .839                                      | .964                                                   | .754    | .210    | 80.1                       | 86.0                                                     | 71.6 | 14.4  |
| 9          | .854                                      | .974                                                   | .756    | .218    | 78.7                       | 83.2                                                     | 71.6 | 11.6  |
| 10         | .860                                      | .972                                                   | .785    | .187    | 77.8                       | 81.8                                                     | 72.6 | 9.2   |
| 11         | .852                                      | .968                                                   | .790    | .178    | 77.5                       | 81.0                                                     | 72.0 | 9.0   |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the Observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force<br>of Vapour. | Mean Weight of Va-<br>pour in a Cubic<br>foot of Air. | Additional Weight of<br>Vapour required<br>for complete satu-<br>ration. | Mean degree of Hu-<br>midity, complete<br>saturation being<br>unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                                |                                                                      |
| Mid-<br>night. | 72.4                            | 3.8                 | 70.5                | 5.7                          | .0739                            | 8.03                                                  | 1.63                                                                     | 0.83                                                                 |
| 1              | 72.3                            | 3.4                 | 70.6                | 5.1                          | .741                             | .07                                                   | .44                                                                      | .85                                                                  |
| 2              | 72.0                            | 3.2                 | 70.4                | 4.8                          | .736                             | .02                                                   | .35                                                                      | .86                                                                  |
| 3              | 71.8                            | 2.7                 | 70.4                | 4.1                          | .736                             | .04                                                   | .14                                                                      | .88                                                                  |
| 4              | 71.0                            | 2.7                 | 69.6                | 4.1                          | .717                             | 7.84                                                  | .12                                                                      | .88                                                                  |
| 5              | 71.0                            | 2.7                 | 69.6                | 4.1                          | .717                             | .84                                                   | .12                                                                      | .88                                                                  |
| 6              | 70.2                            | 2.9                 | 68.7                | 4.4                          | .697                             | .63                                                   | .16                                                                      | .87                                                                  |
| 7              | 70.4                            | 3.0                 | 68.9                | 4.5                          | .701                             | .66                                                   | .21                                                                      | .86                                                                  |
| 8              | 71.7                            | 5.1                 | 69.1                | 7.7                          | .706                             | .66                                                   | 2.17                                                                     | .78                                                                  |
| 9              | 72.4                            | 7.5                 | 68.6                | 11.3                         | .695                             | .50                                                   | 3.28                                                                     | .70                                                                  |
| 10             | 73.0                            | 9.7                 | 68.1                | 14.6                         | .684                             | .32                                                   | 4.40                                                                     | .63                                                                  |
| 11             | 73.9                            | 11.6                | 68.1                | 17.4                         | .684                             | .29                                                   | 5.43                                                                     | .57                                                                  |
| Noon.          | 74.2                            | 13.6                | 67.4                | 20.4                         | .668                             | .09                                                   | 6.51                                                                     | .52                                                                  |
| 1              | 74.4                            | 15.2                | 66.8                | 22.8                         | .655                             | 6.93                                                  | 7.40                                                                     | .48                                                                  |
| 2              | 74.4                            | 16.0                | 66.4                | 24.0                         | .646                             | .83                                                   | .84                                                                      | .47                                                                  |
| 3              | 74.2                            | 16.1                | 66.1                | 24.2                         | .640                             | .76                                                   | .87                                                                      | .46                                                                  |
| 4              | 73.5                            | 16.1                | 65.4                | 24.2                         | .626                             | .62                                                   | .71                                                                      | .46                                                                  |
| 5              | 74.0                            | 13.7                | 67.1                | 20.6                         | .661                             | 7.01                                                  | 6.55                                                                     | .52                                                                  |
| 6              | 73.9                            | 10.8                | 68.5                | 16.2                         | .692                             | .41                                                   | 5.01                                                                     | .60                                                                  |
| 7              | 73.3                            | 8.4                 | 69.1                | 12.6                         | .706                             | .58                                                   | 3.79                                                                     | .67                                                                  |
| 8              | 73.2                            | 6.9                 | 69.7                | 10.4                         | .720                             | .77                                                   | .07                                                                      | .72                                                                  |
| 9              | 72.7                            | 6.0                 | 69.7                | 9.0                          | .720                             | .79                                                   | 2.62                                                                     | .75                                                                  |
| 10             | 72.5                            | 5.3                 | 69.8                | 8.0                          | .722                             | .82                                                   | .31                                                                      | .77                                                                  |
| 11             | 73.0                            | 4.5                 | 70.7                | 6.8                          | .744                             | 8.07                                                  | 1.97                                                                     | .80                                                                  |

All the Hygrometrical elements are computed by the Greenwich Constants.

*Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1861.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                 |
|-------|-----------------------|---------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------|
|       | 0                     | Inches.                         |                                   |                                                                                                            |
| 1     | 148.0                 | ...                             | S. W. & S.                        | Cloudless.                                                                                                 |
| 2     | 142.4                 | ...                             | E. & S.                           | Cloudless.                                                                                                 |
| 3     | <i>Sunday.</i>        |                                 |                                   |                                                                                                            |
| 4     | 140.5                 | ...                             | S.                                | Cloudless till 5 A. M. Scatd. $\searrow$ till 10 A. M. cloudless afterwards.                               |
| 5     | 137.2                 | ...                             | S.                                | Cloudless till 5 A. M. Scatd. $\searrow$ & $\nearrow$ till 7 P. M. cloudless afterwards.                   |
| 6     | 136.0                 | ...                             | S.                                | Cloudless till 6 A. M. Scatd. $\searrow$ & $\searrow$ till 6 P. M. cloudless afterwards.                   |
| 7     | 139.2                 | ...                             | S.                                | Cloudless.                                                                                                 |
| 8     | 135.0                 | ...                             | E. & N.                           | Cloudless.                                                                                                 |
| 9     | 138.4                 | ...                             | S. E. & N. E.                     | Cloudless till 6 A. M. Scatd. $\searrow$ & $\nearrow$ afterwards; also slightly drizzling at 8 P. M.       |
| 10    | <i>Sunday.</i>        |                                 |                                   |                                                                                                            |
| 11    | 139.0                 | 0.28                            | N. & W.                           | Cloudless till 4 A. M. Scatd. $\searrow$ till 1 P. M. cloudy afterwards; also rain between 5 & 8 P. M.     |
| 12    | ...                   | ...                             | N.                                | Cloudy till 6 P. M. cloudless afterwards.                                                                  |
| 13    | 138.2                 | ...                             | N. & W.                           | Cloudless till 10 A. M. Scatd. $\searrow$ till 6 P. M. cloudless afterwards.                               |
| 14    | 135.6                 | ...                             | N. & W. & S. W.                   | Cloudless till 4 P. M. Scatd. $\searrow$ & $\searrow$ till 9 P. M. cloudless afterwards.                   |
| 15    | 141.8                 | ...                             | S. W. & S. & W.                   | Cloudless.                                                                                                 |
| 16    | 140.4                 | ...                             | S.                                | Cloudless till Noon. Scatd. $\nearrow$ till 4 P. M. cloudless afterwards.                                  |
| 17    | <i>Sunday.</i>        |                                 |                                   |                                                                                                            |
| 18    | 139.0                 | ...                             | S. & W. & N.                      | Cloudless till 6 A. M. Scatd. $\searrow$ till 5 P. M. cloudless till 9 P. M. Scatd. $\searrow$ afterwards. |
| 19    | 135.9                 | ...                             | W.                                | Cloudless till 11 A. M. cloudy afterwards.                                                                 |
| 20    | ...                   | 0.60                            | S. E. & S. W.                     | Cloudy with rain between 8 & 11 A. M.                                                                      |
| 21    | 137.0                 | ...                             | S. & S. E. & S. W.                | Cloudy till 6 A. M. cloudless till 10 A. M. Scatd. $\searrow$ till 4 P. M. cloudless afterwards.           |
| 22    | ...                   | ...                             | S. & S. W.                        | Cloudy.                                                                                                    |
| 23    | 134.9                 | ...                             | S. W. & S. & W.                   | Scatd. $\searrow$ & $\nearrow$ .                                                                           |
| 24    | <i>Sunday.</i>        |                                 |                                   |                                                                                                            |
| 25    | 138.0                 | ...                             | S. & S. W.                        | Scatd. clouds.                                                                                             |
| 26    | 135.0                 | ...                             | S. & S. W.                        | Scatd. clouds till 4 A. M. cloudless afterwards.                                                           |
| 27    | 139.0                 | ...                             | S. W. & S. & S. E.                | Cloudless.                                                                                                 |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1861.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky. |
|-------|-----------------------|---------------------------------|-----------------------------------|----------------------------|
| 28    | 137.2                 | ...                             | S.                                | Cloudless.                 |
| 29    | 139.8                 | ...                             | S.                                | Cloudless.                 |
| 30    | 141.0                 | ...                             | S.                                | Cloudless.                 |
| 31    | <i>Sunday.</i>        | ...                             |                                   |                            |

∩i Cirri, ∪i Cirro strati, ∩i Cumuli, ∩i Cumulo strati, ∪i Nimbi, —i Strati, ∪i Cirro cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1861.*

MONTHLY RESULTS.

|                                                                 |    |    | Inches |
|-----------------------------------------------------------------|----|----|--------|
| Mean height of the Barometer for the month,                     | .. | .. | 29.853 |
| Max. height of the Barometer, occurred at 10 A. M. on the 12th, | .. | .. | 30.090 |
| Min. height of the Barometer, occurred at 5 P. M. on the 23rd,  | .. | .. | 29.662 |
| <i>Extreme range</i> of the Barometer during the month,         | .. | .. | 0.428  |
| Mean of the daily Max. Pressures,                               | .. | .. | 29.933 |
| Ditto ditto Min. ditto,                                         | .. | .. | 29.786 |
| <i>Mean daily range</i> of the Barometer during the month,      | .. | .. | 0.147  |

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|                                                              |    |    | °    |
|--------------------------------------------------------------|----|----|------|
| Mean Dry Bulb Thermometer for the month,                     | .. | .. | 80.8 |
| Max. Temperature occurred at 4 P. M. on the 30th,            | .. | .. | 97.8 |
| Min. Temperature occurred at 6 A. M. on the 8th,             | .. | .. | 67.8 |
| <i>Extreme range</i> of the Temperature during the month,    | .. | .. | 30.0 |
| Mean of the daily Max. Temperature,                          | .. | .. | 91.2 |
| Ditto ditto Min. ditto,                                      | .. | .. | 72.8 |
| <i>Mean daily range</i> of the Temperature during the month, | .. | .. | 18.4 |

---

|                                                               |    |    | °      |
|---------------------------------------------------------------|----|----|--------|
| Mean Wet Bulb Thermometer for the month,                      | .. | .. | 72.7   |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, .. |    |    | 8.1    |
| Computed Mean Dew-point for the month,                        | .. | .. | 68.6   |
| Mean Dry Bulb Thermometer above computed Mean Dew-point, ..   |    |    | 12.2   |
|                                                               |    |    | Inches |
| Mean Elastic force of Vapour for the month, ..                | .. | .. | 0.695  |

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|                                                                         |    |    | Troy grains. |
|-------------------------------------------------------------------------|----|----|--------------|
| Mean Weight of Vapour for the month,                                    | .. | .. | 7.49         |
| Additional Weight of Vapour required for complete saturation,           | .. | .. | 3.58         |
| Mean degree of humidity for the month, complete saturation being unity, |    |    | 0.68         |

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|                                                   |    |    | Inches     |
|---------------------------------------------------|----|----|------------|
| Rained 3 days, Max. fall of rain during 24 hours, | .. | .. | 0.60       |
| Total amount of rain during the month,            | .. | .. | 0.88       |
| Prevailing direction of the Wind,                 | .. | .. | S. & S. W. |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1861.*

## MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind  
blew, together with the number of days on which at the same hour,  
when any particular wind was blowing, it rained.

| Hour.     | N.           | Rain on.<br>N. E. | Rain on.<br>E. | Rain on.<br>S. E. | S. | Rain on.<br>S. W. | Rain on.<br>W. | Rain on.<br>N. W. | Rain on.<br>Calm. | Rain on. | Missed. |
|-----------|--------------|-------------------|----------------|-------------------|----|-------------------|----------------|-------------------|-------------------|----------|---------|
|           | No. of days. |                   |                |                   |    |                   |                |                   |                   |          |         |
| Midnight. | 3            | 1                 |                |                   | 3  | 10                | 4              | 2                 |                   | 1        | 2       |
| 1         | 3            | 1                 |                |                   | 3  | 12                | 4              | 2                 |                   | 1        |         |
| 2         | 3            | 1                 |                |                   | 3  | 12                | 4              | 2                 |                   | 1        |         |
| 3         | 3            |                   |                |                   | 3  | 12                | 2              | 2                 |                   | 1        |         |
| 4         | 2            |                   |                |                   | 2  | 11                | 4              | 2                 |                   | 1        | 3       |
| 5         | 3            |                   |                |                   | 3  | 13                | 3              | 3                 |                   |          | 1       |
| 6         | 3            |                   |                |                   | 1  | 15                | 4              | 3                 |                   |          |         |
| 7         | 3            |                   |                |                   | 1  | 14                | 4              | 4                 |                   |          |         |
| 8         | 2            | 1                 | 2              | 1                 | 9  | 8                 | 3              | 1                 |                   |          |         |
| 9         | 3            | 2                 | 1              |                   | 9  | 8                 | 2              | 1                 | 1                 |          |         |
| 10        | 3            | 2                 |                |                   | 10 | 8                 | 2              | 1                 | 1                 |          |         |
| 11        | 1            | 1                 |                | 1                 | 10 | 6                 | 3              | 1                 | 4                 |          |         |
| Noon.     | 1            |                   | 2              |                   | 6  | 8                 | 7              | 2                 |                   |          |         |
| 1         | 1            |                   | 2              |                   | 4  | 10                | 8              | 1                 |                   |          |         |
| 2         | 3            | 2                 | 1              |                   | 4  | 9                 | 6              | 1                 |                   |          |         |
| 3         | 2            | 2                 | 1              |                   | 9  | 3                 | 8              | 1                 |                   |          |         |
| 4         | 1            | 2                 | 1              | 1                 | 6  | 4                 | 8              | 3                 |                   |          |         |
| 5         | 3            | 1                 | 1              | 1                 | 1  | 10                | 6              | 4                 |                   |          |         |
| 6         | 3            | 1                 | 1              | 2                 | 13 | 3                 | 3              |                   |                   |          |         |
| 7         | 4            | 1                 | 2              | 1                 | 13 | 2                 | 2              |                   |                   |          | 2       |
| 8         | 3            | 1                 | 1              | 1                 | 15 | 3                 | 2              |                   |                   |          |         |
| 9         | 3            | 1                 | 1              | 1                 | 15 | 3                 | 2              |                   |                   |          |         |
| 10        | 3            | 1                 | 1              | 1                 | 17 | 1                 | 2              |                   |                   |          |         |
| 11        | 1            | 1                 | 1              | 1                 | 16 | 1                 | 3              |                   |                   |          | 2       |















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